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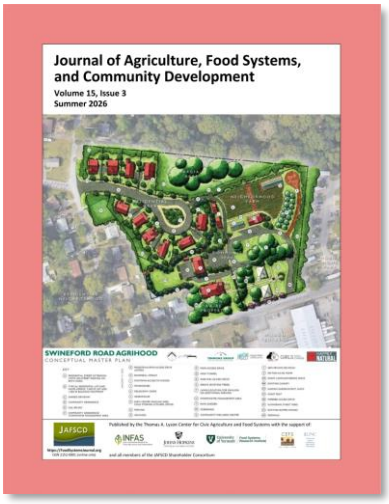
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Planning image courtesy of Duron Chavis

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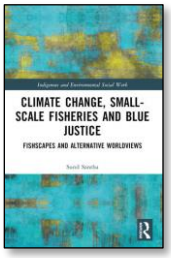
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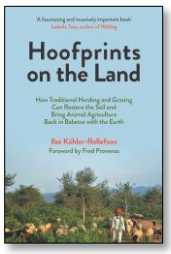
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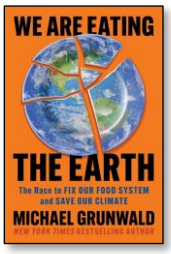
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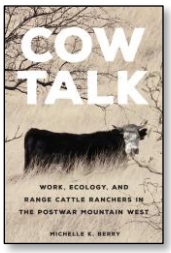
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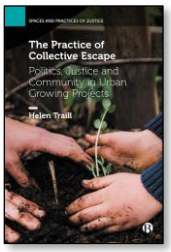
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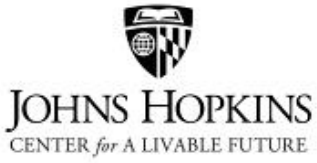
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IN THIS ISSUE
DUNCAN HILCHEY

Food systems and community well-being



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The summer 2026 issue of the *Journal of Agriculture, Food Systems, and Community Development* presents a diverse collection of scholarship and commentary spanning food security, food safety, entrepreneurship, markets, governance, resilience, climate adaptation, Indigenous food sovereignty, and community development. Together, these contributions illustrate both the complexity of contemporary food systems, and the wide range of approaches researchers and practitioners are advancing to address persistent social, economic, and environmental challenges.

Our cover features the proposed Swineford Road Agrihood outside Richmond, Virginia, U.S., an ambitious collaboration among affordable housing, food justice, and community development organizations seeking to create a neighborhood centered on affordable homes, urban agriculture, and shared community space. As the project moved through the zoning process, however, it encountered repeated delays, shifting requirements, and growing conflict with local officials, leading project leaders to argue that the proposal had become entangled in broader questions of race, exclusionary land-use practices, and community self-determination. The case illustrates how efforts to integrate housing, farming, and social infrastructure into a single community vision can expose deeper tensions surrounding equity, governance, and the future of local development. (Planview image was provided by Duron Chavis.)

Duncan Hilchey, MRP, is editor-in-chief and publisher of the *Journal of Agriculture, Food Systems, and Community Development*, published by the Thomas A. Lyson Center for Civic Agriculture and Food Systems; duncan@lysoncenter.org; https://orcid.org/0000-0001-9465-6606

AI Use Declaration
I produced this editorial with assistance from ChatGPT (ver. GPT-5.5) to analyze themes and improve syntax and grammar.

On Our Cover
The proposed Swineford Road Agrihood outside Richmond, Virginia, U.S. Planning image courtesy of Duron Chavis.

We begin this issue with another insightful contribution from senior JAFSCD columnist **John Ikerd.** In *The need for radical changes in community development policies*, Ikerd argues that sustainable communities cannot be built through fragmented, program-specific government initiatives. Instead, he calls for a fundamental restructuring of community development policy that shifts decision-making authority and flexible public investment to communities that—since they are locally governed—are capable of integrating food systems, housing, health, economic development, and environmental stewardship into comprehensive place-based strategies.

Next, we have the second installment of the Value Chain Coordination Editorial Circle column, by **Anaya Hall** and **Laura Edwards-Orr,** who examine the role of relationship-based coordination in strengthening regional food systems. In *Adaptive by design: Flexibility and resilience in regional food systems*, they make the case that value chain coordination constitutes the "soft infrastructure" of regional food systems, including the trust, technical assistance, place-based knowledge, and collaborative relationships that enable markets to respond to changing economic, environmental, and policy conditions. They further point out that these essential contributions are often overlooked by conventional performance metrics, making the development of more appropriate evaluation frameworks critical to demonstrating the long-term value of coordination in building resilient regional food economies.

JAFSCD's Value Chain Coordination Editorial Circle has also produced its first two-page VCC Program, Policy, and Practice Brief! In *Unlocking institutional food purchasing: Contract strategies for values-based sourcing,* **Anaya Hall, Heather ("H") Nieto-Friga, Kathryn Barr, Elliott Smith, Ashton Potter,** and **Jodee Smith** translate complex contracting systems into practical guidance for practitioners by highlighting four key levers for expanding local food procurement. See the standalone brief at the JAFSCD website: https://doi.org/10.5304/jafscd.briefs.vcc01

The columns are followed by three timely viewpoints that explore important policy questions from complementary perspectives. In *Four points to reframe the debate on public supermarkets in New York City,* **Valerie Imbruce** argues that proposals for publicly owned supermarkets should build upon existing neighborhood food businesses and community food infrastructure rather than relying primarily on large-scale public retail solutions. In *What is the role of national policies in fostering local food supply chains?*, **Chyi-Lyi (Kathleen) Liang** and **Timothy Mulrooney** examine how national policies can strengthen local food systems through better coordination among federal, state, and local initiatives. In *Improving nutrition in Massachusetts emergency food systems: A tiered tax credit and distribution standards approach*, **Bo Wang** proposes combining targeted tax incentives with nutrition standards to improve the *quality*, rather than simply the *quantity*, of food distributed through emergency food systems. Collectively, these viewpoints illustrate how thoughtful public policy and institutional innovation can strengthen food access, public health, and the resilience of local and regional food systems.

Across diverse geographies and disciplines, the following open-call papers demonstrate that resilient food systems depend not only on sound policies and technological innovation, but also on trust, collaboration, cultural knowledge, and community capacity.

Rachel Kelly, Rich Pirog, and **Jahi Johnson-Chappell** open this section with *Reflections on 10 years of "An Annotated Bibliography on Structural Racism Present in the U.S. Food System,"* a reflective essay documenting how the Michigan State University Center for Regional Food Systems has developed and applied this widely used resource over the past decade.

Next, in *Understanding demand for agriculturally integrated neighborhoods: Characteristics, health behaviors, and design preferences among prospective homebuyers*, **Renée Umstattd Meyer, Emma Lewis, Kathryn Janda-Thomte, Meg Patterson, Rebecca Seguin-Fowler, Jason Carter,** and **Jay Maddock** find that prospective agrihood buyers are largely middle-income, educated, and diverse, with suboptimal health behaviors but strong interest in nature- and food-integrated living environments. These findings suggest that agrihoods may attract both health-conscious residents and those seeking environments that could support healthier lifestyles.

Natalie Minton, Robbie Pollard, Cameron Brown, Anne Cafer, and **Meagen Rosenthal**, in *A farmer-designed food assistance pilot program,* describe a community-based participatory research project in the U.S. Mississippi Delta that partnered with a cooperative of BIPOC farmers to co-design and deliver culturally appropriate food boxes to homebound older adults. Their findings demonstrate how farmer-led food assistance programs can simultaneously improve healthy food access, strengthen local agricultural livelihoods, and deepen community connections.

Next, **Garrett Broad, Yvette Ng, Jeanine Cava, Mahbubur Meenar, Kathia Ramirez,** and **Jose Spellman-Lopez,** in *Understanding caregiver perspectives to improve food security screening in healthcare settings: A focus group study*, explore how low-income caregivers experience food insecurity screening within healthcare settings, revealing how trust, communication, and community relationships shape participation in food is/as medicine initiatives.

Cassandra Nguyen and **Laura Held,** in *Food bank member agencies' orders change after implementation of culturally responsive labels and procuring practices,* show that relatively simple changes in food bank procurement policies and online ordering systems significantly increased the selection of culturally responsive foods by member agencies, illustrating how upstream institutional changes can improve food access for diverse communities.

Michelle Zuñiga, **Mohsin Raza**, **Tara Bengle**, **Colleen Hammelman**, and **Elliott Royal**, in *"It's not just about groceries": Understanding perspectives on a planned food co-op in West Charlotte, North Carolina*, demonstrate that residents view a proposed cooperative as far more than a grocery store, but as a potential hub for community life, education, and neighborhood revitalization.

Next, in Atsalugpiaq *awareness: Food agency of cloudberry subsistence to support Indigenous food sovereignty*, **Claire Friedrichsen, Lynn Marie Church, Jacqueline Cleveland, Sean Gleason, Sire Kassama, Mary Church, Willard Church, Frank Mathew, Miles Bavilla, Grace Hill, Eleanor Merrit, Warron Jones, Grace Hunter, Lucille Mark, Jonathon Hunter, Dorothy Mark, Margaret Roberts, Mathew Roberts, Catherine Beebee,** and **Jonathon Mark** expand the concept of food agency through participatory research with the Yup'ik community of Kuinerraq, Alaska, U.S., demonstrating how Indigenous food sovereignty depends upon cultural knowledge, ethics, autonomy, and lived relationships with the land.

We offer two studies on food safety, examined from both producer and institutional perspectives. **Elma Kontor-Manu, Maria Marshall, Renee Wiatt,** and **Yaohua Feng,** in *Impacts of the Food Safety Modernization Act's Produce Safety Rule exemptions and behavioral insights among small-scale produce growers*, investigate how exempt produce growers understand and navigate food safety requirements, emphasizing the importance of trust-based outreach and practical education. And in *Strengthening institutional capacity for fresh food safety governance: Evidence from Indonesia's regional food safety authorities,* **Dhany Hermansyah, Machfud, Muhammad Romli,** and **Muslich** identify institutional strategies needed to strengthen regional food safety governance, while reinforcing traditional markets as trusted channels for fresh food distribution.

Markets, entrepreneurship, and value chain development form another major theme in this issue. **Kristin Krokowski,** in *Farmers market manager networks for sustainability, support, and innovation*, demonstrates how regional farmers market manager networks foster collaboration, mentoring, innovation, and organizational resilience. In *Agri-food entrepreneurs' perceptions of the infrastructure to support their business: A West of Ireland analysis*, **Maria McDonagh, Maria Staunton,** and **Lisa Ryan** explore the financial, social, and institutional infrastructure supporting rural agri-food entrepreneurs. **Mitsuhito Hosaka, Mitsuyo Uematsu,** and **Hironori Yagi,** in *Real-time image sharing system: Urban farm stand management facilitated by information resources and market orientation*, show how digital technologies strengthen direct marketing and operational decision-making among urban farm stands. **Pratyoosh Kashyap, Justin McElderry, Kim Niewolny,** and **Weslynne Ashton,** in *Advancing wholesale market access: Technical assistance to support Black, Hispanic, and Tribal Producers*, identify the culturally responsive technical assistance needed to expand wholesale market opportunities for

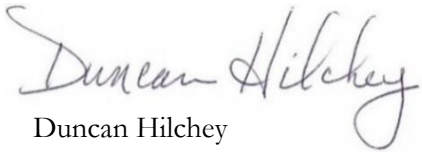
historically underserved producers. **Andile Nomfundo Samkelisiwe Ngubane** and **Mfundo Mandla Masuku,** in *Promises and pitfalls: Small-scale farmers' perspectives on market access initiatives in Jozini, South Africa*, examine why many market access interventions fail to overcome structural barriers confronting small-scale farmers. And in *Improving USDA's public price and volume data for an equitable organic food value chain*, **Katie Butterfield, Ryan Galt,** and **Houston Wilson** assess how public market information can better support equitable organic value chains.

Resilience, adaptation, and community capacity emerge as unifying themes across the final group of papers. **Cathy Rozel Farnworth, Anne Rietveld, Rachel Voss,** and **Angela Meentzen,** in *How gender norms shape opportunities for building resilience to climate change in low- and middle-income countries*, demonstrate how gender norms influence resilience pathways and argue for gender-transformative approaches that strengthen women's agency. **Lindsay Harris, Damon Chouinard,** and **Sarah-Patricia Breen,** in *Potential, precarity and persistence: What British Columbia's food hub network tells us about resilient food systems*, examine how food hubs simultaneously embody promise, precarity, and persistence in regional food systems. Finally, **Chiwoneso Tinago, Geoffrey Anguyo, Madison Scalleat, Naya Weeks, Kamugisha Arnold, Gopal Sankaran, Kimberly Johnson, Zeinab Baba, Patricia Davidson,** and **Whitney Katirai** illustrate how small animal husbandry can strengthen household nutrition, livelihoods, and food security while building local community capacity in *"Rabbit farming is easy": Perspectives from rabbit farmers in Kabale, Uganda*.

We conclude the issue with five thoughtful book reviews that explore topics ranging from small-scale fisheries to pastoralism, sustainability, ranching culture, and community food growing. **Hannah Lewis** reviews *Climate Change, Small-Scale Fisheries, and Blue Justice: Fishscapes and Alternative Worldviews* by Sunil Santha. **Katie Mason** reviews *Hoofprints on the Land: How Traditional Herders and Grazing Animals Hold the Key to Restoring the World's Grasslands* by Ilse Köhler-Rollefson. **Obed Boitshepo Masege** reviews *We Are Eating the Earth: The Race to Fix Our Food System and Save Our Climate* by Michael Grunwald. **Alexandre Rehbinder** reviews *Cow Talk: Work, Ecology, and Range Cattle Ranchers in the Postwar Mountain West* by Michelle K. Berry. **Rose Jennings** reviews *The Practice of Collective Escape: Politics, Justice and Community in Urban Growing Projects* by Helen Traill. Together, these book reviews continue our commitment to introducing readers to important new scholarship from across the broad interdisciplinary landscape of agriculture, food systems, and community development.

Although this issue was assembled through our regular open-call submission process rather than around a single theme, the contributions collectively underscore the importance of institutions, relationships, and place in shaping resilient food systems. Across diverse settings, the authors demonstrate that resilient food systems are built not only through sound policies and technological innovation, but also through trust, collaboration, and cultural knowledge, which provide the foundation for enduring community capacity.

Yours for food systems that contribute to community well-being,



Duncan Hilchey
Publisher and editor-in-chief

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THE ECONOMIC PAMPHLETEER
JOHN IKERD

The need for radical changes in community development policies

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This is the final installment in a series of Economic Pamphleteer columns advocating radical changes in government policies. Previous columns have made the case for changing policies that affect farming and food production. This column focuses on additional policy changes needed to revitalize communities—both rural and urban. When I began writing this series, it seemed as if the current political turmoil had created an opportunity for changes that would not have been possible earlier. With growing cultural division and social dissent, it appears we are nearing a time when radical changes in government policies will no longer be optional but necessary. Anything less may be too little, too late.

I concluded my previous columns with policy proposals to empower people to create more sustainable agri-food systems locally, within their communities. People in like-minded food communities could then form networks to create bioregional, national, and global sustainable food systems. Over the years, I have become convinced that community-based food networks are the key to creating sustainable food systems. I believe the same is true for economies and societies. Authentic sustainability begins with committed individuals

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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

but grows within and among caring communities. Government policies can not create sustainable communities, but radical changes in community development policies could replace current obstacles with opportunities.

Federal community development programs are currently administered through the U.S. Department of Housing and Urban Development (HUD), the U.S. Department of Agriculture (USDA), the Department of Health and Human Services (HHS), and the Department of the Treasury. Each agency provides funding, primarily through grants, for specific services and purposes such as affordable housing and healthcare, safe drinking water, wastewater treatment, low-cost business loans, assistance for low-income households, and incentives for economic development. The states also provide funds for community development purposes, including economic development and assistance for low-income households.

Each of these government programs involves complex application processes, and commitments to specific quantifiable goals, benchmarks, and deliverables—and once funded, detailed monitoring and reporting on progress and accomplishments. In addition, service- and purpose-specific development initiatives have limited potential unless they are integrated into comprehensive, long-term community development strategies (Amadei, 2020) and are planned and implemented in collaboration with the community members they are to serve (World Bank Group, 2012). Thus, communities must attempt to fit their individually funded projects into overall community development strategies, with no assurance that funding will continue once specific grants and contracts are completed.

Community development practitioners consistently stress the difficulty in solving specific problems, such as hunger, homelessness, and pollution, without addressing related problems and constraints in the cultural, political, and economic environment. They express frustration with current government programs that fail to appreciate this interconnectedness.

For example, a recent issue of this journal featured articles related to community-based circular food systems (C-B CFS) (Hilchey, 2025). The editorial team for the issue wrote,

> The articles and commentaries in this special issue reflect a collective shared insight: circularity is not only a technical fix, but a practice deeply embedded in social relationships, political processes, and cultural norms. The special issue also reveals important tensions and limitations facing global C-B CFS efforts, marked by patchwork funding, policy inconsistency, structural inequalities, and limited recognition in planning frameworks." (Alonso Martínez et al., 2025, p. 5)

As Food Lifeline in Seattle, Washington, USA, a foodbank affiliate of Feeding America, explains,

> Food Justice is a holistic and structural view of our food systems that sees healthy food as a basic human right and addresses the structural barriers that obstruct this right. These structural barriers include poverty, racial inequity, and social injustice. Food Lifeline believes these are the 'root causes' of hunger" (Food Lifeline, n.d., para. 1–2). It goes on to say, "We believe that people who have experienced or are currently living with food insecurity are truly experts in what it takes to solve hunger. Yet food assistance programs are often created without the input of those with lived experience. (Food Lifeline, n.d., para. 5)

The international organization Community Solutions is funded by the MacArthur Foundation to eliminate homelessness. Its programs treat homelessness as a community problem, and it notes that "research further reminds us that while government departments and local systems often operate within isolated silos, addressing homelessness is not the sole responsibility of any single agency. It necessitates community-wide systems change" (Chimowitz & Ruege, 2023, "Conclusion," para. 1). The organization prioritizes housing but stresses that "providing a continuum of supportive, medical, and social services … can not only improve the livelihoods and wellbeing of individuals and families, but also alleviate strains on public budgets over the long term" ("Conclusion," para. 2).

Vital Communities is an example of a network of communities working together to address the challenges of sustainable community development. The organization was established in 1993 to serve the Upper Valley on the Connecticut River in the U.S. Northeast, which encompasses 69 cities, towns, and districts, including Norwich and Hartford in Vermont, and Hanover and West Lebanon in New Hampshire. As it notes on its website,

> The Upper Valley of the Connecticut River is made up of thousands of visible and invisible networks of people working together: launching businesses, growing food, creating art, making homes, teaching, healing, caring for the environment, and running the governments. … Vital Communities works to build a thriving Upper Valley by focusing on the biggest issues facing our region including housing, transportation, climate disruption, and access to nourishing food and a resilient local economy. (Vital Communities, n.d., para. 1–2)

Current government programs support specific purposes that communities must integrate into comprehensive development strategies to further their purposes. After the federal government's recent withholding of funds, cancelling of contracts, and cutting budgets for climate change mitigation and other environmental and social programs, there seems to be little hope for significant, dependable, long-term government support for any specific aspect of community development.

So, what does this suggest about changes in government programs? I believe there is widespread public support for community development as a generic concept or ideal. However, the various programs that affect communities are so fragmented that it is difficult to translate public support for communities into political support for specific government policies. Also, there are political disagreements over development priorities, such as economic development versus climate change mitigation, or economic development versus sustainable development. With public support—or, preferably, public demand—politicians might be willing, and perhaps relieved, to devolve or shift primary responsibilities for community development priorities and programs from federal and state levels to the community level.

The various programs that affect communities are so fragmented that it is difficult to translate public support for communities into political support for specific government policies.

As I have suggested previously, federal programs might function more effectively if all community development programs currently administered through HUD, USDA, HSS, and other departments were consolidated under a new Department of Community Development. Regardless, Congress could mandate that local communities be allowed to determine their own priorities and programs, as long as they serve the public interests. Current government grants that currently support specific purposes, such as affordable housing and poverty alleviation, could be bundled into generic block grants to support community development. Cities, towns, villages, or counties could then use these funds in any way they choose to support their community development strategies.

State, federal, and local government funds currently appropriated for purposes such as food assistance, housing, healthcare, energy, education, and transportation could then be used more effectively and efficiently, as individual programs would be integrated into comprehensive community development systems. This would allow people within local communities to use government funds to meet their unique needs and preferences. The role of government agencies would be limited to ensuring that funds are used to serve the public interest, rather than being diverted to private interests. Within these bounds, communities could determine their own programs and priorities.

Some communities would likely prioritize economic development, but priorities would be

determined locally rather than statewide or nationally. Other communities would be empowered to pursue sustainable community development—ecologically, socially, and economically. In communities that prioritize sustainable development, businesses may need to sacrifice some short-term economic benefits to ensure long-term ecological and social sustainability. Community members might need to modify their lifestyles to accommodate local businesses. They might also need to devote more time and energy to building personal relationships and protecting the environment. However, those making the changes would reap the benefits. The changes would improve their individual quality of life as well as the overall quality of life in their communities.

It might be easier to gain the necessary consensus regarding program priorities if the boundaries of communities for government funding purposes were not restricted to those of existing state and local governments. Perhaps the new legal entities could be established as comprehensive community-development districts. The legal structure of these districts would be similar to that of current Economic Development Districts (EDDs) (U.S. Economic Development Agency, n.d.) or Community Development Districts (CDD) (Keating, 2014), but their purpose and programs would be more comprehensive. For example, CDDs are typically established for specific residential developments to finance infrastructure, amenities, or specific services. EDDs focus on economic development rather than comprehensive community development.

Development communities would need to be large enough to allow for some economies of scale in carrying out their functions, but small enough to maintain the sense of interconnectedness and common interest essential for effective self-governance. Communities might develop their own wind or solar farms to provide sustainable energy. They might own their own bank or credit union, where community members' deposits would provide reserves for development loans to local businesses to produce goods and services to meet community members' needs. These local lenders would have the legal authority to loan far more money than they hold in reserves, essentially creating new money for the specific purpose of supporting community economic initiatives.

Some essential community functions might need to be carried out directly by the community. For example, communities could own and operate their own processing facilities, grocery stores, and restaurants to ensure access to nutritious foods for those most in need. Communities might also construct local neighborhoods of energy-efficient housing units, designed to foster positive community relationships, and made available to residents at affordable rental rates. In such instances, the emphasis would be as much on building communities to care for public-owned facilities as on building the facilities. Flexibility in federal, state, and local funding would allow the local experts—the people in local communities—to decide how best to use the funds appropriately to support the development of their communities.

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There is no guarantee that the people within communities will make the best decisions for their future. But as long as local decisions do not impose economic, social, or ecological costs on the world around them, there is no better guide to how people should live together than communities of people making decisions collectively, for themselves. There is no best strategy for community development or best set of government policies because every community has different needs and preferences.

The world changes only when people either change their communities or allow their communities to be changed for them. Community development policies of the past have not worked and are unlikely to work in the future because they impose development programs on communities rather than help communities develop themselves. The

result has been community degradation and societal disintegration rather than community development. There are no guarantees of success, but as thoughtfully argued by Margaret Wheatley (2011), "The world changes as local communities become self-determining" (p. 3). It's time to radically change community development policy, before it is too late.

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VALUE CHAIN COORDINATION COLUMN

Adaptive by design: Flexibility and resilience in regional food systems



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Practitioners working in regional food systems know that volatility is the norm, not the exception. Market shifts, climate disruption, changing priorities of buyers and public agencies, and turbulent funding landscapes are defining features of operating in this space. Responding to these perennial fluctuations requires flexibility and adaptability, which is exactly where value chain coordination (VCC) shines. Coincidentally, those same attributes make VCC efforts much more complex to measure and study than conventional supply chain interventions.

Building and maintaining a value chain requires a complex set of actors, resources, and physical infrastructure that is coordinated to move identity-preserved food products from producers through intermediaries to final consumers. Appropriately sited and scaled built infrastructure (such as processing facilities, aggregation warehouses, and distribution trucks) is essential, but on its own is a blunt tool that is built for anticipated conditions and difficult to change. While physical infrastructure's costs and timelines are fixed and legible to funders, investment in VCC is harder to pin down, and yet its long-term market impacts can be significant and far-reaching.

While VCC professionals can and do support the development of hard infrastructure, much of their work focuses on the soft infrastructure of market matchmaking, providing technical assistance, and catalyzing new projects among aligned stakeholders (Rocker, 2019). The work encompasses many things, but at its core is fundamentally relational and place-based, contingent on deep knowledge of a particular regional market, its actors, and its rhythms. In contrast to the sweeping efficacy of infrastructure solutions, place-based knowledge enables VCC professionals to facilitate

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specific, focused interventions to existing supply chains or market dynamics for maximum benefit to suppliers and eaters.

This adaptive focus is not incidental; it is a core structural feature. Effective coordinators anticipate changing system conditions and respond accordingly, adapting in moments of disruption to support resilient and fair food chains. The COVID-19 pandemic offered a vivid illustration of this adaptive capacity in action: as restaurant markets and wholesale channels shut down, value chain coordinators redirected regional farm products into emergency food networks and direct-to-consumer channels. During that historic crisis, value chain coordinators from San Francisco to Kansas City were able to protect smallholder income streams while ensuring access to fresh foods by leveraging pre-existing relationships and place-based knowledge (Bomstein, 2021).

Yet coordination does not look the same everywhere; its expression depends on organizational context, funding structures, and regional market conditions. Coordinators may be housed in municipalities, nonprofits, food hubs, or Cooperative Extension services, or may operate as standalone consultants or enterprises. Funding and revenue models vary just as widely, contouring the specific objectives and guiding the day-to-day activities of the coordinators.

We suggest that across the variety of coordination models, what distinguishes VCC is that it is relationship-centered, adaptive, and calibrated to a particular place-based system. Whether working in an urban hospital's food-as-medicine initiative or as a rural extension specialist organizing a farm-to–food bank program, coordinators actively cultivate relationships, resources, and community capital that empower food systems to react and adapt to changing economic, political, and environmental conditions.

Unfortunately, the same qualities that make VCC nimble and adaptive—namely its focus on gradually building the mutually respectful relationships that undergird value chains and ensure that economic benefits are shared across supply chain participants—also make it difficult to measure. Conventional metrics, like sales volume, can capture monetary outputs, but systematically miss the relational labor and place-based knowledge that make coordination durable. Building long-term, trusted relationships, providing information and resources, and sharing risk across supply chains may not appear in a balance sheet, yet these are frequently the key mechanisms by which VCC engenders meaningful impacts in regional agri-food economies.

The field of VCC increasingly recognizes the importance of incorporating formal evaluation mechanisms as core components of proving market resilience and scaling regional agricultural networks. The Food Systems Leadership Network's 2023 VCC Evaluation Framework is one example, helping practitioners connect day-to-day coordination work with longer-term outcomes (Food Systems Leadership Network, 2023). Specific tools like outcome harvesting, ripple effect mapping, and social network analysis offer promising approaches for capturing the nonlinear impacts of VCC (Rocker, 2019; Wilson-Grau & Britt, 2012). As participatory and systems-oriented approaches, they allow practitioners and academics to document complex market shifts, track the growth of trust-based relational infrastructure, and illustrate the interconnected economic ripples generated by VCC professionals.

Effective value chain coordinators anticipate changing system conditions and respond accordingly, adapting in moments of disruption to support resilient and fair food chains.

Embedding measurement frameworks that are calibrated to the coordination model, the moment, and the stage of organizational development into VCC activities is critical for demonstrating impact and securing institutional funding. Right-sized evaluation frameworks allow VCC professionals and enterprises to capture incremental progress and build a cumulative evidence base for their own programs as well as for other practitioners, funders, and policymakers.

Documenting small wins matters for the people inside this system, too. The work of transforming food systems can sometimes feel Sisyphean: slow, difficult, and resistant to the tidy timelines preferred by funders. Practitioners associated with the U.S. Department of Agriculture (USDA)'s Food LINC initiative (USDA, 2016), for instance, agreed that three years was a reasonable minimum before relational investment yields reportable changes in sales or market activity (Dunning, 2022). Celebrating achievements beyond traditional volume-based metrics can help coordinators sustain themselves through the long work of agri-food systems change. It is also how the field accumulates collective knowledge about what coordination makes possible.

The work of transforming food systems can sometimes feel Sisyphean: slow, difficult, and resistant to the tidy timelines preferred by funders.

The field has generated important knowledge about coordinating value chains, but we suspect there is more out there that has not been shared across communities of practice. Informal producer networks, for instance, have long been recognized as a source of flexibility and adaptation in responding to shifts in food markets (Diamond & Barnham, 2012), yet we lack systematic documentation of the time-tested coordination practices and programs that cultivate and sustain these networks. Practitioners, scholars, and policymakers enmeshed in the everyday work of coordination have amassed hard-won insights about what holds up across changing conditions: financing models that sustain the soft infrastructure through turbulent funding cycles, governance structures that distribute roles across positions without losing coherence, and evaluation approaches tailored to what coordination work actually looks like.

This JAFSCD VCC Briefs series is an opportunity to get that knowledge into circulation. We invite submissions[1] featuring well documented good practices, and durable policies and programs across various regional contexts and organizational models, with a particular interest in how programs have been evaluated across stages of development. Honest accounts of initiatives that were restructured or discontinued are encouraged. In addition to our ongoing open call requesting submissions for VCC Briefs on a wide range of topics across the marketing domain of the food system, we have a special call focused on coordinating institutional procurement.

As scholars and practitioners of this field, we suggest that the flexibility and nimbleness of VCC is a critically important adaptive tool for building food chains that prioritize producer viability, environmental stewardship, and community economic development—particularly in moments of disruption. Food system transformation requires both blunt and precise instruments; that means hard infrastructure and soft. This series is committed to helping us understand and hone the latter.

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[1] Learn more about the JAFSCD VCC Editorial Circle and Briefs series at https://www.foodsystemsjournal.org/index.php/fsj/VCCEC

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VIEWPOINT

Four points to reframe the debate on public supermarkets in New York City

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Introduction

New York City's food retail landscape is dominated by small-scale retailers that make neighborhoods unique and culturally tailored. I once counted 88 produce vendors and grocers within four blocks of Manhattan's Chinatown, a shopping artery that serves an East Asian panoply of specialty foods. Whereas supermarkets are the dominant destination for grocery shopping around the county, for the 1,000 supermarkets scattered around New York City (NYC), there are 25,000 independent stores, thousands of mobile produce vendors, and nearly 140 farmers markets (Sowder, 2022). The food and beverage sector is a major engine of employment, providing one in four jobs (New York State Comptroller, 2020).

There has been rapid growth in national supermarket franchises opening across the city, and now NYC Mayor Mamdani's administration is advancing plans to establish five publicly owned supermarkets in response to rising food insecurity and food costs. This plan is narrowly focused on large-scale retail solutions to improve underutilized, city-owned property. But this strategy should be more holistic; it should include small, culturally embedded food businesses and community organizations that already contribute to food access, affordability, and resilience, but need more support. NYC's diverse retail food economy, emerging food council initiatives, and Manhattan's Chinatown offer evidence that resilient food systems are built through decentralized social, economic, and supply-chain relationships embedded in place.

The need for city government to address food affordability and access is acute. It is admirable to see the urgency with which it is being handled by the Mamdani administration. Mamdani used his Ugandan and Indian food identity to connect with constituents during his campaign through a resurgence of his rap video as "Mr. Cardamon," set in a Halal food cart, and by interviewing on Palestine while eating biryani with his fingers, as do over a billion South Asians and those who are a part of its global diaspora. He should keep in mind food producers and vendors from immigrant communities

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as he advances his campaign promise for a public supermarket in each of the five boroughs of NYC.

The first public supermarket will be in La Marqueta, the failing, city-owned public market in East Harlem (New York City Office of the Mayor, 2026). There is much debate on whether the city can be successful at supplying low-cost food items in an industry that operates on thin margins and high volume. The public cost of the project is very high, estimated at US$30 million to build the first market, and anywhere between US$60 and US$100 million to operate annually. For such a high price tag, there is critical, additional context to consider before implementing a public supermarket plan—or else we may miss the chance to uplift existing community assets, particularly small, culturally focused food businesses and community organizations that work on anti-hunger and local food system initiatives. A city council agenda from 2019 stated that "every neighborhood should have food businesses that reflect the community's cultures and diversity" (Johnson et al., 2019). This is a moment to act as if this perspective is still valued.

Trends in Supermarket Formation in NYC

Private capital is already flowing to create supermarkets in NYC. Are public funds needed in this space? National food chains, such as Key Food and Associated Supermarkets, are strong and growing in the city, rising from 377 to 394 stores from 2024 to 2025 alone. That includes the discount grocers Aldi, which now has 14 stores, and Lidl, which built 10 stores in just two years (Bowles et al., 2025). In fact, there are three discount supermarkets—Aldi, Lidl, and Costco—already located within one mile—just six blocks—to the east and west of the proposed site of the first public supermarket. Affordability between supermarket chains varies wildly, but these three are among the least expensive. A pricing survey we did at Washington College's Center for Environment and Society found that a weekly market basket of groceries, enough to feed a family of four with home-cooked, nutritious meals, cost 36% less at Aldi than at chains like Safeway and Acme. Aldi is on par with Walmart for grocery store pricing.

Furthermore, the intervention of placing affordable, full-service private or public supermarkets in "food deserts," or any low-income neighborhood without an existing supermarket, is laudable, but has not been enough to improve food security nor public health (Atanasova et al., 2022). Despite rapid growth in the number of supermarkets in NYC, persistent supply gaps between what people need and what is available remain. Neighborhoods where a low-cost grocer recently opened, like Corona in Queens, Kingsbridge in the Bronx, and Sheepshead Bay in Brooklyn, all have above-average rates of food insecurity and food supply gaps (Reynolds, 2025).

Food Councils Aim For Equity in Communities

Low-cost supermarkets are key pieces of our food environment, but public support is needed for alternative strategies for resilient food systems and food security. Planning, organization, and intervention need to occur at the neighborhood scale, where "people live, work, and play." Community food systems must be seen for what they are: decentralized but interrelated networks of businesses and organizations. Food retailers, wholesalers, and restaurants operate alongside community organizations, food pantries, churches, and schools to provide groceries and meals. Civic associations provide business services, public agencies enroll SNAP and WIC recipients, agricultural extension agents and urban agricultural programs provide nutrition education and technology transfer to farmers and gardeners. Food as medicine programs run through health networks to prescribe produce vouchers. The list goes on. Every community has its own constellation of public, private, and charitable businesses and organizations—both large and small—that make up its food system.

We need to use a holistic approach to understanding and supporting community food systems, and not just rely on public or private supermarkets. Investment on the scale of what Mamdani proposes—even a percentage point of what he proposes—could send out ripple effects if invested in existing community-scale approaches to identifying what assets need to be created or shored up. Existing city programs already recognize the need for community-level interventions. The Community Food Connections program that is tasked with reducing city neighborhoods' food supply gaps

recommends investing in the capacity of small and medium-sized food providers, including storage, refrigeration, technology, inventory management, transport, and staffing, and helping them apply for grants and find capital as well as opportunities for new investment strategies (NYC Mayor's Office of Food Policy, 2025). Why not invest in small and medium-sized food providers? Why keep investing in large supermarkets through tax benefits, as the existing program Food Retail Expansion to Support Health (FRESH) already does (NYC Economic Development Corporation, 2026)?

Capacity-building at the community level is the conversation being held in the food councils that I participate in upstate New York, the Eastern Shore of Maryland, and a historic immigrant neighborhood in NYC that has long been a site of my interest, Manhattan's Chinatown (Imbruce, 2015). These kinds of community-scale interventions are well recognized by the people doing the work; they need more public recognition to move municipal and state government actors to allocate resources. Food councils with direct ties to government are known to perform better; in fact, the ability for food councils to be involved in the policy process necessitates a willingness of government actors to engage with them (Bassarab et al., 2019). Other unlikely sectors, like mine (higher education), are devoting human and financial capital to community food systems work by doing applied research to target interventions, facilitate nonprofits' work, and understand communities' needs (Gajewski et al., 2025).

While they are a very small segment of food policy and governance, food councils are on the rise across the country and can play a role in NYC's landscape, interfacing with the existing government agencies, such as the Mayor's Office of Food Policy and the Mayor's Office of Urban Agriculture. In New York, Equity Advocates has pulled together over 50 organizations into the NYC Food Policy Alliance. They are working with 13 active local food councils throughout the state, alongside NYS Senate and Assembly sponsors, to advocate and appropriate US$2 million for such efforts. Their bottom line is that local food councils in every region can build capacity through strengthening existing programs for healthy people, strong local economies, and climate-resistant food futures (New York Equity Advocates, n.d.; NYS Community Food Collaborative, n.d.).

Social Networks are Critical for Resilient Food Systems; Manhattan's Chinatown Offers a Model

At the neighborhood scale, Manhattan's Chinatown is a model for resilient community food systems. I take inspiration from the people who work in its food system. Small, owner-operated businesses can provide a vibrant community food system that caters to nutritional, linguistic, and cultural needs. They should not be overlooked as part of the city's food security strategy. In Chinatown, a farm-to-market supply-chain network that spans local to global scales keeps street-level shelves stocked with fresh and affordable specialty Asian and mainstream produce items. Key to this supply chain are low overhead and high volume. Food retailers are bare-bones operations clustered along the busiest thoroughfares. Their proximity to wholesale and retail markets for cooling and delivery infrastructure, and their storefront and street vending, make Chinatown a quick and easy, as well as one-of-a-kind, shopping destination.

I have also learned cautionary tales from the changes I have observed in Chinatown. The wholesale sector is all but gone, having moved to Queens and Brooklyn because the Manhattan rent is too high. Street vending has declined by half. And business owners report a loss of patronage and impossible costs of doing business. The most recent shock to the livelihoods of food businesses was COVID-19, by which Chinatown was disproportionally affected and slower to rebound compared to neighborhoods that are not predominately Asian-American (Yi et al., 2022). Food retailers and farmers have told me that the hustle and bustle of the food economy is not like it used to be, when a sea of people shopped on the weekends and came in from out of town. A third-generation Chinese-American farmer whose grandfather started growing for Chinatown in the 1950s continues to do so, even though he takes a loss in this market. He, and others, hold on, wanting to serve a neighborhood that is important to their families' trajectories and to others seeking their own American dream.

Businesses like this hold on, in part, because of

relationships. Social infrastructure undergirds our supply chains. Trusted, exclusive relationships are the secret sauce of the grocery business. Wholesalers play an important behind-the-scenes role. They open access to city markets, they are lynch pins in the system, and they extend capital as well as critical market knowledge to growers. By supporting growers, they protect their own suppliers, but they also help reduce waste ("shrinkage," as it is known in the industry), which runs up costs that are passed to the consumer. In perishable markets where tractor-trailers–sized shipments are made from farms across oceans or continents, maintaining the quality of the inventory and trust between trade partners is key. I have also observed social values that operate in specialty grocery businesses. Accompanying the need to turn a profit is the desire to help others, be part of reciprocal relationships, and provide culturally relevant foods to keep culinary traditions alive and to introduce them to new audiences.

Four Points to Reframe Public Support for Food Systems Resilience

The Mamdani administration, or any municipal administration, need to initiate programs that improve food systems resilience and community food security. Some community leaders and business owners, like my community partners in Chinatown, do not want a public supermarket in their neighborhood and do not support public investment in it for important reasons (von Massow, 2026). I can boil the issue down to four areas of consideration common to any community when planning food systems interventions.

1. **Place matters:** Consider what products the demographics of the neighborhood require, what is already provided and what is not, and how to mitigate the potential for displacement of existing businesses due to a large public intervention. Pay attention to the relationships between actors in the place of focus.
2. **Scale matters:** Consider what size of farmers and food suppliers can succeed selling to a public supermarket or any new market, and be inclusive of small-scale and newcomers to the industry (such as by using contract requirements and regulations that work for them). Build trusting relationships.
3. **Timeliness matters:** Food suppliers are often strapped for cash, inventory turns over quickly, and payments must be made rapidly. Note that the Perishable Agricultural Commodities Act establishes net-10-day payments as critical to the produce industry. Timely payments are crucial for trusted, durable trade relations.
4. **Values matter:** Aligning and articulating values during the procurement process are needed to build trust and transparency in new markets, from producers through to consumers. People express their beliefs and cultural values through what they grow and how they eat.

The proposition for a major public investment in food security should go well beyond making good use of city-owned land, which is one of the core objectives of the public supermarket initiative. Who stands to win from any public investment is not the only question; who stands to lose as well? Communities have existing assets that need to be built upon, not sidelined or overlooked by the specter of a new supermarket.

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VIEWPOINT

What is the role of national policies in fostering local food supply chains?

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National Policies and Programs Supporting Local Foods

As defined in the 2008 farm bill, local foods are those that are transported less than 400 miles from their origins or only within the state in which they are produced (Martinez et al., 2010). However, different states use other definitions of local foods. For example, state organizations, like the North Carolina Department of Agriculture & Consumer Services (NCDA&CS) and North Carolina Cooperative Extension, recognize local foods as food grown, caught, or raised in North Carolina (Favre, 2022). Both producers and consumers generally consider the definition of local foods to be "locally grown and sourced" products, with an appreciation for local farmers and their commitment to stimulating economic activity and development.

The initial concept of local foods can be traced back to neighborhood activities or county-level connections that allowed growers to connect with residents. Many of us who grew up in rural areas (where modern supermarkets were not as popular) share personal experiences or memories of going to local markets and being fascinated by the dynamic interactions between sellers and buyers. Over time, this type of localized exchange has evolved and expanded into more formal market settings, such as farmers markets, roadside stands, food hubs, and restaurants showcasing specialty products sourced locally. Martinez (2016) provided a comprehensive review of policies that contribute to the local food movement in the U.S., thus

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strengthening the relationship between growers and consumers grounded in rural communities. Some of the obstacles to growing local food programs and initiatives have been discussed by researchers including production limitations (e.g., geographical location and landscape, soil, and climate variations), distribution limitations (e.g., demand versus supply matching, market regulations, and food safety compliance), traceability issues between vendors, suppliers, and buyers, and timely responses to unforeseen challenges (e.g., economic and environmental shocks create gaps for labor and market channel operations) (Martinez, 2016).

Since the 2008 farm bill, federal agencies working on food and agricultural policies and programs have included financial and technical support to help farmers grow local food markets, build infrastructure, and adopt sustainable practices (Martinez, 2016). Many USDA agencies have offered programs to support local food production, resource conservation, procurement, financing, risk management, consumer education, diet and health optimization, market accessibility, food safety and accountability, and innovative business and market development (USDA National Agricultural Library, n.d.). Many of these government programs have integrated impacts on local food development and household welfare.

Beyond USDA efforts, local foods are affected by new initiatives at the U.S. Food and Drug Administration (U.S. FDA). Specifically, FDA introduced new approaches through the Human Foods Program (HFP) in 2026 and set a priority to improve food safety and food traceability to ensure the high quality of food supplied to consumers. These new initiatives will affect some farmers' participation in growing and supplying local markets, provided proper compliance, such as maintaining records from production to supply chains. In the sections below, we focus on three USDA programs and provide a more in-depth discussion.

Investments in Local Foods through the Natural Resources Conservation Service (NRCS)

To enhance farm operations through practices and management, NRCS offers a series of technical assistance and cost-share programs to help farmers improve on-farm infrastructure, increase yields, access irrigation water, extend crop seasons, and establish a feasible conservation and ecosystem protection plan. These programs include the Conservation Stewardship Program, the Environmental Quality Incentives Program (EQIP), and the Farm and Ranch Lands Protection Program. High tunnels (a hoop house used to extend the growing season) are among the most popular cost-share programs in EQIP, allowing farmers to work with NRCS staff to mitigate threats posed by unpredictable weather patterns and extend production seasons for many fruits and vegetables to meet market needs at the local and regional levels (USDA NRCS, n.d.-a). NRCS programs are often linked to a variety of technical assistance for business and enterprise development thus providing farmers with opportunities to learn strategies for creating effective plans to engage local markets. For example, many community-based organizations often collaborate with NRCS and local colleges or universities to run the Beginning Farmer and Rancher Development program for those interested in designing, creating, and running farm enterprises at different scales. The Beginning Farmer and Rancher Program also draws participants from active-duty military service (e.g., the North Carolina State Cooperative Extension offers a Soldiers to Agriculture program specifically within 180 days of separation), veterans, and other culturally diverse groups who are passionate about enhancing food security and community health at the local level (Johnson, 2025).

There has been a shift in NRCS focused programs since December 2025, when NRCS launched the Regenerative Pilot Program including 15 types of primary conservation practices (USDA NRCS, n.d.-b). This new program invests US$700 million (US$400 million through the EQIP and US$300 million through the Conservation Stewardship Program) to help farmers address whole farm natural resource management via voluntary regenerative agriculture conservation plans. This new program aims to encourage producers to bundle practices with an integrated approach while addressing all resource concerns in soil, water, and other elements. It also encourages supply chain

vendors to offer farmers assistance and credit for proper resource management.

Investments in Local Foods through the Agricultural Marketing Service (AMS)

AMS leads marketing and promotion efforts to help local/regional farmers connect with buyers through several programs and directories. AMS programs also have interconnecting effects that help consumers access local foods regardless of income level. AMS's investments focus on three flagship programs, the Local Food Purchase Assistance Program (LFPA), the Local Food Promotion Program (LFPP),[1] and the Regional Food System Partnership (RFSP).[2]

The most significant change in AMS funding is the recent cut in several programs. The over US$1 billion funding cut impacted schools' and local food banks' purchases of local foods from farmers (Santucci, 2025). For example, the Local Food for Schools Cooperative Agreement Program lost funding for 2025, and the LFPA Cooperative Agreement Program also lost funding support. Although the current LFPA agreements will continue, there will be no new funding moving forward. The funding cut directly influences the local farmers' income and reduces the opportunities for schools and community organizations to acquire local foods.

In March 2026, AMS announced an award of US$26.8 million to support projects through the Local Agriculture Market Program (LAMP), which aims to support the development, coordination, and expansion of direct marketing, local and regional food systems, and value-added agricultural products. LAMP could fill the gaps due to the previous funding cut to stimulate coordinated efforts between producers, supply chain service providers, community-based organizations, and local government agencies to cultivate public-private partnerships while strengthening business planning and enterprise development to improve income and economic opportunities for the overall food system participants. The LAMP Navigator offers online information, which allows users to explore LAMP grant information such as project activities and other details (Figure 1). This data includes historical records from 2006 to 2024 of all projects funded under the Farmers Market Promotion Program (FMPP),[3] LFPP, and RFSP.

To understand how the funding distribution varies across the U.S., we further extracted specific data from the LAMP database via keyword searches, then used ArcGIS Pro to show awards under the FMPP, LFPP, and RFSP programs in different states based on available public data (Figures 2–4).

A large proportion of the FMPP awards were made in the Northeast and Mid-Atlantic regions (Figure 2). The number of awards does not seem to correlate with the amount of funding received in each state. For example, California, Taxes, Florida, and Pennsylvania received 18 to 56 awards, according to the current data, and the average award amount was between US$125,000 and US$287,000. Nevada and Maine had 1 to 5 awards, and the average amount of awards was above US$300,000.

Most of the awards of LFPP were distributed in two coastal regions (Figure 3). Colorado, New Mexico, Minnesota, and West Virginia had 9 to 12 awards each with an average award of least US$190,000.

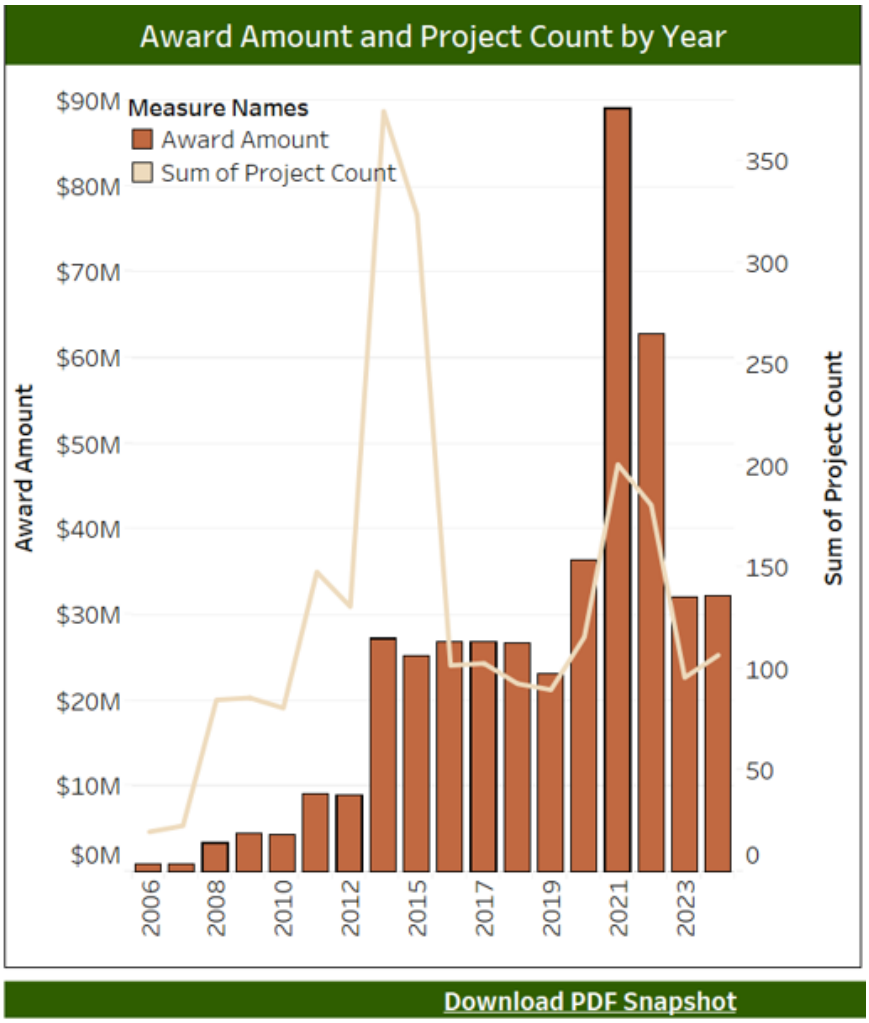
California, Colorado, New York, Massachusetts, Kentucky, and Virginia had the highest number of awards in the RFSP (Figure 4). Montana, Oklahoma, Michigan, Indiana, and North Carolina received significant award amounts, with an average award of over US$500,000. The funding amounts reflect the fact that it takes some effort to coordinate stakeholders, organizations, institutions, and government agencies to establish a sustainable regional food system network and partnership. For example, in fiscal year 2024, the RFSP awarded 10 projects with a total of US$5.2 million to support building a statewide, grassroot network of partnership to address Alaska's food insecurity issues; for several counties in California to enhance market access for local producers; and to bring together a diverse community of partners to increase efficiencies throughout the supply chain that support the

[1] https://www.ams.usda.gov/services/grants/lfpp
[2] https://www.ams.usda.gov/services/grants/rfsp
[3] https://www.ams.usda.gov/services/grants/fmpp

charitable food network (USDA AMS, n.d.-b).

Beyond providing financial assistance for local and regional entities to develop effective strategies in supporting local food development, AMS has compiled directories to assist consumers in finding local food vendors, including agritourism operations, community supported agriculture operations, farmers markets, food hubs, and on-farm markets (e.g., farm stands and roadside markets). Queried in March 2026, there were 13,564 listings in the Agritourism category, 1,992 listings in the Community Supported Agriculture category, 7,090 listings in the Farmers Market category, 479 listings in the Food Hub category, and 4,674 listings in the On-Farm Market category.

Figure 1. Partial View of the AMS LAMP Dashboard Showing Trends of Funds and Number of Awards, 2006–2024



Source: U.S. Department of Agriculture, Agricultural Marketing Service [USDA AMS]. (n.d.-a).

Investments in Local Foods through the Food and Nutrition Service (FNS)

FNS programs support local foods by connecting federal nutrition assistance (e.g., school meals, Supplemental Nutrition Assistance Program [SNAP] and Special Supplemental Nutrition Program for Women, Infants, and Children [WIC]) with local food producers. Several federal programs have provided resources to establish farm-to-school initiatives or allow schools to purchase locally available produce for lunch and childcare programs. Many farmers markets accept SNAP, WIC, and Senior Assistance benefits nationwide. For example, in 2017, over 7,000 farmers and farmers markets across the country were authorized to accept SNAP benefits, a significant increase from 2012. According to a 2022 USDA ERS report (Sauer et al., 2022), there are over 8,700 farmers markets in the U.S., and the number has been steadily growing since 2014. The USDA FNS (2021) estimated that US$33 million in SNAP benefits were redeemed at farmers markets in 2020. Witzling et al. (2025) examined attendance and experiences at U.S. farmers markets using a national survey. The descriptive analysis of the survey responses yielded some observations: (a) most of the customers purchased fresh fruits and vegetables at the farmers markets, and many were interested in buying a meal kit; (b) summer was the most common season to visit farmers markets; (c) customers were more likely to visit farmers markets located along a main street or in a

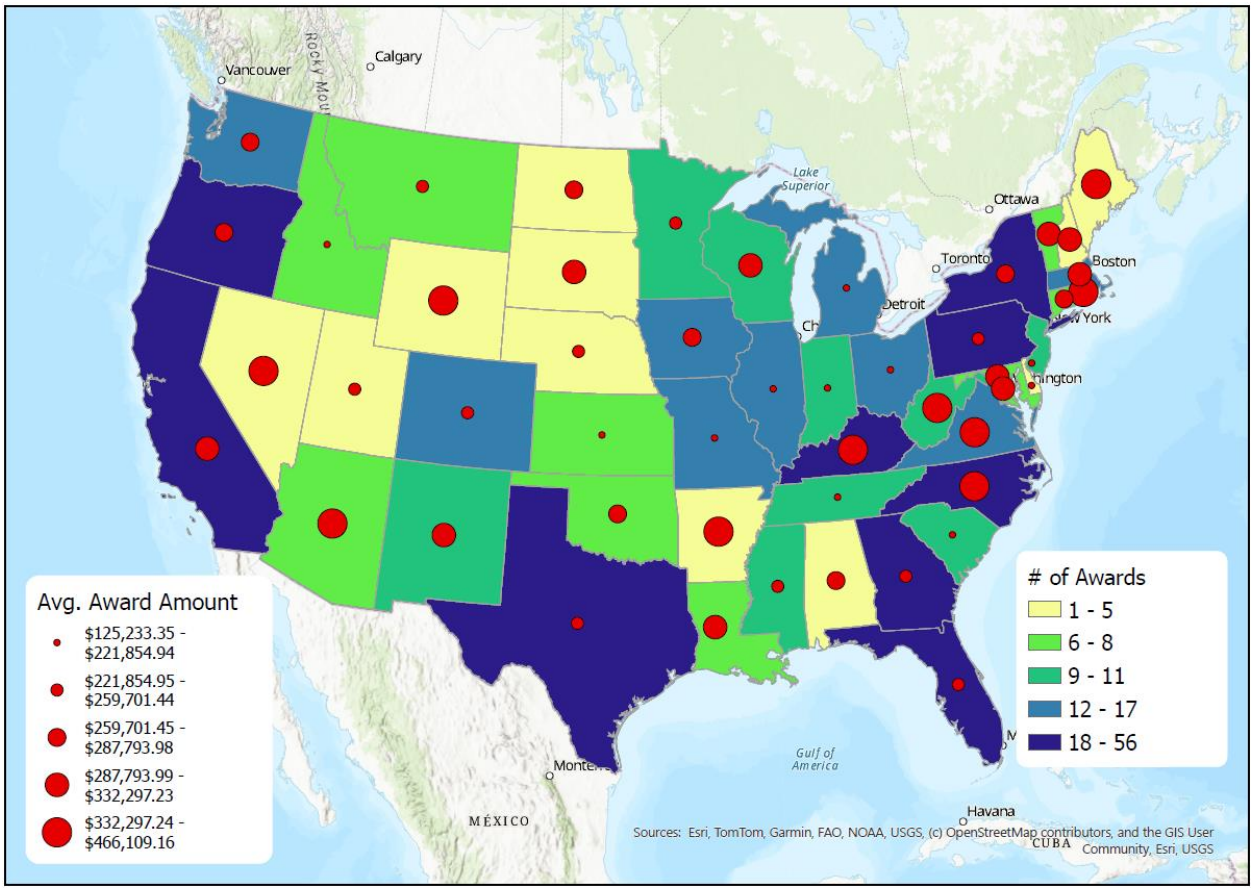
neighborhood; (d) many customers preferred using cash or credit cards at the farmers markets, and (e) there was strong interest in using SNAP, WIC, or coupons issued by the farmers market or a state agency at farmers markets. These strategies encouraged customers at farmers markets to purchase affordable fruit and vegetables, which helps support low-income communities (Ball et al., 2019; Grin et al., 2013).

There have been drastic changes in the Supplemental Nutrition Assistance Program (SNAP) since 2025 (USDA FNS SNAP, undated). The One, Big, Beautiful Bill Act of 2025 changed certain eligibility criteria for individuals or families to apply for SNAP. For example, individuals need to prove their eligibility according to citizenship status, all applicants must have a social security number, able-bodied adults between the ages of 16 and 60 must register for work and take part in an employment and training program to which they will be referred by the SNAP office. Other restrictions are applied to students and persons on strike, and on the basis of income and resources available within the families. These new eligibility requirements might restrict participation in SNAP, which could trigger a decline in the number of people using SNAP benefits to purchase local foods at farmers markets. This could lead to income loss for some local farmers whose primary income sources are from local farmers markets.

What is the Role of Local Food Policy Councils in Supporting Access to Federal Programs?

Local food policy councils host meetings to facilitate brainstorming and the exchange of information among farmers, local government agencies, supply chain service providers, consumers, and

Figure 2. Funding Distribution and Number of Awards Related to the U.S. Department of Agriculture, Agricultural Marketing Service's Farmers Market Promotion, 2015–2025

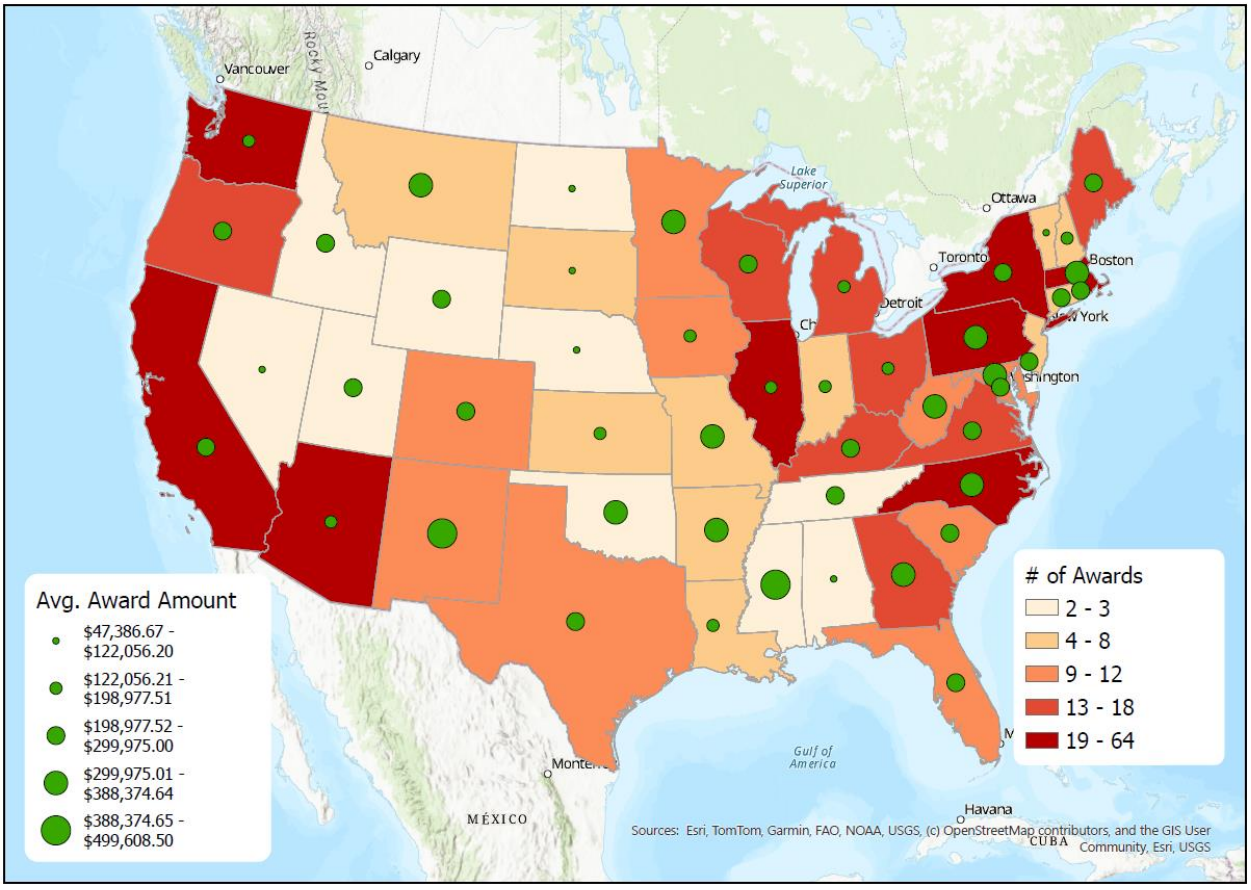


nonprofit organizations. According to a database maintained by Johns Hopkins Center for a Livable Future's Food Policy Networks (FPN) project, more than 300 food policy councils operate in the U.S. Local food policy councils are usually formed organically by groups of organizations or individuals committed to generating ideas to establish local food systems (Liang & Brown, 2019). The formation and operation of local food policy councils may be triggered by state authorities responding to specific state-level needs, or by grassroots movements in which community organizations propose and initiate the gathering with volunteers. Many local food policy councils lead initiatives by collaborating and coordinating with institutions, government agencies, and grassroot organizations to design and apply for USDA AMS program grants to enhance food security, improve food system resilience, and eliminate barriers for individuals and families to access locally grown products (e.g., USDA AMS, n.d.-b). Many local food policy councils also engage in discussions of state and federal policies to formulate scalable, adaptive, and community-oriented strategies to connect producers, government, and consumers when solving complex food system issues (see for example Gupta et al., 2018).

What Might Be the Next Iteration of the Local Food Movement in Light of Changes in National Policies?

A series of new federal policies introduced by the USDA and U.S. FDA in 2026 emphasizes achieving national health goals. Some examples of these new policies include emphasizing eating "real food," strengthening local food security, increasing local sourcing for schools, and improving food safety monitoring standards, including monitoring for chemicals and microplastics in food (USDA

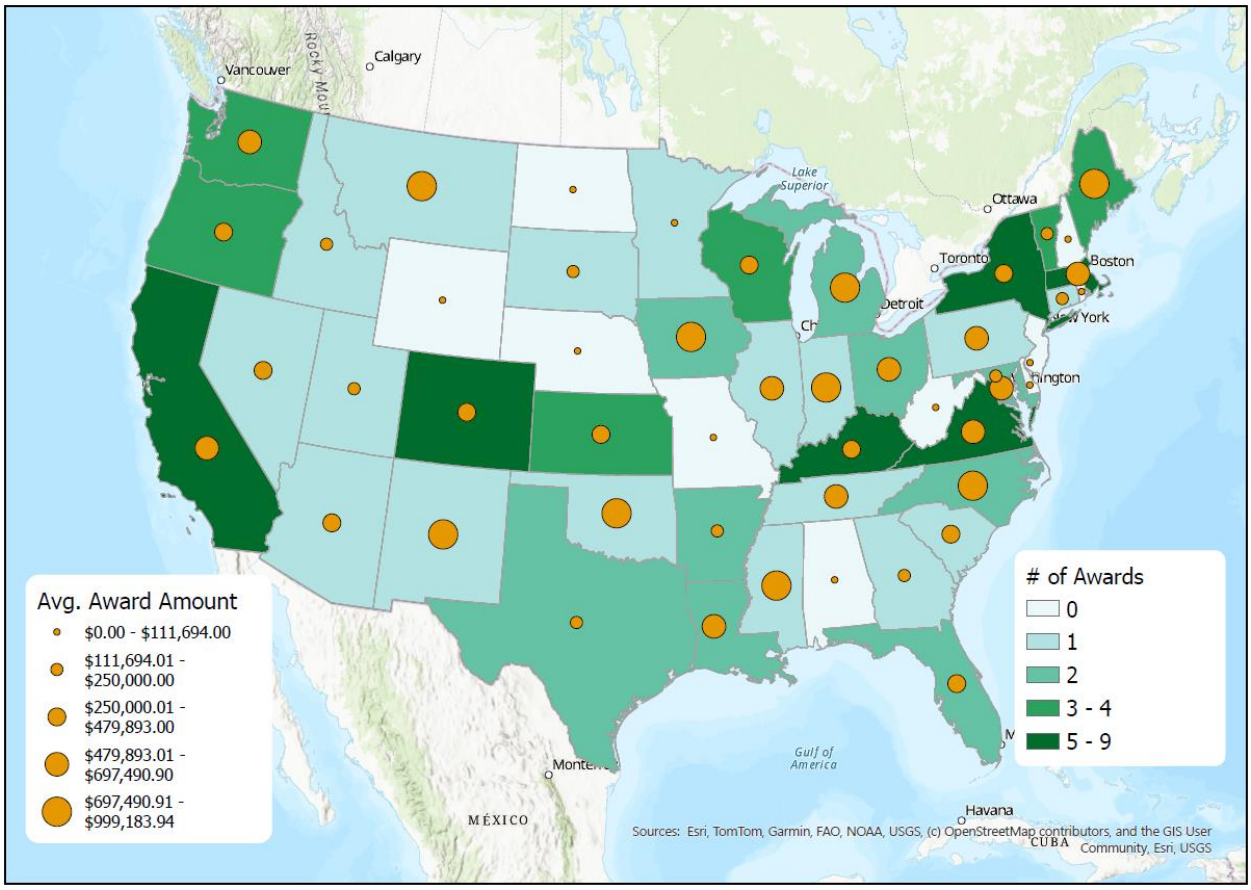
Figure 3. Funding Distribution and Number of Awards Related to U.S. Department of Agriculture, Agricultural Marketing Service's Local Food Promotion Program, 2015–2025



NIFA, 2026; USDHHS, 2026; U.S. FDA, 2026). NIFA has reinforced the importance of supporting and promoting local and regional food systems as effective approaches to "reduce food waste; support local economy; increase the biodiversity, freshness, and nutritional value of foods; and reduce food insecurity" (USDA NIFA, n.d., para. 1). Given evolving trends and national priorities, there will be new opportunities to engage and energize farmers and community organizations to reimagine the possibilities of local food systems (Liang, 2025). For example,

- USDA offers financial and technical assistance to farmers seeking opportunities to establish, expand, or transition into local and regional food market chains. However, farmers in rural areas often lack the knowledge or information to access federal or state resources. With the new efforts initiated by USDA and other agencies to enhance local and regional food systems, support is needed to establish effective, timely communication channels from federal agencies that relay program details to state governments and Cooperative Extension agents at land-grant universities, enabling them to offer information sessions for farmers and grassroots service providers. Such coordinated efforts will significantly demystify federal initiatives and turn federal policies into actionable items that can be understood and implemented at the local level by non-policy audiences.
- Small farmers or grassroots organizations in rural areas often face challenges in establishing credit lines when applying for funding or cash-matching programs to start building or growing farmers markets. There is a need to

Figure 4. Funding Distribution and Number of Awards Related to U.S. Department of Agriculture, Agricultural Marketing Service's Regional Food System Partnerships, 2015–2025



increase financial literacy training and education for farmers or organizations to maintain meaningful financial records when applying for federal or private financial assistance, such as loan and cost-share matching programs.

- Local food varieties may be limited at farmers markets and other local-oriented venues compared with those in conventional grocery stores. This is a natural limitation due to geographical environment, weather variations, and soil and land characteristics. Although local farmers would not be able to grow all the foods for customers, there are ways to reduce the barriers for farmers to extend production seasons (e.g., high tunnels), reduce pest and disease threats (e.g., technology driven sensors and monitoring), and better manage their field practices to offer high quality food as well as achieve higher profit margins from local food sales (e.g., climate resilient varieties, seed enhancement, and field monitoring using Artificial Intelligence for instant reporting and responses). National policies could support technology development, technical training, and infrastructure enhancement to improve access to data, information, analysis, and diagnosis for timely problem-solving.

- Continuing or increasing nutrition incentives would be essential to change the national health profile in the long term. Local food systems often compete with large chain stores for affordability, accessibility, and availability. The support of local food policy councils, Cooperative Extension programs, and public-private partnerships across the food, nutrition, and healthcare industries could help create and share messages aligned with national food policies and priorities to develop holistic community strategies tailored to different needs.

Food safety issues are integrated into all phases of local food development. An interview with a food safety service provider revealed some concerns and hopes for future policy design (J. White, personal communication, January 29, 2026). There is growing interest among wholesale buyers in sourcing more local food. However, many farmers are not commercial-ready due to (a) lack of food safety certification; (b) difficulties in maintaining reliable and consistent traceability; and (c) lack of reliable commitment to meet requirements in all logistics, including supplies, varieties, timing, and quality standards. Many local food hubs and co-ops serve as local aggregators for farmers. Many producers or aggregators need assistance in creating shared space or shared marketing strategies, especially in understanding the mandatory FSMA 204 rules. The FDA's FSMA 204 set the compliance starting date to January 20, 2026, but has proposed extending it to July 20, 2028 (Fragedakis, 2026). The FDA FSMA 204 set rules to require business entities (including domestic and foreign companies involved in foods on the Food Traceability List) that manufacture, process, pack, or hold foods on the FDA's Traceability List to maintain details of all records in electronic formats, which would allow for timely identification and removal of adulterated foods. Several key aspects of FSMA 204 include (a) Food Traceability List (FTL)—applies to food deemed "high risk" defined by FDA; (b) Critical Tracking Events (CTE—must record, maintain, and share information at points of harvesting, cooling, packing, shipping, and receiving; (c) Traceability Lot Codes (TLC)—must assign unique codes to specified products to facilitate rapid tracking when certain events occur; (d) 24-Hour Rule—must provide records within 24 hours per FDA requests; and (e) Traceability Plan—must develop a plan including details of gathering, maintaining, and sharing records. National policies could support these intermediary service providers within the supply chains (e.g., recordkeeping, aggregation, shipping, handling, distribution, and inspection) in achieving required compliance and in building trust and transparency for all involved in local food systems.

There are some exemptions that could benefit small-scale producers (U.S. FDA, n.d.), such as:

- Farms with annual produce sales of US$25,000 or less (on a three-year rolling average adjusted for inflation) are exempt.

- Small Retail Food Establishments (RFEs)

and restaurants with annual food sales of US$250,000 or less are generally exempt from recordkeeping requirements.

- Food grown and packaged solely for personal use on a farm, or by home gardeners, is not covered.

Direct-to-consumer and institutional exemptions include:

- Sales through farmers markets, roadside stands, on-farm stores, or CSAs are generally exempt, provided that the food is packaged on the farm, remains sealed until it reaches the consumer, and is labeled with the farm's contact information.

- Food sold or donated directly to consumers, or delivered directly to schools and institutions, may be exempt or qualify for modified requirements.

Concluding Remarks

Our world of food—what and how we grow, what and how we eat, and what happens if we eat different things—has changed dramatically. Local food issues are evolving with food safety requirements, healthy diet needs, and funding appropriation given various priorities to protect the U.S. population. The unknowns will continue to challenge us to develop new ideas and approaches. National policies related to local food systems provide a means for achieving the expected goals and serving various needs. The continuity of funding plays a key role in supporting, enhancing, and creating innovative strategies to boost the local food movement linking supply to demand for all U.S. citizens. From a research perspective, we explore the frontiers of future possibilities when faced with limited resources and time constraints. Who defines the goals, for what purposes, and in what timeframe become a critical factors for local foods systems in achieving a balance between nurturing healthy people, cultivating invigorated places, and achieving long-term prosperity.



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VIEWPOINT

Improving nutrition in Massachusetts emergency food systems: A tiered tax credit and distribution standards approach

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Introduction

Massachusetts faces a worsening food insecurity crisis: 37% of households were food insecure in 2024, up from 19% in 2019, with four regional food banks serving 882,000 people (Greater Boston Food Bank, 2025). Yet quantity alone does not ensure health. Food pantry clients consume diets high in processed foods, with Healthy Eating Index scores up to 20 points below national averages (Simmet et al., 2017), and face elevated rates of diabetes, hypertension, and cardiovascular disease (Eicher-Miller, 2020). Massachusetts bears over US$41.4 billion in annual chronic disease costs; preventing just 1% of new diabetes cases statewide would save an estimated US$66 million annually (American Diabetes Association, 2025; Massachusetts Department of Public Health, n.d.).

Two structural barriers drive poor nutrition in emergency food sources. First, donation economics favor processed foods: Shelf-stable items require no cold storage, spoilage management, or rapid logistics, while perishable produce carries significant handling costs and liability risk. Still, both receive identical tax treatment under current law. Second, nutrition standards are weak and inconsistent. Purchases funded by Massachusetts Emergency Food Assistance Program (MEFAP) account for 31% of food bank distribution (Greater Boston Food Bank, 2025) and follow the Supporting Wellness at Pantries (SWAP) and Healthy Eating Research (HER) guidelines. However, community food drives and supermarket donations largely lack standards. Capacity constraints in cold storage and staffing further limit perishable distribution (Ali, 2024; Wetherill et al., 2018).

Pending state legislation H.4373 extends civil liability protections and creates state tax credits of

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up to US$25,000 annually for food donations (Massachusetts H.4373, 2025). However, by calculating credits on fair market value regardless of nutritional quality, the bill provides no incentive for donors to choose nutrient-dense over processed foods. Further, the bill contains no distribution standards. This viewpoint argues that two targeted amendments would transform H.4373 from a donation incentive into a genuine public health instrument.

Proposed Component One: Nutrition-Tiered Tax Credits

We propose amending Section 2(b) of H.4373 to replace the uniform credit with three tiers aligned with the SWAP/HER ranking system already used by the Food Bank Coalition of Massachusetts (FBCMA) (Miller et al., 2021; Schwartz et al., 2020; Supporting Wellness at Pantries [SWAP], n.d.). Tier 1 (50% credit) covers fresh produce, lean proteins, and whole grains (SWAP/HER Green); the maximum rate offsets higher perishable handling and transport costs. Tier 2 (35% credit) applies to minimally processed staples such as low-sodium canned goods and whole-grain pasta (SWAP/HER Yellow). Tier 3 (25% credit) covers shelf-stable processed items (SWAP/HER Red); the baseline incentive is retained to discourage disposal while reducing state financial exposure. The US$25,000 annual per-donor cap and liability protections in H.4373 remain unchanged. The Department of Agricultural Resources (MDAR), in consultation with the FBCMA, would define tier classifications using existing SWAP/HER standards to minimize administrative burden.

Proposed Component Two: Minimum Nutrition Standards for State-Funded Programs

Organizations receiving US$50,000 or more in MEFAP funding must meet enforceable standards, administered by the Department of Public Health (DPH), phased in over three years. A minimum for fresh produce requires that at least 30% by weight of food distributed be fresh or frozen fruits and vegetables (20% in Year 1, 25% in Year 2, 30% in Year 3). Distributed food must meet aggregate limits on sodium, added sugars, and saturated fat per American Heart Association (2026) guidelines. Pantries must implement client-choice distribution where feasible, allowing clients to select items matching cultural preferences and dietary needs, with waivers available for mobile or emergency sites. Annual reports to DPH documenting food distribution by tier and compliance with nutrition limits are also required.

Three agencies coordinate implementation: MDAR administers tax credits; DPH enforces nutrition standards; and the Department of Transitional Assistance (DTA) integrates standards into MEFAP funding agreements. Technical assistance grants will support smaller organizations in acquiring cold storage equipment and building distribution capacity.

Evidence and Discussion

Tiered tax incentives demonstrably shift donor behavior. Following the 2005 federal expansion of enhanced food donation deductions, national donations rose 137% (ReFED, 2025). In Missouri, the annual cap on the 50% food pantry tax credit was fully claimed for the first time in 2020 (Circle of Concern, 2021). Virginia's 50% farm donation tax credit supported 2.8 million pounds of farm-to-family distribution in 2023 (Federation of Virginia Food Banks, 2024). Pennsylvania's Charitable Food Program explicitly excludes candy, soda, and snack foods from its 55% credit, confirming that nutrition-conditioned incentives are feasible (Pennsylvania Department of Community and Economic Development, 2020). Massachusetts' own Healthy Incentives Program increased fruit and vegetable consumption among SNAP participants by 0.24 cups per day (Olsho et al., 2016). The state's 2014 organic waste ban achieved a 13.2% reduction in commercial food waste through phased implementation and technical assistance (Anglou et al., 2024), demonstrating proven capacity for complex food system reform.

The proposal also generates co-benefits: Redirecting surplus business food waste reduces disposal costs; expanding fresh produce distribution stimulates local economic activity through increased demand for cold storage, logistics, and skilled workforce; and improving diet quality narrows health disparities.

Critics may argue that lower Tier 3 credits will reduce overall donations. However, most Massachusetts food donors currently receive no state credit. Tier 3 still represents a meaningful new incentive above the status quo, and evidence from Virginia suggests that tiered structures redirect rather than reduce giving. Small-pantry concerns are addressed through the US$50,000 funding threshold, three-year phase-in, and targeted technical assistance grants.

Conclusions

Amending H.4373 with nutrition-tiered tax credits and minimum distribution standards, both aligned with the SWAP/HER framework already in use, would transform Massachusetts emergency food assistance into a strategic public health tool, positioning the state as a national leader in nutrition-focused food policy. The reforms are evidence-based, administratively feasible, and modest in cost relative to the chronic disease burden they address.



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Reflections on 10 years of *An Annotated Bibliography on Structural Racism Present in the U.S. Food System*

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Abstract

This paper is a reflective essay from the Michigan State University Center for Regional Food Systems (CRFS) on 10 years of writing and updating *An Annotated Bibliography on Structural Racism Present in the U.S. Food System* (ABSR). The ABSR provides a literature compilation of research, outreach, and opinion on structural racism in the U.S. food system for the practitioner, researcher, educator, and advocate. The authors of this paper provide a comprehensive overview of the ABSR, detailing its purpose, value, applications, and evolution. They also explain how the ABSR has been integrated into CRFS's ongoing racial equity efforts. This publication concludes with learnings, outcomes, and opportunities that have emerged from the development and utilization of the ABSR.

Keywords

annotated bibliography, structural racism, equity, food justice, food systems, food sovereignty, systemic racism, race

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Introduction

An Annotated Bibliography on Structural Racism Present in the U.S. Food System (ABSR), authored by the Michigan State University (MSU) Center for Regional Food Systems (CRFS), provides a literature compilation of research, outreach, and opinion on structural racism in the food system for the practitioner, researcher, educator, and advocate (Kelly et al., 2025). The ABSR is focused on structural racism literature across and within all sectors of the U.S. food system. Annotated bibliographies on important food system topics are often developed as one-time projects, and many are not maintained or updated over time. Examples include bibliographies focused on food hubs and values-based food supply chains (Lerman et al., 2012) and local food systems in community and economic development (Smith, 2016). In contrast, CRFS has made a long-term commitment to the ABSR, now in its 11th edition and containing more than 725 citations.

The ABSR identifies literature that links the social construction of Whiteness (Guess, 2006) and its intentional or consequential impact on structural racism in the U.S. food system. It includes works that explore a variety of topics, including unequal access to land, capital, markets, and decision-making power for Black and Brown farmers, higher rates of food insecurity and poorer health outcomes for communities of color, food sovereignty and efforts by Indigenous communities to reclaim cultural foodways, conditions for food and agricultural laborers, and more. The breadth, volume, and continuity of the ABSR provides a unique opportunity to reflect—in particular, through this publication—on its history and evolution, as well as on the process of researching, curating, publishing, and promoting the resource. This article will highlight learnings, outcomes, and opportunities that have emerged from the development and utilization of the ABSR. The authors have attempted throughout to use terms that are respectful, adequately descriptive, inclusive, and have a level of acceptance by the groups in question themselves. However, we recognize that all such terms have limits, exclusions, and contentions around them, and that terminology used to describe characteristics like race, ethnicity, and gender is always evolving.

Structural Racism

Structural racism has been defined as the "normalization and legitimization of an array of dynamics—historical, cultural, institutional and interpersonal—that routinely advantage whites while producing cumulative and chronic adverse outcomes for people of color" (Lawrence & Keleher, 2004, p. 1). Structural racism is an especially pernicious form of racism because of how embedded it is in our society. Braveman et al. (2022) write:

> Racial inequities, and their ensuing socioeconomic and health consequences, persist because of deeply rooted, unfair systems that sustain the legacy of former overtly discriminatory practices, policies, laws, and beliefs. At times, these systems and structures, which are rooted in beliefs in White supremacy, operate unconsciously or unintentionally, but nevertheless effectively, to produce and sustain racial discrimination. (p. 172)

It is worth noting that the terms *structural racism* and *systemic racism* are often used interchangeably; however, some scholars explicitly use *systemic* racism to refer to racism present within whole systems (in the case of the ABSR, the U.S. food system), whereas they may use *structural* racism to refer to the structures (policies, practices, etc.) that have been put in place to perpetuate racism within those systems (Bonilla-Silva, 1997; Braveman et al., 2022). The use of the term *institutional* (or *institutionalized*) racism is often used to include both the systems *and* the structures that exacerbate racism in institutions (Braveman et al., 2022). For this article, the authors have opted to mainly use the term *structural* racism for consistency, with the "system" of focus being the U.S. food system.

One well-documented example of structural racism that has impacted the food system, among many other systems, is what is called "redlining." Historic redlining, which began in the early 1930s, targeted Black and minority neighborhoods through discriminatory lending practices, making it harder for people of color to secure mortgages (Lynch et al., 2021; Rothstein, 2017). The term "redlining" refers to the color codes used by the federal government to designate which areas were

too high risk to insure homeowners' mortgages—areas where people of color lived, or lived nearby, were colored red (Gross, 2017). According to the Federal Reserve History (2023), when the Federal Housing Administration (FHA) began its operations in 1934, "FHA staff concluded that no loan could be economically sound if the property was located in a neighborhood that was or could become populated by Black people, as property values might decline over the life of the 15- to 20-year loans they were attempting to standardize" (para. 3). The practice of redlining was explicitly condoned by the federal government as well as state and local governments. Moreover, its impacts are still evident today, as Black and other minoritized residents still experience higher rates of poverty and other inequalities (Butler et al., 2020; Gross, 2017; Swope et al., 2025). Even a "molehill of bias creates a mountain of disadvantage" (Valian, 1998, p. 54).

Housing segregation has resulted in communities where, among other outcomes, residents may have decreased access to healthy, fresh, affordable food options due to lack of an enabling food environment—with particular attention often (and somewhat controversially) focused on nearby food retail stores (Bower et al., 2014; Healthy Food Policy Project, 2022, pp. 14–23). These neighborhoods have been referred to as "food deserts" because of their sparsity of fresh food options (Ver Ploeg et al., 2011); however, critics argue the term "food apartheid" is more appropriate, as it "accounts for the idea the food inequity is not a natural occurrence based in ecological limits, but rather an explicit outcome of political economy based in structural racism and unequal geographies of access" (Joyner et al., 2022, p. 68; see also Healthy Food Policy Project, 2022; and work on structural and social determinants of health, e.g., Odoms-Young et al., 2024). Residents in these communities also experience higher rates of food insecurity and hunger (Flores-Lagunes et al., 2024; Li & Yuan, 2022). These dynamics contribute to significant public health disparities in the U.S., as residents in neighborhoods with limited access to healthy foods are more likely to suffer from diet-related diseases such as obesity, diabetes, and heart disease (Neff et al., 2009).

Structural racism manifests in other ways throughout the food system as well. In the food and agriculture industry, for example, racial and ethnic minorities make up a disproportionately large percentage of the workforce but face higher rates of discrimination, which can lead to poor physical and mental health and greater economic disadvantages (Yearby et al., 2023). There are well-documented examples of this discrimination in the restaurant industry, where servers and kitchen staff are subject to low wages as well as poor working conditions and harassment (Food Chain Workers Alliance, 2012; Restaurant Opportunities Centers United, 2013). Farmworkers, many of whom are immigrant laborers, may face unsafe working conditions, including high levels of exposure to pesticides and harmful agricultural chemicals (Ferguson et al., 2019), exposure to health- and life-threatening heat conditions (Federation of American Scientists, 2024), and higher risk of injury in dangerous industries, such as dairy farming (Keller et al., 2017). Migrant farmworkers are particularly vulnerable to working in such conditions because the threat of deportation makes many feel that they have no choice but to endure their circumstances (De Genova, 2002).

Another example of structural racism in the food system is how access to farmland for farmers and producers of color has been inhibited by the federal government. There is considerable evidence of the USDA's discriminatory lending practices against Black farmers and other groups (see USDA Equity Commission, 2024), such as denying farmers credit or access to other government support (Balvanz et al., 2011; Gilbert et al., 2002; Wallace et al., 2026). This has made it more difficult for Black farmers to purchase or keep land, affecting their livelihoods as well as those of future generations of family farmers. Going back further in history, the colonization of Indigenous lands continues to significantly affect the food systems of Indigenous communities, such as through losing traditional knowledge for growing and harvesting food and dealing with the impacts of climate change (Malli et al., 2023).

The generational impact of structural racism is stark. The U.S. food system is an excellent example of how public and private institutions have for cen-

turies upheld racist policies and practices that continue to disadvantage people of color in this country. The resources in the ABSR provide many more examples of how racism manifests in food systems and, more significantly, how we can work to dismantle it.

Food Systems

It is important to clarify that the title of the ABSR includes the phrase "U.S. food *system*," but there is not one singular food system in the U.S., or anywhere. Rather, food systems are complex networks made up of a "range of actors … involved in the production, aggregation, processing, distribution, consumption and disposal of food products that originate from agriculture, forestry or fisheries, and parts of the broader economic, societal and natural environments in which they are embedded" (Food and Agriculture Organization of the United Nations [FAO], 2018, para. 1). Moreover, they are shaped, at least in significant part, by federal, state, and local policies that have historically "entrenched patterns of power, norms, and behaviors [that exist] … at the expense of the public's health, farmers' economic independence, and the long-term capacity to sustain productive and biodiverse agricultural systems" (Shannon et al., 2015, p. 162).

Food systems are also geographically distinct and dynamic—even within the same region or locality—so it is crucial not to draw definitive conclusions about structural racism in food systems within the U.S. and beyond based on the citations included in the ABSR, but, rather, to use it as a starting point: as one resource to inform respectful inquiry in specific places and times. Solutions to food system problems vary by place, meaning that the most effective food systems transformations require innovative place-based frameworks that consider the interplay of environmental, economic, and social factors (Sonnino & Milbourne, 2022). An additional, and particularly important point was made by one of our anonymous reviewers:

> Given the deeply embedded nature of racism in the food system, the notion of "solutions" should be approached with care, with attention to scholarship—highlighted in the ABSR—that calls for substantial restructuring of the food system rather than simply "solution" oriented responses that too often address symptoms (i.e.[,] hunger) rather than root causes (i.e.[,] racism). (See also Guthman's (2024) broader critique of food system "solutionism.")

Origins and Conceptualization of the ABSR

The vision of CRFS is for a "thriving economy, equity, and sustainability for Michigan, the country, and the planet through food systems rooted in local regions and centered on food that is healthy, green, fair, and affordable" (Center for Regional Food Systems, n.d.-a, para. 1). Food systems are essential to understanding and making progress towards racial equity, and vice versa. People of color in the U.S. have had their labor, knowledge, and skills exploited by the institution of chattel slavery, as migrant workers, and as indentured servants to produce, harvest, and process food and fiber for the benefit of wealthy business owners and the public. CRFS's focus on racial equity stems from a belief, buttressed by our research, that racism creates "ever-present barriers to an equitable food system" and that only by dismantling the "barriers, procedures, and policies that harm people of color [can we] achieve a food system [wherein] everyone can access healthy food, the land to grow that food, and other resources needed to supply healthy food" (Center for Regional Food Systems, 2021, "Why Embed," para. 2–4). Credit for advancing this conversation on racial equity should also be extended to the W.K. Kellogg Foundation (WKKF), one of CRFS's funders. WKKF and other food systems funders have increasingly recognized the absolute necessity of supporting a more diverse and equitable range of food systems practitioners, and have actively encouraged food systems organizations to use a racial equity lens in their work (e.g., Sustainable Agriculture and Food Systems Funders, n.d.-a).

CRFS committed to initial steps in its racial equity journey in 2014. Individual CRFS staff, including Center leadership, had participated in various racial equity workshops and experiences over the previous years, and the consensus that emerged among staff was a need to integrate equity

across all internal and external workings of CRFS. Internal discussions that followed led to planning and implementing a racial equity retreat in 2015. During this same period, CRFS led a Michigan-based Food Hub Network of regional food distributors working to support local food economies. To guide the network, CRFS staff used resources from a partner organization's annotated bibliography that focused on resourcing food hubs and values-based food supply chains (Lerman et al., 2012). The bibliography sparked the idea for a new resource exploring the intersection of racial equity and food systems. The concept was discussed among CRFS staff and several Michigan-based and national food system leaders during the development of the Center's racial equity plan. With strong support and positive feedback, the ABSR became one of the primary strategic actions in the CRFS racial equity plan.

The rationale for the ABSR was intentional and straightforward: CRFS sought to align its organizational mission, the broader mission of Michigan State University, and the aspiring goals of its nascent racial equity plan. The ABSR was to be both an academic resource that encouraged scholarship and a strategic action to foster equitable food systems change. An interesting point, however, arose after the publication of the first edition. As we have stated, the motivation to create the ABSR sprang largely from CRFS's own perception of the need for it, alongside growing university-level commitments to diversity and the encouragement by some prominent funders. But the fact that we received some comments after the first edition that questioned why we were doing it, and that it was a stretch to claim that there was significant structural racism in the U.S. food system, reinforced the need for a resource like the ABSR in the first place.

Solicitation and Selection Process of the ABSR

The ABSR is a compilation of peer- reviewed and gray literature materials that are national, regional, and local in scope.[1] The ABSR also includes published doctoral dissertations and master's theses as well as certain video resources. Blog entries, social media posts, podcasts, and news articles are not included due to their considerable volume. However, these materials contribute significantly to the discussion on structural racism in the food system and thus should be recognized as part of the relevant public discourse.

The ABSR has, in most cases, been updated annually using two strategies. First, a call for resources is sent to national listservs and other food system practitioners and researchers who are willing to post a request for resources on their websites or social media pages. Suggested citations are accepted for a set period (typically, two to three months) and reviewed to ensure they meet simple criteria—they must address race *and* food systems, the content must pertain (at least in part) to U.S. food systems, and they must be an accepted type of literature/media, as previously described. Citation suggestions can be sent to the ABSR authors via email or, as of the 10th edition, via a Google form used to collect responses.[2] There is no limit on the number of citations someone can submit.

Second, CRFS staff and research assistants conduct searches for new resources using a curated list of food- and agriculture-related journals and organizations as a basis, along with a list of key words to systematically search journals, academic search engines, and the MSU Library.

The list of journals referenced for searching has grown with each edition of the ABSR, as has the list of key words. Examples of key word searches include structural racism, racism and food systems, Black farmers, Indigenous food systems, food sovereignty, farm workers, and food justice.

[1] Gray literature (or grey literature) is the general name for scholarly or substantive information produced outside traditional academic publishing and distribution channels, and includes technical reports, working papers, evaluation reports, conference proceedings, issue briefs, and publications from national and international nongovernmental organizations, think tanks and policy institutes.

[2] The Google form, which was accessible via CRFS's ABSR webpage and hyperlinked in the email request for citations, was a simple form to facilitate collecting resources. It included fields for contributors to add the following information about their suggested resource(s): author(s) of publication, title of publication, URL to locate the resource, and the contributor's name and email (optional) for follow-up questions. In 2022 we received 36 responses of suggested citations for the 10th edition, and in 2024 we received 69 responses for the 11th edition.

At the time of this publication, the list of keywords in the on-line research management program Zotero numbered over a thousand. The authors are currently working on condensing the keywords to make them more consistent and useful. For example, keywords such as "agricultural land," "farmland," and "land" will be combined into one tag, and a corresponding key will be developed to help users decipher which search terms to use.

Co-authors of the ABSR

An important benefit of the ABSR that came to be understood as invaluable, while not intentional at the outset, has been providing a racial equity-oriented learning experience for its authors. Across all editions, undergraduate and graduate students and post-graduate fellows interested in racial equity considerations in the food system have been engaged to search and identify appropriate literature for the ABSR. Some of these co-authors have been part of MSU's Science Research Opportunities Program (SROP), which aims to help underrepresented undergraduate students prepare for graduate study through an intensive research experience. CRFS staff have provided both guidance and mentorship for these students and fellow co-authors, and worked with them to identify appropriate resources, develop annotations, and format citations.

Two previous authors of the ABSR shared the following statements about what they learned from their experience working on the ABSR and what they think its value is to writers, educators, and researchers. Kimberly Carr, co-author for the 8th edition, stated:

> The bibliographic experience highlighted the importance and marriage of academic research and measurement, as well as a call to action for food system practitioners, encompassing advocacy, policy, and practice. The value of the bibliography is ever timelier as it relates to visibility, resilience, and the action needed for an "All of Us" approach to a more people-centered, systems-change-oriented food system. (Personal communication, April 7, 2025)

Sydnie Burnstein, co-author for the 10th and 11th editions, shared:

> While working on the annotated bibliography, I quickly recognized its role as a curated activist space where scholars intently record, reckon with, and reimagine our food systems. Altogether, the sources form a collective case study that captures the legacy of state-sanctioned violence, exposing how racism is entrenched in the policies, institutions, and everyday operations of the U.S. food system. It is a critical tool for writers, educators, and researchers seeking to employ an anti-racist praxis within their scholarship and advocacy. (Personal communication, April 22, 2025)

Applications of the ABSR

Since its inception, the ABSR's intended uses have been to help food system researchers, writers, practitioners, and activists learn about structural racism in the U.S. food system and to support and ground their written or spoken work within the relevant scholarly literature. As one food systems scholar-practitioner summarizes, the ABSR "brings together the wisdom produced by responsible knowledge producers to empower individuals and communities to reckon with structures, systems, and institutions" (N. Didla, personal communication, July 15, 2025). Over the past ten years, CRFS has heard from other food systems practitioners about some of the ways the ABSR has been useful. The authors of this paper obtained the following examples through personal communication or through in-depth internet searches for mentions of the ABSR.

As an educational resource for those interested in the intersectional work of racial equity and the food system

Based on an internet search conducted in early 2025, more than 75 national, state, and city-based nonprofit organizations, government agencies, foundations, food and farm businesses, religious groups, authors, journalists, researchers, educators, students, and consultants have listed the ABSR as a resource link on their websites. Some examples of organizations include Marbleseed, a nonprofit committed to supporting farmers transitioning toward sustainable, organic farming systems, Food Tank, a convening organization that seeks to edu-

cate and collaborate with local partners to amplify on-the-ground solutions, The Food Literacy Project, a nonprofit that provides farm-based food, nutrition, and environmental education to youth and the broader community, National Sustainable Agriculture Coalition, an alliance of grassroots organizations advocating for federal policies that support sustainable agriculture, food systems, natural resources, and rural communities, and North American Food Systems Network, a professional association that provides networking opportunities, resources, career guidance, and leadership opportunities for strengthening local and regional food systems.

As a resource tool for authors writing about equity issues in the food system

Book, periodical, and manuscript authors—including graduate students—use the ABSR to inform their publications. Authors also use the ABSR as a resource to develop presentations that focus on structural racism in the food system or closely related topics.

As an educational resource in classroom teaching and research

College instructors have used ABSR citations for class assignments or in-class exercises. For example, the ABSR was used as a resource in a graduate-level class in MSU's Department of Community Sustainability.

As evidence of academic scholarship for inclusion in a faculty or staff promotion packet

Interestingly, several researchers and educators have documented, on their websites and academic promotional packets, their included citation(s) in the ABSR as evidence of the popularity and/or proof of readership of their publication(s). This includes figures at institutions such as University of Illinois Urbana-Champaign, American University, and University of California-Berkeley.

As a resource to support an organization's own racial equity journey

The ABSR has been used as support material in service of several organizations' internal racial equity work, including university Cooperative Extension, policy centers, food policy councils, and religious organizations.

Evolution of the ABSR

Since the first edition of the ABSR was completed in 2015, the authors have implemented changes to make it more inclusive, accessible, and useful. CRFS has gathered feedback with the release of each edition, which with the authors' learnings have led to adjustments in updating and formatting the ABSR. The following section provides an overview of some of the significant ways the ABSR has evolved over the past decade.

Early Feedback Widens Racial and Ethnic Breadth of Citations

Many publications cited in the first ABSR edition examined structural racism toward Black people in the U.S. food system. Feedback on the first edition influenced, in subsequent editions, a broadened search and identification of peer-reviewed and gray literature covering racial disparities and structural racism directed toward Native Americans, other Indigenous peoples, and those of Asian and Latine descent. Additional publications were identified that shared foodway stories of Native Americans before and during European colonization, including their forced removal to reservations and how the change to a more highly processed Western diet adversely affected their health. Similarly, more literature was identified that examined disparities throughout the food system toward Asian and Latine immigrants. Through this evolution, the ABSR itself has become a more inclusive and representative resource, demonstrating its role as an active/living document that responds to community feedback and deepens our collective understanding of structural racism in the food system.

Changes to Improve Accessibility, Tracking, and Utility

Since the third edition, the authors of the ABSR have included the digital object identifier (DOI) of publications whenever possible. The DOI is useful for tracking electronic documents. With the fifth edition, the ABSR became available on Zotero, a free, online open-source management tool for collecting, managing, and citing publication sources.

Zotero provides users with an easy way to collect, organize, annotate, cite, and share literature, also enabling users to search for resources using keywords or tags. With the inclusion of Zotero, CRFS staff received feedback from authors of books and articles stating that the tool made the ABSR more accessible and useful.

Video Resources and Webinars

As feedback on the early editions of the ABSR accumulated, it became clear that limiting citations to print materials did not fully capture the range of media documenting food system structural racism. And although the written word has been and still is the "coin of the realm" in how academic institutions communicate and measure success, other forms of communication are also important for various communities, cultures, and individuals (Bentley, 2006; Latour & Woolgar, 1986). In response, the search for citations in the fifth edition of the ABSR was intentionally broadened to include video recordings, mainly films, documentaries, and TED Talks, that focus on the spoken word and visual communication.

The onset of the COVID-19 pandemic shifted most learning opportunities, trainings, and presentations onto virtual platforms such as webinars (Karl et al., 2022). At the same time, the murder of George Floyd in Minnesota catalyzed a national reckoning with racial injustice in the U.S. (Engelhardt & Kam, 2025), including a shift in rhetoric around race and racism at American higher education institutions (Grace et al., 2022; Toraif et al., 2023). During the process of updating the ABSR in 2020, the authors discovered webinars from higher education institutions that focused on structural racism found in the U.S. food system. Recognizing the significance of these timely and widely accessible resources, the ABSR team began including webinar recordings in the seventh edition, released in 2020. Since then, webinars have typically comprised at least half of the new video citations added in each update of the ABSR.

Growing Number of Citations

After 2020, the number of new resources added to each updated edition increased significantly. As noted above, the authors cite two pivotal events—the murder of George Floyd and the COVID-19 pandemic—that may have contributed to the substantial increase in new resources. Table 1 shows the growth in the number of resources for each edition. For example, in the year between the 7th edition (January 2020) and 8th edition (January 2021), there were 106 new resources added—the highest number of new additions up to that point. And in the three and a half years between the

Table 1. Number of Included Citations from First to Eleventh Edition

Edition	Year Published	Total # New Resources Added	Percentage Change in # of Resources	Overall Total by Edition [a]
1	2015 (April) [b]	—	—	32
2	2015 (June)	17	53%	49
3	2016 (Jan.)	22	45%	71
4	2017 (Feb.)	56	79%	127
5	2017 (Dec.)	56	44%	183
6	2019 (Jan.)	50	27%	233
7	2020 (Jan.)	56	24%	289
8	2021 (Jan.)	106	37%	395
9	2022 (Mar.)	125	32%	520
10	2023 (July)	143	28%	663
11	2025 (Jan.)	92	14%	755

[a] The overall totals by edition are approximate and reflect the sum of the total number of new resources added to the overall total of the previous edition. Over the years, however, resources have been removed from the ABSR during the updating process if they are no longer available online. This pertains mostly to resources without a DOI, such as gray literature, and webinar recordings. Thus, the overall total by edition count is slightly lower than what appears on this table. The 11th edition currently has 728 resources.

[b] The original edition was published in April 2015 and revised shortly after, in June 2015, to include a more expansive set of citations (see "Early Feedback Widens Racial and Ethnic Breadth of Citations" section).

release of the 7th edition (January 2020) and the 10th edition (July 2023), the number of resources in the ABSR nearly doubled, from 298 to 585.

Peer-reviewed literature on structural racism in the U.S. food system has also grown rapidly since 2015 in its diversity of topics, authorship, place-centeredness, and publication origin. This literature can be found in journals beyond those focused on agriculture and/or food, including journals that focus on policy, education, sociology, planning, law, psychology, anthropology, gastronomy, equity, culture, climate, ecology, geography, health, nutrition, medicine, nursing, and epidemiology. (See Appendix A for a complete list of journals that have resources listed in the ABSR through the 11th edition.) While further analysis is needed to explore the content of the new additions in depth and identify broad trends, it is clear that scholarship in this area continues to expand.

Addition of Themes

The 11th and most recent edition of the ABSR has a significant update from previous editions—the citations are organized into themes. As of this writing, there are over 725 citations in the ABSR. Given the volume of citations, the lead authors determined a need to categorize resources by theme to make it more accessible. As a Michigan food systems policy and planning professor noted, "Having [the ABSR] organized into themes and annotated is an extra plus so that users can quickly scan sub-topics that are of interest to them and get a quick sense of the resources before downloading the entire publication" (L. Hoey, personal communication, June 2025).

The themes were developed by reviewing the full scope of resources in the ABSR. The authors proposed 14 categories that best fit the existing resources, based on their collaborative qualitative judgement (Table 2). CRFS colleagues familiar with the ABSR were asked to review the categories and provide feedback, which was then implemented by the lead authors. The authors acknowledge that as the scholarship and advocacy on exposing food system racism continues to develop, and as we continue to receive feedback, the themes selected may change.

In the ABSR, each theme includes additional context and key terminology to help users understand the category. For example, for the theme *Activism: Frameworks, Reflection & Tools*, the following description and key terms are included:

> Description: Works that examine and or critique the role of activism, either deliberate activist frameworks, alternative food initiatives, or tools and reflections from activists
>
> Key terms: Activist critiques; alternative food activism; food justice; food sovereignty; tools for activism

Outcomes, Learnings, and Opportunities

The ABSR has created opportunities for CRFS to broaden its racial equity work through both external collaborations and internal actions. This final

Table 2. Themes and Number of Resources in Each Category [a]

Theme	#	Theme	#
Activism: Frameworks, Reflection, & Tools	74	Health, Wellness, & Nutrition	59
Agricultural Production & Food Systems Labor	124	Historical Patterns, Practice, & Trends	63
Cultural Foodways & Storytelling	82	Identity Politics & Experiences	75
Economic Impacts & Markets	75	Land: Loss, Access, & Rights	22
Educational Institutions & Extension Services	45	Local Policy: Analysis, Tools, & Organized Activism	96
Federal Policy & Governance: Action, Effects, & Analysis	36	Models, Frameworks, & Theory	110
Food Assistance & Public Assistance Programs	32	Place, Location, & Community- based Experiences	90

[a] A substantial number of citations were assigned two themes, so counts do not reflect the overall total number of citations in the ABSR.

section explores key outcomes, as well as learnings and insight gained from updating the ABSR. It concludes with opportunities for further exploration.

ABSR and Cooperative Extension's Role in Civil Dialogue on Racism

MSU is a land-grant university—an educational institution that was designated by Congress or by its state legislature to receive the benefits of the 1862 and 1890 Morrill Acts, or the 1994 Equity in Educational Land Grant Status Act.[3] The original mission of the 1862 Morrill Act was to teach agriculture and the mechanical arts, and it established the original land-grant universities (including MSU), while the 1890 Morrill Act specifically targeted Historically Black Colleges and Universities (HBCUs), and the 1994 Equity in Education Land Grant Status Act recognized and provided support to Tribal colleges and universities (Association of Public and Land-grant Universities, n.d.). The 1914 Smith-Lever Act created the Cooperative Extension System to disseminate research and learnings to respond to needs of communities (Danbom, 1986; National Institute of Food and Agriculture, 2025).

In 2016, the then-director of CRFS (and lead author for editions 1–8 of the ABSR and co-author of this publication) was contacted by the associate director of the Southern Rural Development Center (SRDC) at Mississippi State University (an 1862 land-grant university) to serve on an Extension Committee on Organization and Policy (ECOP) rapid response team. The purpose of the team was to help determine Extension's role in promoting civil dialogue on race relations in the U.S. The CRFS director was told that the primary reason for selection to the team was the Center's publication and promotion of the ABSR.

A primary action of the rapid response team was the formation of the Coming Together for Racial Understanding (CTRU) initiative, to be coordinated through the SRDC. CTRU is an Extension-initiated dialogue-to-change process developed in partnership with the dialogue-to-action organization Everyday Democracy (Walcott et al., 2020). Its goal is to facilitate new ways of working together across racial differences to foster understanding and to build trust to take collective action to address racism.

CRFS was part of the team leading the planning and design of the first national CTRU workshop in 2018. CRFS also provided some funding[4] for this first workshop through the same grant that supported the ABSR. Teams from 20 states, including from both 1862 and 1890 land-grant institutions, participated in this first workshop, with many teams receiving additional follow-up training to hold CTRU workshops with Extension staff and community partners in their own states. Through 2024, 32 states and 46 institutions have had individuals complete the training for state facilitators (G. Langford, personal communication, March 26, 2025).

An evaluation of the CTRU program has shown that it helped increase partnerships between 1862, 1890, and 1994 land grant institutions, changed hiring practices at those institutions, and increased the visibility of diversity, equity, and inclusion (DEI) work in Extension programming (Walcott et al., 2020). While such work is under heavy criticism in the current political climate, the ABSR is a resource that helps extensively establish the need for more, better DEI work, rather than a pulling back from DEI goals and principles.[5] CRFS also provided funds[6] to Michigan State University Extension (MSUE) for 10% of one of their state specialist's time to serve on the CTRU planning and design team and have a co-facilitating role in the initial national workshop. The MSUE specialist, in collaboration with other MSUE staff who participated in the 2018 CTRU session, offered two

[3] Some critics of the term and/or system of "land-grants" refer to these institutions as "land-grab universities" (Lee & Ahtone, 2020) given the violent historical practice of stealing land from Indigenous populations in the processes that allowed these lands to be "granted."

[4] Pass-through funds received by CRFS from the W.K. Kellogg Foundation.

[5] Notably, even in current political conditions, which has seen institution- and sector-wide retreats from DEI per se, the ABSR (to date) has not occasioned comment from our institution.

[6] Pass-through funds received by CRFS from the W.K. Kellogg Foundation.

Michigan training sessions in 2019. In subsequent years, the MSU Extension specialist and a CRFS staff member helped facilitate CTRU trainings in other states.

As the ABSR has become better known in the U.S. food system community, CRFS was provided opportunities to speak about the ABSR and other racial equity-related resources that CRFS developed. These opportunities included conversations with leaders of color of food system organizations in the U.S and Canada, as well as Black and Indigenous farmers and book authors. Frank conversations about privilege and race in the food system with these leaders had a significant influence on CRFS's evolution as an anti-racist organization. As previously described, the ABSR was a key initial output of the 2016 CRFS Racial Equity plan. CRFS has taken other actions aligned with the priorities of its Racial Equity Plan. For two significant examples and a more complete list of other CRFS actions aligned with its Racial Equity Plan, see Appendix B.

Insights Gained and Lessons Learned from 11 Editions of the ABSR

An annotated bibliography can be a useful tool because it helps writers, researchers, educators, and producers of other forms of media connect the central idea of their own communication with the concepts that others have shared (Merkle, 2021). The ABSR has helped create a network of related topics on structural racism and the food system. Though the ABSR is not a comprehensive collection of all aspects of or references to structural racism in the food system, it can serve as a starting point for authors.

Producing an annotated bibliography is a sound strategy for a university-based Center like CRFS to undertake, given the academic requirement for outputs that educate and inform the public, conduct research, and support students, staff, and faculty in their scholarly pursuits. In the current political climate, it can also be a useful tool for grounding the need for anti-racism and actions supporting diversity, equity, and inclusion in existing research. For those in academia, it may facilitate placing commitments to racial equity solidly within the heart of academic freedom—the freedom of an academic to "investigate and discuss the issues in his or her academic field, and to teach and publish findings without interference from administrators, boards of trustees, political figures, donors, or other entities" (American Association of University Professors, n.d., para. 1).

However, the ABSR's impact has gone far beyond academic pursuits. Significantly, the work of researching, curating, editing, promoting, and responding to feedback on the ABSR over 11 editions has been a critical strategy to build more awareness and understanding for the ABSR co-authors (CRFS staff and MSU students) and other CRFS staff regarding structural racism issues. Thus it functions as both an external and internal pedagogical tool. While creating a learning experience for its authors was not intentional at the outset of the ABSR, internal reflection through its development has allowed it to serve as both a compass and a barometer for CRFS as it navigates its own racial equity journey. At the same time, one internal priority going forward is to create further accessible syntheses of the ABSR content (starting with this paper) and to use it to more systematically inform CRFS's programs and strategies.

As with any long-term project, there are always lessons learned and processes that can be improved. For example, CRFS has not yet conducted a thorough evaluation of the ABSR, including a more in-depth examination of who uses the resource and how. This paper will help ground future evaluation of the ABSR to make it more informative for users. We also hope to incorporate a formal feedback process for making improvements to future editions of the ABSR based on user experience. In addition, we thank one of our anonymous reviewers for helping us reflect on the benefits of developing a more structured process for selecting co-authors (students and postdocs), such as creating a base set of questions to ask each potential candidate interested in working on the ABSR. We also foresee adding an agreed-upon learning/on-boarding process about the history of the ABSR and encouraging candidates to reflect upon their own perceptions of structural racism in the food system before and after their work on the project. Documenting these things would be useful to further evaluate (pre- and post-) how the ABSR

also functions as a learning tool for those who work on it.

It is also worth noting that our requests for citations were limited in that they were sent to specific (albeit with national reach) listservs, which controlled the scope of suggestions, and the ABSR co-authors' searches for resources may have been limited by factors such as their search strategies, knowledge domains, and capacities. Additionally, searches by CRFS were conducted using search terms that may have missed some resources or not fully represented the full scope of food system racial equity issues. For example, an article not explicitly naming food sovereignty might have still addressed that issue.

Additionally, though the ABSR has helped guide the work of CRFS, it would have been beneficial for the ABSR authors to conduct an analysis of the content synthesis earlier on in the updating process. For one, it may have helped the authors identify if new citations collected were reflective of cultural shifts or significant events. Moreover, an analysis could have helped identify strategies to improve the ABSR, such as implementing themes sooner. And perhaps most significantly, it could have helped scholars, practitioners, and advocates have access to a concrete and more compact "state of knowledge" review as a companion to the bibliography, especially as the number of resources began to grow past a "digestible" size.

Lastly, in addition to re-thinking our recruitment and selection process for co-authors, the authors will reflect on further internal conversations we might have throughout the production process for new editions of the ABSR. One of our anonymous reviewers asked about how authors' positionality may have affected their own experience and the overall ABSR. Since we have not had a practice of soliciting feedback, we do not have much information on the effects working on the ABSR have had on authors. And we have not done any internal assessments of how author positionality may affect the final product. We propose that our process of broadly soliciting suggestions for the resources and generally including any relevant peer-reviewed and grey literature resources implies that author positionalities may have a limited effect on what goes in the ABSR. However, as the addition of themes to the latest editions shows, there are other ways authors influence the final product, something that bears further consideration for the next editions.

Areas for Further Exploration

Updating the ABSR on a consistent, annual basis since its inception in 2015 has provided a rich data set that, with further analysis, may provide a better understanding of the cultural, social, economic, and political steps needed to create a more equitable U.S. food system. One area for further exploration is a closer examination of the great diversity of journals that are cited in the ABSR. As mentioned earlier, as of the 11th edition there are citations at the intersection of structural racism and the food system from more than 145 unique journals. A deeper analysis of the journals could provide insight into the kinds of topics regarding food system structural racism that are being published by which journals and in what quantity.

Another possibility is starting a new, companion annotated bibliography on structural racism in *global* food systems—not just the U.S. The ABSR authors opted to focus on the U.S., as it is where we work and bring the most lived expertise and relevance. Practical consideration plays a part as well; for example, for our first time creating the resource, narrowing in on the U.S. rather than attempting to characterize structural racism across the globe created a much more tractable task. Nevertheless, in our global food economy, food systems around the world are inextricably interconnected (Hueston & McLeod, 2012). Moreover, global food systems are heavily influenced by power and politics, which often create unjust food systems (Leach et. al., 2020). A professor of agroecology and critical technology states, "I see structural racism as configured through relationships—of surplus value extraction, exploitation, surveillance, control, etc.—that extend transnationally and work through unequal exchange, de-development, and other historical processes of global accumulation" (M. Montenegro, personal communication, July 1, 2025). And a food systems colleague from the United Kingdom cautioned:

> It is also important … that we don't slip into the colonial trick of universalising US based analysis, or any analysis. Instead, we must also align with the political objectives of decolonising knowledge. As such, we need to steadfastly keep our attention on difference and the particular and reveal how race has power in various geographies which are informed by distinct colonial histories and understand more closely how these racialised (and caste) hierarchies show up differently in the food systems outside of the USA. (J. Singh, personal communication, June 19, 2025)

We also note that we have received some questions on the ABSR's role in civil dialogue, considering the current federal policy, political, and funding landscape. In terms of the ABSR's future itself, we have been fortunate that the ABSR has received no direct negative feedback from funders, policymakers, or our institution. On the contrary, significant food systems funders such as the Kellogg Foundation have indicated that they are "in it for the long haul" (W. K. Kellogg Foundation, 2025; Sustainable Agriculture and Food Systems Funders, n.d.-b), and we have not been discouraged from applying to such funders. At the same time, we do seek to increase the ABSR's and subsequent resources' impact in policy and funding landscapes. The groundwork of the ABSR as it exists today was a necessary step for us. In the coming years, we hope to implement and report on further strategies through which the ABSR can provide greater value in the tumultuous political and social climate we live in.

Other suggestions for further exploration of the ABSR include:

- Which thematic areas in the ABSR contain articles/resources that are receiving the most attention (e.g., most citations in other scholarly journals);
- Which academic institutions are generating the highest volume of graduate theses and dissertations related to structural racism in the food system;
- Which journals and publishers have prioritized content focused on structural racism in the food system;
- Why the authors, researchers, and educators focused on food system structural racism chose these journals and publishers;
- Which nonprofit organizations are producing more resources (written and/or video) in this area of work;
- Which cities, states, and/or regions in the U.S. have been the focus of articles, stories, and videos;
- Can Artificial Intelligence (AI) be ethically utilized in the ABSR to enhance learnings about structural racism in the food system? If so, can it generate consistently accurate results?[7]
- And perhaps most compellingly, how can the ABSR contribute more effectively to relevant social change, particularly in the current political landscape?

Further exploration of these and other examples will be part of a forthcoming peer-reviewed paper in preparation. The authors of this publication encourage you—the reader—to explore the latest edition of the ABSR and use it to help inform your understanding and the central ideas of the story you wish to share about structural racism in the U.S. food system.

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[7] We are also exploring if and how AI can be *responsibly* trained on and utilized within the ABSR to answer specific questions about structural racism in the U.S. food system. There is a plethora of research about AI and its potential benefits and risks (Slattery et al., 2026), including environmental harm and inequitable effects on communities. It is likely that the use of AI will continue to grow and become more integrated in our lives. Although the authors of this paper are not advocating for or against AI specifically, conversations about the use of AI in food systems work are burgeoning, and there may be future approaches that decrease potential harm and inequity. For instance, the Center for Integrated Agricultural Systems at the University of Wisconsin recently announced a webinar series, "Food Supply Networks and AI," which explores whether and how AI tools may have the potential to create more equitable, sustainable food systems (n.d.)

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Appendix A

List of Journals with Citations in the ABSR

As of the 11th edition of the ABSR, there are citations at the intersection of structural racism and the food system from more than 145 unique academic journals. Although many of the journals specialize in food, agriculture, and/or closely related fields (e.g., public health), the list also includes journals that focus on topics such as culture, climate, education, law, and geography.

1. Antipode
2. Agriculture and Human Values
3. Geoforum
4. Journal of Agriculture, Food Systems, and Community Development
5. Culture, Agriculture, Food, and Environment
6. Whiteness and Education
7. American Journal of Public Health
8. Cultural Geographies
9. The Professional Geographer
10. Humanity and Society
11. Frontiers in Sustainable Food Systems
12. Humanities
13. Journal of Agrarian Change
14. Environment and Society
15. Journal of Rural Studies
16. Food, Culture and Society
17. Journal of Political Ecology
18. Food and Foodways
19. Environmental Justice
20. Gastronomica
21. Graduate Journal of Food Studies
22. American Indian Culture and Research Journal
23. Global Food History
24. Ecological Processes
25. Food Security
26. International Journal of Critical Geographies
27. Climatic Change
28. Human Geography
29. Digest: A Journal of Foodways and Culture
30. Feminist Studies
31. Journal of Urban and Regional Research
32. Journal of Law, Medicine, and Ethics
33. International Journal of Environmental Research and Public Health
34. Journal of Racial and Ethnic Health Disparities
35. Preventative Medicine
36. Cornell Hotel and Restaurant Administration Quarterly
37. Built Environment
38. Pacific Historical Review
39. Health Education Research
40. Cityscape
41. Californian Journal of Health Promotion
42. UC Irvine Law Review
43. Journal of Public Policy and Marketing
44. New Design Ideas
45. PLOS ONE
46. Health and Place
47. Agriculture and Food Security
48. Appetite
49. Anthropology of Work Review
50. Socialism
51. Health Promotion Practice
52. Journal of Critical Dietetics
53. American Journal of Health Promotion
54. Tribal College Journal of American Indians in Higher Education
55. Native American and Indigenous Studies
56. Critical Studies in Education
57. Elementa: Science of the Anthropocene
58. Drake Journal of Agricultural Law
59. Journal of the Agricultural and Applied Economic Association
60. Journal of Agricultural and Applied Economics
61. American Journal of Economics and Sociology
62. Renewable Agriculture and Food Systems
63. Civil Liberties Law Review
64. Agricultural Finance Review
65. Journal of Agricultural and Environmental Ethics
66. Journal of Peasant Studies
67. Texas Law Review
68. Professional Agricultural Workers Journal
69. Applied Economics
70. Quarterly Journal of Economics
71. JAMA Network Open
72. UC Davis Law Review
73. Human Organization
74. Journal of Community Health
75. Georgetown Journal on Poverty and Law Review
76. Food Policy
77. Preventing Chronic Disease
78. American Journal of Preventative Medicine
79. Local Environment
80. Health education Research
81. Food Quality and Preference

82. Nutrition Reviews
83. Journal of Best Practices of Health Professions Diversity
84. Journal of Immigrant and Minority Health
85. Sustainability
86. Nutrition Research Review
87. Health Promotion Practice
88. Family and Community Health
89. University of Memphis Law review
90. Epidemiology
91. Politics, Groups, and Identities
92. Southern University Law Review
93. Culture, Agriculture, Food and Environment
94. Gerontology and Geriatric Medicine
95. Journal of Multidisciplinary Research
96. American Journal of Community Psychology
97. Multidisciplinary Global Contexts
98. Sociology Compass
99. Nursing Research
100. Fordham Law Review
101. Civil Liberties Law Review
102. Southern Rural Sociology
103. Journal of African American History
104. Journal of African American Studies
105. Western Historical Quarterly
106. Applied Economic Perspectives and Policy
107. University of South Carolina Upstate Student Research
108. Journal of American Ethnic History
109. Journal of Agromedicine
110. Anthropology of Food
111. Ecology of Food and Nutrition
112. International Journal of Sociology of Agriculture and Food
113. Hastings Law Journal
114. Urban Geography
115. Journal of the Academy of Nutrition and Dietetics
116. Society and Natural Resources
117. Journal of Culture and Agriculture
118. Rural Sociology
119. Agroecology of Sustainable Good Systems
120. Graduate Journal of Food Studies
121. Humanity and Society
122. Social Identities
123. Built Environment
124. Urban Agriculture and Regional Food Systems
125. Sociation Today
126. Social Sciences
127. Sociological Spectrum
128. Environmental Practice
129. Sociological Inquiry
130. Annals of the American Association of Geographers
131. Agricultural Systems
132. Environment and Society: Advances in Research
133. Current Developments in Nutrition
134. Environment and Planning D: Society and Space
135. The Scholar
136. Argumenta
137. Environment and Planning F: Philosophy, Theory, Models, Methods, and Practice
138. Harvard Environmental Law Review
139. Health Policy and Planning
140. Journal of Planning and Education Research
141. Nature and Space
142. Social Science and Medicine
143. Annals of Anthropological Practice
144. Journal of American Planning association
145. Applied Geography
146. The Good Society

Appendix B

CRFS Actions Aligned with its 2016 Racial Equity Plan

The ABSR was a key initial output of the 2016 CRFS Racial Equity Plan. However, CRFS has taken other actions aligned with the priorities of the Plan. Below are two examples that provide additional detail, as well as a bulleted/abbreviated list of additional actions.

Racial Equity in the Food Systems Workgroup

Established in 2018, Racial Equity in the Food System (REFS) is a national workgroup whose members are Cooperative Extension professionals and community leaders. REFS' priority goal is to help other food system educators and leaders to connect, learn, and collaborate to build racial equity within the food system and the institutions and organizations in which they work. REFS national webinars on a variety of topics have drawn food system leaders and advocates from hundreds of nonprofits, and educators at universities and colleges from all 50 states, including the 1862, 1890 and 1994 land grant institutions. In 2025, CRFS supported Professor Brandy Phipps at Central State University (an 1890 land-grant) to lead REFS' continuing programming.

Measuring Racial Equity in the Food System: Established and Suggested Metrics

Published in 2019, Measuring Racial Equity in the Food System: Established and Suggested Metrics[8] is a tool that offers an expansive list of metrics that U.S. food system practitioners and food movement organizations can use to hold themselves accountable for progress towards a more equitable food system. The metrics are described, cited, and organized by themes: food access, food and farm business, food chain labor, and food movement.

Other examples of actions related to the 2016 CRFS Racial Equity Plan include:

- Racial equity emphasis in the 2022 Michigan Good Food Charter[9]
- Publication of the report *Delivering More Than Food: Understanding and Operationalizing Racial Equity in Food Hubs*[10] (2020)
- Involvement in the MSU CANR Diversity Equity and Inclusion (DEI) Committee (2018-2020)
- CRFS staff participation in workshops and trainings and webinars as part of annual plans of work (2015 to present; note that given the current climate, this was mandated to be "optional" starting in 2025)
- Inclusivity and equity focus at the 2019 Michigan Farm to Institution Network (MFIN) Gathering
- Annual staff self-evaluation on being an inclusive workplace (2016-present)
- Racial Equity and Food Sovereignty Postdoctoral Fellow (July 2019–June 2020)
- DEI committee lead for the USDA-funded Gus Schumacher Nutrition Incentive Program (GusNIP) (2020–2022)
- Centers for Disease Control and Prevention (CDC) grantee national training on racial equity in the food system (2019)

[8] https://www.canr.msu.edu/resources/measuring-racial-equity-in-the-food-system
[9] https://www.canr.msu.edu/michiganfood/index
[10] https://www.canr.msu.edu/resources/delivering-more-than-food-understanding-and-operationalizing-racial-equity-in-food-hubs

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Understanding demand for agriculturally integrated neighborhoods: Characteristics, health behaviors, and design preferences among prospective homebuyers

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Abstract

Agrihoods are residential communities intentionally designed around agriculture and green space to foster connections with food, nature, and neighbors. Despite their growing popularity, little is known about who is drawn to these developments or the amenities they value. This study examined the characteristics, health behaviors, and housing priorities of prospective agrihood homebuyers. From March to July 2024, adults interested in purchasing a home in a Fort Bend County, Texas, agrihood (N = 128) completed an online survey distributed through the developer's marketing chan-

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nels. Measures included sociodemographics, health behaviors (time spent in nature, amount of sleep, physical activity, fruit and vegetable consumption), housing priorities, and willingness to pay more or extend commutes for specific amenities. Respondents were predominantly female, racially and ethnically diverse, middle-income, and highly educated. Although many respondents reported health behaviors below national recommendations, they expressed interest in health-promoting amenities. Affordability, school quality, and proximity to important places and people emerged as key housing priorities, while most respondents indicated they would be willing to pay more or extend their commutes to gain access to opportunities for physical activity, nature, fresh produce, social spaces, and agricultural features. These findings suggest that agrihoods may not only attract individuals already engaged in healthy lifestyles but also those who view these environments as potential catalysts for positive behavior change. As such, agrihoods may represent a promising setting for embedding preventive health promotion into residential development. Longitudinal research is needed to determine whether relocation to an agrihood translates into measurable improvements in health outcomes.

Keywords
agrihood, residential design, urban agriculture, health behaviors, community health, food systems, community agriculture, built environment, sustainable development, healthy living

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Introduction and Literature Review

Chronic diseases such as heart disease, diabetes, obesity, and certain cancers are leading causes of death and disability in the U.S., accounting for an estimated 90% of health care expenditures and contributing substantially to reduced quality of life (Centers for Disease Control and Prevention [CDC], 2025; Hacker, 2024; Kochanek et al., 2022). Modifiable health behaviors (e.g., diet, physical activity, social engagement) play a crucial role in both the prevention and progression of these conditions and are largely shaped by the environments in which people live (CDC, 2024; Office of Disease Prevention and Health Promotion, n.d.; Rahelić et al., 2024; Zhang et al., 2023). A recently published meta-analysis revealed that closer residential proximity to grocery retailers is associated with higher dietary quality, greater residential walkability and access to space for exercise is associated with higher levels of physical activity, and greater diversity in residential land use is associated with lower body weight (Dixon et al., 2021).

To support these health and quality of life benefits, innovative community designs have emerged that integrate residential living with local food systems and green space. One such model is the "agrihood," an agriculturally integrated residential development designed to foster stronger connections between residents, their food sources, and natural environments suitable for safe outdoor activities (Norris, 2018). The developments often feature a working farm as a central amenity, complemented by trail networks, communal gathering areas, and other infrastructure to promote sustainability, active living, and social cohesion. By shortening the food supply chain and encouraging local production, agrihoods may contribute as well to reduced environmental impacts associated with long-distance food transportation. Agrihoods can also

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help support local economies through job creation for farming, food production, and community-based enterprises, as well as increase property values and local commerce (Breger, 2020; Donnally, 2015; Murphy, 2014; Norris, 2018).

Despite growing interest in agrihoods across the U.S. and globally—an estimated 200 agrihoods now span more than 30 states (National Association of Homebuilders, 2024; Norris, 2018)—limited research has investigated who chooses to live in these communities, how such environments influence health behaviors, and the extent to which prospective homebuyers value specific agrihood features (Lewis et al., 2025; Norris, 2018). Although the literature supports the benefits of proximity to fresh food, walkable infrastructure, and green space, the associations have not been thoroughly examined in agrihood-specific contexts (Lewis et al., 2025). Furthermore, understanding the characteristics of individuals drawn to these communities is essential, as self-selection into health-promoting environments may affect observed outcomes and the broader scalability of agrihoods as a public health strategy (James et al., 2015).

Prospective homebuyer preferences are equally important for guiding developers, planners, and policymakers. Insights into how much value potential residents place on amenities such as farms, trails, or communal spaces, and whether willingness to pay more or to extend commutes for these amenities varies by sociodemographic group, can help align design and marketing strategies with community-identified needs. Such information is also critical for promoting equitable access to mixed-use land that has the potential to protect local food systems and reduce chronic disease risks.

To address these gaps, this study examined the sociodemographic characteristics, health behaviors, and purchasing preferences of a sample of individuals interested in buying homes in a planned agrihood development in the southern U.S. Specifically, we explored (1) whether these prospective residents represented diverse populations, (2) whether they were currently engaging in behaviors associated with health and wellbeing, and (3) the extent to which they valued certain health-promoting neighborhood features.

Applied Research Methods

Details regarding the study design, participant recruitment, survey measures, and analytic approach are provided below.

Design

The present cross-sectional study served as formative research to inform a larger project examining longitudinal changes in health behaviors and outcomes among agrihood residents compared to those in a nearby development matched on home prices and square footage, zoning, and mixed-use amenities (Maddock et al., 2025). An online survey was administered from March to July 2024. The survey was designed to take approximately 12–15 minutes to complete and was available in English, consistent with the developer's English-language marketing materials and recruitment channels through which the survey was distributed. Study procedures were approved by the Baylor University Institutional Review Board prior to beginning recruitment efforts.

Respondents

The study was focused on Indigo Community,[1] a planned agrihood located in Richmond, Texas, approximately 28 miles southwest of downtown Houston in Fort Bend County. Respondents were recruited online based on their expressed interest in purchasing a home in Indigo, identified through the developer's website,[2] email listservs, and direct communication (e.g., one-on-one emails, phone conversations, scanned QR codes on flyers available onsite at welcome centers) targeting prospective homebuyers. Eligible respondents were 18 years or older, and consent was given at the start of the survey. Of the 307 adults who initiated the survey, 171 consented, and 128 completed all items and were included in the final sample.

[1] https://www.indigocommunity.com
[2] https://www.meristemcommunities.com

Measures

Survey items were developed by the research team with 40 questions total, including a mix of multiple choice, open-ended response, and ranking formats. Most measures were derived or adapted from existing validated sources.

Sociodemographic Characteristics

Sociodemographic items were derived from the Centers for Disease Control and Prevention (CDC) 2022 Behavioral Risk Factor Surveillance System (BRFSS) survey (CDC, 2022). Respondents were asked to provide their current relationship status, highest grade or year of school completed, whether they currently owned or rented their home, how many bedrooms were in their current home, their current state of residence, the type of region in which they currently resided (urban, suburban, or rural), current employment status, how many children less than 18 years of age currently living in their household, annual household income from all sources, self-reported race and ethnicity, age in years, sex at birth, and sexual orientation.

Health Behaviors

Health behavior items were derived from various sources. First, nature exposure was measured using a previously validated two-item measure assessing frequency and duration (Maddock et al., 2022). The first question measures frequency of visits to nature areas and was adapted from the Monitor of Engagement with the Natural Environment (White et al., 2019). The second question measures duration in nature (in this case, the previous year) and comes from the Nature of Americans Study (Kellert et al., 2017; White et al., 2019). Physical activity was measured using a single item asking respondents to report typical weekly moderate and vigorous physical activities lasting at least ten minutes (i.e., where their heartbeat increases and they breathe faster) during both leisure time and transport (Danquah et al., 2018, p. 2). This item is included in the Nordic Physical Activity Questionnaire short version (NPAQ-short), which has established test-retest reliability and acceptable kappa correlations (Danquah et al., 2018). Total hours per week in moderate and vigorous physical activity (MVPA) were calculated. Fruit and vegetable consumption was measured using six items from the Behavioral Risk Factor Surveillance System (BRFSS)[3] (CDC, 2022), which asked respondents to report usual dietary intake (e.g., fruit, fruit juice, leafy greens, fried or other kinds of potatoes, other vegetables) in the past 30 days. The median frequency of fruit and vegetable daily intake was first calculated by converting weekly and monthly intake into daily intake by dividing the frequency of weekly or monthly reported intake by 7 or 30, respectively. Subsequently, the frequencies of all fruit and vegetable variables were summed to obtain the total frequency of fruit and vegetable intake. Exclusion criteria included those who reported implausible values (e.g., consuming fruits >16 times and vegetables >23 times per day). The median was then calculated using total daily fruit and vegetable intake frequency as a continuous variable (Lee & Moore, 2017). Sleep was measured by an item from the Pittsburgh Sleep Quality Index (PSQI) survey, which asked respondents to report on their usual total hours of sleep per night in the past 30 days (Buysse et al., 1989). General perceived health status was measured using the 2022 BRFSS single-item for Health Status: "Would you say that in general your health is: Excellent, Very Good, Good, Fair, Poor" (CDC, 2022).

Prioritized Agrihood Features

Items related to agrihood features were developed to assess preferences and rank priorities of neighborhood design features and number of bedrooms in prospective and current homes. Items were also developed using the contingent valuation method (Carson, 2000; Markandya et al., 2019; Mitchell & Carson, 1989) to estimate what people would be willing to pay and how much time they would be willing to spend driving in order to live in a development with specific neighborhood health and wellbeing design features. Respondents were asked to drag-and-drop the following items: "Zoned for good schools," "Price of home," "Proximity to work or other frequented locations," "Proximity to

[3] https://www.cdc.gov/brfss/index.html

family or current close friends," "Walking distance to trails," "Walking distance to fresh fruits and vegetables and healthy foods," "Places nearby to exercise or be physically active," "Easy access to nature and outdoor spaces," "Walking distance to parks or playgrounds," "Having safe places to walk for fun or to get to places," "Easy opportunities and/or places to interact with others in the neighborhood," "Peacefulness of the community," "Living near people like myself," "Having a farm, agriculture, Community Supported Agriculture program (CSA), or large community garden within the neighborhood," and "Organized events and/or programming within the neighborhood" according to their importance (i.e., Extremely Important, Very Important, Moderately Important, Slightly Important, or Not At All Important). Respondents were also asked to rank these same fifteen items from 1 to 15, 1 being most important when looking for a house or place to live.

Respondents were asked questions about how much more they would be willing to pay for a similar house that: has access to more outdoor spaces and nature, has access to more places to walk and/or be physically active (e.g., trails, sidewalks, parks, fitness places); has access to more fresh fruits and vegetables and other healthy foods; that is in a neighborhood with a farm, agriculture, a CSA, or a large community garden; or that is in a neighborhood with easy opportunities and/or places to interact with others in the neighborhood, with six multiple-choice response options (i.e., None at all, $5,000 more, $10,000 more, $15,000 more, $25,000 more, or $50,000 more.[4] Respondents were also asked, "When looking at homes in the Indigo Community, how many bedrooms are in the home you are most interested in?" To ascertain willingness to add to commute times, respondents were asked: "How many minutes would you be willing to add to your daily commute to live somewhere that provides you with the following neighborhood amenity or resource?" Specified amenities were access to open outdoor space and nature; access to fresh fruits and vegetables and healthy foods, places to walk and/or be physically active (e.g., trails, sidewalks, parks, fitness places); opportunities and/or places to interact with others in the neighborhood; and a farm, agriculture, CSA, or a large community garden, with seven multiple-choice response options (10 minutes, 10–20 minutes, 20–30 minutes, 30–45 minutes, 45–60 minutes, More than 60 minutes, or I would not be willing to add more time to my daily commute to have access to this amenity).

Data Collection and Analyses

Data were collected using the Qualtrics platform. After surveys were completed, the research team checked for completeness and accuracy of responses. Descriptive analyses were calculated to summarize sociodemographic characteristics, health behaviors, and neighborhood preferences. Analyses were conducted using SPSS.

Results

Among our sample of 128 respondents, most were female (71.4%) and middle-income (54.7% reported annual household incomes between $50,000 and $150,000). A little over half identified as non-Hispanic White (57.0%), followed by 15.6% Black, 12.5% Hispanic, and 13.3% Asian. About two-thirds (64.8%) owned their home, and nearly half (49.0%) had children under 18 living in their household. Ages ranged from 22 to 81 years, with a median age of 39 years (interquartile range [IQR]: 32–53 years). Most respondents were highly educated, with 87.5% reporting having obtained a college degree. Table 1 provides complete descriptive statistics.

In a typical week, 39.4% of respondents reported spending less than one hour in nature. During the previous month, 34.6% reported sleeping fewer than seven hours per night, falling short of the American Academy of Sleep Medicine and Sleep Research Society's joint recommendation for promoting optimal health for adults, ≥7 hours of sleep per night (Watson et al., 2015), with only 28.9% reporting at least eight hours per night. About two-thirds (63.2%) self-reported meeting physical activity guidelines, ≥150 minutes of moderate-to-vigorous physical activity per week (U.S. Department of Health and Human Services, 2018),

[4] All currencies are in US$.

Table 1. Respondent Sociodemographic Characteristics

Characteristic	Number (%)
Sex (*N* = 126)	
Male	34 (27.0)
Female	90 (71.4)
Prefer not to answer	2 (1.6)
Sexuality (*N* = 126)	
Lesbian or Gay	2 (1.6)
Straight (that is, not gay)	105 (83.3)
Bisexual	8 (6.3)
Something else	5 (4.0)
I don't know the answer	1 (0.8)
Prefer not to answer	5 (4.0)
Race and Ethnicity* (*N* = 128)	
American Indian	1 (0.8)
Asian	17 (13.3)
Non-Hispanic Black	20 (15.6)
Hispanic	16 (12.5)
Native Hawaiian	0 (0.0)
Non-Hispanic White	67 (52.3)
Other	10 (7.8)
Marital Status (*N* = 128)	
Married	82 (64.1)
Divorced	16 (12.5)
Widowed	3 (2.3)
Separated	2 (1.6)
Never married	15 (11.7)
Member of an unmarried couple	10 (7.8)
Educational Attainment (*N* = 128)	
Grade 12 or GED (high school graduate)	1 (0.8)
College 1–3 years (some college or technical school)	15 (11.7)
College 4 years or more (college graduate)	54 (42.2)
Post-graduate degree (e.g., MS, EdD, PhD, MD, JD)	58 (45.3)
Current Residence Ownership Status (*N* = 128)	
Own	83 (64.8)
Rent	33 (25.8)
Other arrangement	12 (9.4)
Current Residential Urbanity–Rurality (*N* = 128)	
Urban	32 (25.0)
Suburban	94 (73.4)
Rural	2 (1.6)
Employment Status (*N* = 128)	
Employed for wages	88 (68.8)
Self-employed	14 (10.9)
Out of work ≥ 1 year	1 (0.8)
Homemaker	10 (7.8)
Student	1 (0.8)
Retired	14 (10.9)

continued

averaging 3.95 hours/week (SD=3.3). About two-thirds (65.6%) reported consuming 28 servings or less of fruit per month (less than one per day, on average, compared to the recommended two servings per day) and 62.4% reported consuming 12 servings or less of vegetables per month, less than half a serving per day, on average, compared to the recommended 2.5 servings per day (U.S. Department of Agriculture & U.S. Department of Health and Human Services, 2020). Overall, 52.2% rated their general health as Very Good or Excellent.

Common measures of home ownership preference, including price (93.2%), quality of schools (59.5%), proximity to work or other frequented locations (56.5%) and proximity to family and close friends (51.8%) were frequently rated as being Extremely Important or Very Important by respondents. Features supporting active and healthy lifestyles were also highly valued, including having safe places to walk (83.1%), community peacefulness (79.0%), easy access to nature and outdoor space (76.1%), proximity to physical activity opportunities (62.9%), and walking distance to parks or playgrounds (66.1%), trails (65.3%), or fresh and healthy food outlets (49.6%). Social and community-oriented features were less frequently rated as essential, including places to interact with others (45.6%), living near like-minded people (40.3%), having a community garden, farm, or CSA (27.3%), and organized community events (16.8%). Most respondents were willing to extend commute times for access to walkable areas (86.7%) and to pay more for a home with better walkability (83.6%), with 25.8% willing to pay $15,000 or more. Many also reported willingness to pay more and extend commutes for access to nature (76.6% and 85.9%, respectively), although fewer were willing to pay more or extend commute times for access to a community farm or garden (53.9% and 62.5%, respec-

Table 1, continued

Annual Household Income (in US$) (*N* = 126)	
Less than $25,000	1 (0.8)
$25,000 to < $35,000	0 (0.0)
$35,000 to < $50,000	3 (2.4)
$50,000 to < $75,000	16 (12.7)
$75,000 to < $100,000	21 (16.7)
$100,000 to < $150,000	32 (25.4)
$150,000 to < $200,000	19 (15.1)
Number of Children (<18 years of age) in Home (*N* = 123)	
0	62 (50.4)
1	27 (22.0)
2	23 (18.7)
3	8 (6.5)
4	0 (0.0)
5	3 (2.4)

* Respondents could select more than one category

tively), or to spaces that facilitate social interaction (53.9% and 62.5%, respectively). More specifically, more than half indicated willingness to extend commutes by more than ten minutes for nearby places to be active (57.8%) and be in nature (61.8%), with less than half indicating willingness for nearby places in order to access fresh food (41.0%), social spaces (35.9%), and a community farm or garden (33.6%). See Tables 2 and 3.

Discussion

This study provides an early exploration of the demographic, behavioral, and community preferences of adults considering relocation to an agriculturally integrated neighborhood ("agrihood"). Overall, the findings suggest that agrihoods and their design features may appeal to a range of prospective homebuyers, with greater prioritization of physical activity and nature-related features than agriculture or social features, and moderate interest in access to fresh food. Our sample of 128 respondents was sociodemographically diverse in age (22–81 years), race and ethnicity, and income, although respondents were more likely to be highly educated (87.5% with a college degree), middle-

Table 2. Respondents' Willingness to Pay More Money for Agrihood Amenities (*N* = 128; all amounts in US$)

Willingness to Pay	None	$5,000	$10,000	$15,000	$25,000	$50,000
More Outdoor Spaces and Nature	30 (23.4%)	37 (28.9%)	28 (21.9%)	18 (14.1%)	9 (7.0%)	6 (4.7%)
More Places to Walk and/or Be Physically Active	21 (16.4%)	45 (35.2%)	29 (22.7%)	21 (16.4%)	7 (5.5%)	5 (3.9%)
More Fresh Fruits, Veggies, and Other Healthy Foods	51 (39.8%)	54 (42.2%)	12 (9.4%)	6 (4.7%)	2 (1.6%)	3 (2.3%)
Neighborhood With Farm, Agriculture, CSA or Large Community Garden	59 (46.1%)	45 (35.2%)	13 (10.2%)	7 (5.5%)	1 (0.8%)	3 (2.3%)
Easy Opportunities and/or Places to Interact with Others in the Neighborhood	59 (46.1%)	38 (29.7%)	18 (14.1%)	6 (4.7%)	3 (2.3%)	4 (3.1%)

Table 3. Respondent Willingness to Commute More Minutes for Agrihood Amenities (*N* = 128)

Commuting Minutes	None	10	10–20	20–30	30–60	> 60
More Outdoor Spaces and Nature	18 (14.1%)	31 (24.2%)	48 (37.5%)	20 (15.6%)	10 (7.9%)	1 (0.8%)
More Places to Walk and/or Be Physically Active	17 (13.3%)	37 (28.9%)	41 (32.0%)	23 (18%)	9 (7.1%)	1 (0.8%)
More Fresh Fruits, Veggies, and Other Healthy Foods	37 (29.1%)	38 (29.9%)	33 (26.0%)	10 (7.9%)	9 (7.1%)	0 (0.0%)
Neighborhood With Farm, Agriculture, CSA or Large Community Garden	48 (37.5%)	37 (28.9%)	22 (17.2%)	13 (10.2%)	8 (6.3%)	0 (0.0%)
Easy Opportunities and/or Places to Interact with Others in the Neighborhood	28 (37.5%)	34 (26.6%)	25 (19.5%)	14 (10.9%)	6 (4.7%)	1 (0.8%)

income (54.7% reporting annual household incomes between $50,000 and $150,000), and female (71.4%). Nearly two-thirds were current homeowners, and almost half had children under 18 years of age living in the household.

Compared to the broader population of Richmond and Fort Bend County, our survey response sample reflected a somewhat distinct demographic profile. From 2019–2023, the estimated median household income in Richmond was $87,282, and $113,409 in Fort Bend County (U.S. Census Bureau, 2023). Educational attainment was considerably higher in our sample than in both Richmond (36.7% bachelor's degree or higher) and the county overall (49.3%) (U.S. Census Bureau, 2023). Females were also overrepresented (71.4% compared to 51.0% in both Richmond and Fort Bend County) (U.S. Census Bureau, 2023). The local median ages resembled our sample, 34.9 years in Richmond and 37.1 years countywide, which captured a range of both younger and older prospective homebuyers (U.S. Census Bureau, 2023). Racial and ethnic diversity was lower than that of the surrounding communities: Richmond and Fort Bend County include sizeable Hispanic (39.0% and 24.0%, respectively) and Black (18.0% and 20.0%, respectively) populations. Although our sample is distinct from the surrounding area, it does not necessarily reflect all who are interested in agrihood living, considering our limited response rate.

Despite strongly expressed interest in a community model emphasizing opportunities for physical activity and nature, and tempered interest in opportunities related to food systems, many respondents reported relatively low engagement in recommended health behaviors. About two-fifths (39.4%) spent less than one hour per week in nature, about one-third (34.6%) slept fewer than the recommended seven hours per night, and 36.8% fell short of recommended physical activity levels (i.e., they reported engaging in less than 150 minutes of moderate-to-vigorous physical activity per week). Fruit and vegetable consumption was also below public health guidelines, with nearly two-thirds (65.6%) consuming less than one serving of fruit daily and a similar proportion (62.4%) consuming less than half a serving of vegetables daily. Although over half rated their general health as Very Good or Excellent, self-reported perceptions did not consistently align with evidence-based health behaviors, underscoring an important opportunity for built environment designs to support healthier daily routines.

Homebuying preferences reflected both conventional and health-oriented priorities. Traditional factors such as price (93.2%), school quality (59.5%), and proximity to work or other frequented locations (56.5%) and to family and close friends (51.8%) remained central. However, many respondents also prioritized features linked to healthier living, such as safe places to walk (83.1%), peaceful surroundings (79.0%), and easy access to nature and outdoor spaces (76.1%). Social or communal features such as organized events and proximity to like-minded neighbors were less frequently prioritized, although a substantial proportion of residents expressed a willingness to financially invest more for enhanced walkability and nature access. For example, 83.6% were willing to pay more for a home with better neighborhood walkability, one-quarter of whom were willing to pay $15,000 or more.

Taken together, these findings highlight an emerging public health opportunity that needs to be further studied in larger longitudinal samples, examining how behaviors are influenced by residing in an agrihood. Agrihoods represent a novel residential model that merges traditional homebuying considerations with built environment and social features known to facilitate preventive health behaviors. Importantly, although our sample is relatively small, the appeal of agrihoods appears to extend beyond prospective homebuyers who currently meet recommended guidelines for health behaviors such as sleep, physical activity, and diet. This suggests that agrihoods may not only attract individuals already engaged in healthy lifestyles but also those who view these environments as potential catalysts for positive behavior change. Understanding the motivations and expectations of prospective residents offers insight into how communities intentionally designed around nature, activity, food systems, and social connection may shape health outcomes over time.

For researchers, this emphasizes a need to investigate place-based determinants of health

beyond conventional settings, using longitudinal and mixed-method approaches to assess lived experiences, behavioral change, and objective outcomes (Zheng et al., 2024). For practitioners, including planners, developers, and public health professionals, the evidence points to growing demand for health-oriented residential features such as trails, green space, and overall walkability that can be integrated into new developments or retrofitted into existing ones (Frumkin et al., 2017). For policymakers, agrihoods present an opportunity to incentivize residential models that embed preventive health into housing and land use through supportive zoning reforms, tax incentives, and grants (Sangroniz et al., 2024). Collectively, these implications suggest several avenues for expanding the public health intervention toolkit in transformative ways, creating replicable and scalable residential models that can promote both individual and community wellbeing.

Several limitations should be acknowledged. This study relied on a self-selected convenience sample of individuals already interested in agrihood living, which may limit generalizability to broader homebuyer populations. Respondents were disproportionately female and highly educated, which may reflect recruitment methods and the demographics of early adopters. Because the survey was conducted in English, non-English-speaking adults may have been underrepresented. Nonresponse bias is also possible, as only 128 of 307 individuals who opened the survey completed it. In addition, a small proportion of respondents did not complete several of the priority-ranking items, resulting in limited or missing data for those measures. While this study provides valuable information regarding an emerging trend that aligns with evidence-based health promotion practices, the sample is relatively small and was recruited from a prospective buyer list for one specific agrihood located in Texas, limiting generalizability. Willingness to pay and to commute items for "more places to walk or be physically active" did not explicitly state "outdoor or indoor." While places to be physically active could be situated either indoor or outdoor, given the item wording we are unable to distinguish between these. Finally, health behaviors were self-reported and therefore subject to recall and social desirability bias.

Conclusions

Future research should employ longitudinal designs to determine whether relocation to an agrihood translates into measurable improvements in physical, mental, and social health outcomes. Mixed-method studies could further explore residents' lived experiences and identify the design elements that contribute the most to health and wellbeing. Comparative studies with conventional neighborhoods would clarify the unique contributions of agrihood features, while economic analyses could assess long-term value for both residents and communities. In sum, this emerging line of research has the potential to inform our understanding of how agrihood environmental characteristics impact health, which in turn could provide support for a scalable, health-promoting model of residential development—bridging public health, land use planning, and sustainability in everyday living environments.



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A farmer-designed food assistance pilot program

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Abstract

The Mississippi Delta experiences persistent food insecurity, particularly among older adults. While produce prescription and food box programs have been implemented, they are often grant funded and difficult to sustain, and they typically exclude participants from the program design process. This pilot study used a community-based participatory research (CBPR) approach to design and test a home-delivered food assistance program led by local farmers, serving homebound older adults in Quitman County, Mississippi. The project team partnered with the Happy Foods Project, a coop-

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erative of Black, Indigenous, People of Color (BIPOC) farmers, to co-develop a six-month program providing culturally familiar produce, curated recipes, and weekly delivery. Twenty homebound older adults participated. Mixed methods were used, including participant and farmer surveys, in-depth interviews, and triangulated qualitative analysis. Participants and farmers reported high satisfaction with the program's delivery, cultural relevance of foods, and strengthened community connections. Themes from the qualitative analysis were Community Connection, Innovative Approach, Financial Access, Participant Knowledge, and Health Behaviors. Farmers noted increased market access and guaranteed income. This pilot demonstrates that a farmer-led, CBPR-designed food assistance program can address barriers to healthy food access while supporting local agricultural livelihoods. Findings highlight the importance of centering participant and farmer input in program design, particularly in rural contexts. Future research should explore scalability and long-term impacts.

Keywords
food assistance, program design, community-based participatory research, food box, older adults, local agriculture, pilot study, rural health, food access

Introduction

Health concerns, hunger, and food insecurity are pressing issues in Mississippi, and particularly in the Delta region, where structural inequities have shaped persistent poverty and limited access to healthy foods (Connell et al., 2019; Cosby & Bowser, 2008; Freshour & Williams, 2023; Holmes et al., 2022; Neaves et al., 2008). The Delta is the former floodplain of the Mississippi River in northwestern Mississippi that contains thousands of acres of black alluvial soil, which is largely favorable for agriculture and served as the setting for much of the state's complex history of plantations and slavery (Crockett et al., 2025; Saikku, 2005). Ten of the 18 counties that make up the Delta region in Mississippi experience high rates of food insecurity and hunger, far exceeding national averages (Nguyen et al., 2021). These disparities are rooted not only in economic hardship but also in the enduring effects of discriminatory policies and market exclusion faced by small-scale farmers, particularly farmers of color (Elufisan, 2023; Freshour & Williams, 2023; Hinson & Robinson, 2008; Holmes et al., 2022; Kline et al., 2024).

Older adults are disproportionately affected by food insecurity due to a combination of fixed incomes, mobility limitations, and health concerns (Gualtieri & Donley, 2016). For the purposes of this study, "older adults" refers to individuals aged 65 and above (Centers for Disease Control and Prevention [CDC], 2024; National Council on Aging, 2022). Nationally, older adults experiencing food insecurity consume fewer essential nutrients and are more likely to report poor health, depression, and reduced ability to perform daily activities (Gundersen & Ziliak, 2015). In the rural Delta, lack of public transportation and long distances to grocery stores exacerbate these challenges (DiNatale, 2022; Rankin, 2021).

Various produce prescription and food box programs have been implemented in the Delta of Mississippi to address such issues (Fernandez et al., 2023; Stermer, 2024; Turner, 2019), but most are dependent on short-term grant funding and rarely involve participants in program design. Furthermore, these programs often source produce from wholesalers or food banks (Bell et al., 2014; Briefel et al., 2021; Cabili et al., 2021; Carty et al., 2017; Short et al., 2023; Vos et al., 2024), missing opportunities to connect with and support local farmers.

Community-based participatory research (CBPR) offers an approach for designing programs that are not only culturally relevant but also community-owned. CBPR principles require participants and researchers to engage as equal partners, ensuring that community priorities shape program goals, implementation, and evaluation (Israel et al., 1998; Wallerstein & Duran, 2010). Participants in CBPR projects are able to shape the program to address what matters to them in a way that best suits their daily lives while also deciding how success should be measured (Duncan & Fassiotti, 2018). This approach can improve both the quality of interventions and the likelihood of their sustainability. Using CBPR has a history of improving program design, implementation, and outcome

success (De Las Nueces et al., 2012; Doustmohammadian et al., 2022; Israel et al., 1998; Wallerstein & Duran, 2010).

Similar CBPR-based and food systems-focused interventions, some in rural contexts, have successfully addressed structural barriers by integrating community priorities into intervention design and leveraging local food networks (Doustmohammadian et al., 2022). Doustmohammadian et al. conducted a systematic review of CBPR interventions aimed at improving food insecurity, in which 12 studies were reviewed. Each reported significantly positive results relating to food access, availability, and utility; however, no studies measured sustained food security post-intervention. The researchers found that three studies included local farmers in intervention design and implementation, two of which included farmers in a rural setting, in Malawi (Kansanga et al., 2021; Madsen et al., 2021).

The literature shows that local agriculture–based programs in low-income areas improve nutrition, food security, and farmer income (Ball et al., 2018; Doustmohammadian et al., 2022; Kansanga et al., 2021; Madsen et al., 2021). Ball et al. (2018) engaged local farmers as part of a community action coalition that planned and implemented a farmers market next door to a Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) office. Stakeholders in their program noted that engaging farmers in the planning and implementation phases led to the program's success; the farmers market increased fresh produce availability for WIC participants and income for participating farmers (Ball et al., 2018). Kansanga et al. (2021) found that encouraging agroecological practices (e.g., crop diversification, composting) through farmer-to-farmer training among rural, smallholder farming households improved dietary quality, but only for participating farm families.

This brings us to our research question: could the CBPR approach succeed in improving food access and farmer income in the Mississippi Delta? CBPR with farmers in the Mississippi Delta would require rethinking who is positioned as the expert in the research process. Delta farmers—particularly Black farmers, who have faced generations of land loss, discriminatory lending, and exclusion from USDA programs—bring deep agrarian, cultural, and societal knowledge that is rarely centered in formal research (Crockett et al., 2025).

Research Methods

This pilot study used a CBPR approach with an explanatory sequential design to explore the functionality and impact of a food assistance program designed and led by local farmers to serve homebound older adults in Quitman County, Mississippi. This study was determined to be exempt by the University of Mississippi's Institutional Review Board (Protocol #23x-289). All participants were provided letters of informed consent prior to participating in this study.

Program Design

The project team used CBPR guiding principles to equitably engage farmers and food program participants in every stage of the research process (Israel et al., 2001). CBPR was necessary to maximize the usefulness of the research by all partners and the community at large, enhance the study's validity by incorporating community-specific expertise, and empower the community to shape the research in the way that best meets their needs (Israel et al., 1998).

Three researchers from the University of Mississippi's Community First Research Center for Wellbeing and Creative Achievement (CREW) partnered with a local farm organization, the Happy Foods Project (HFP), to design this study. HFP is a consortium of Black, Indigenous, People of Color (BIPOC) farmers in the Delta region of Mississippi who collaborate on farmer-to-farmer training programs and develop alternate market entry points for farmers in Mississippi. Market diversification and reliable payment options are well-established needs among vegetable farmers in the Delta of Mississippi (Kleiner & Green, 2008; Kline et al., 2024). HFP works to meet these market needs by developing programs for small-scale farmers to participate. Farmer participants in this pilot study consisted of five farmers working cooperatively under HFP: four males and one female, with ages ranging from 50 to 91 years old. The partnership between HFP and CREW reflects the recommended CBPR model and aligns with food

system planning principles that emphasize shared governance, local production, and community control (Brown et al., 2019; B. Israel et al., 2001; B. A. Israel et al., 1998).

CREW, which had funds available from the Walmart Foundation to address local food insecurity, approached HFP in January 2023 and held a virtual discussion about designing a collaborative project. CREW personnel described their previous experiences with food box programs. The director of HFP stated that HFP had been working toward doing a similar program and expressed an interest in pilot-testing a home-delivered food assistance program to serve homebound older adults. HFP farmers had been giving away food they could not sell to some of their neighbors and had been seeking a way to do this on a broader scale. The project team (CREW researchers and HFP farmers) decided to use the funds to run the pilot study in HFP's Delta home community, Quitman County, Mississippi. Piloting in Quitman County was not only convenient for testing HFP's delivery capacity, but it also had an optimal population for program enrollment.

The project team decided to create food boxes containing 15–20 pounds (7–9 kg) of produce along with recipe cards developed by CREW researchers. Farmers on the project team identified produce familiar to the priority population, like tomatoes, okra, purple hull peas, summer squash, etc. Each type of produce was included in at least two of the curated recipes provided, and all recipe ingredients were tailored to suit the cookware, appliances, and household staples the priority population could easily access. Recipes included healthy adaptations of the priority population's traditional recipes, such as baked or grilled green tomatoes instead of the traditional deep-fried green tomatoes. The pilot program was designed to last six months.

During the period of this pilot study, the HFP lead farmer coordinated with the other five farmer participants to aggregate the produce and then deliver food boxes to participants' residences every Friday afternoon. The farmer making deliveries notified participants via telephone 4–6 hours prior to their food box delivery to ensure that someone would be present to receive the food box. If a participant needed to reschedule or have their food box delivered elsewhere, the participant could contact the delivering farmer via telephone with the changes.

Setting

At the time of the program, Quitman County had a higher percentage of its population made up of older adults, disabled people, and people living in poverty than the total Mississippi population. In 2023, the total population of Quitman County was 5,546, with 18.6% ages 65 and older, 13.3% under age 65 with a disability, and 32.1% living in poverty (U.S. Census Bureau, n.d.). The state of Mississippi's population was 17.6% ages 65 and older, 12.6% under 65 with a disability, and 18% in poverty (U.S. Census Bureau, n.d.).

Sampling Methods

The study was limited to 20 participants due to constraints in the production of specialty crops. Participants were selected using purposive sampling based on homebound status and county of residence. All participant recruitment was in-person, based on best practices in rural areas, and a recommendation from the local elder care center (Estabrooks et al., 2017; Scott et al., 2016; Young et al., 2020). The project team went door-to-door handing out recruitment flyers to eligible households. Recruited participants voluntarily shared program information with neighbors, friends, and family, so a snowball effect contributed to our sampling methods as well (Naderifar et al., 2017).

Farmers and participants were interviewed when the program concluded. To recruit for post-program interviews, one CREW researcher called participants on the phone numbers they provided during their initial program registration. If the call was not answered, team members left voice messages requesting a returned call and called again at a different time if the message was not returned. If the second call was not answered, the project team did not call a third time.

Instrument Development

Surveys were developed to assess farmers' and participants' experiences with the program. One researcher from CREW and the director of HFP

collaborated to identify points of interest to include in the survey instruments. Points of interest identified for farmers included satisfaction with delivery, payment, processes, quantity expected to purchase, community interaction, and farm impact. Points of interest relevant for participant surveys included satisfaction with delivery, recruitment, food quantity and quality, and well-being. The CREW researcher designed the surveys around those points of interest. Survey questions for both farmers and participants were scored on a Likert scale (*very dissatisfied* to *very satisfied*), with open-text sections provided for participants to explain their responses.

Two CREW researchers and the director of HFP developed an interview protocol to clarify survey responses (Draucker et al., 2020). Farmer interviews included questions about impacts on farm operation and production pre- and post-program, market involvement, and interest in participating in other community programs. Participant interviews included questions about opportunities for improvement based on the participants' food and schedule preferences, comfort with recipes provided and meal preparation, eating habits during and after the program, and health choices post-program.

Data Collection

In keeping with this study's explanatory sequential design, the study team collected and analyzed the data in two phases: first, we administered the survey to collect quantitative data, then followed up by conducting qualitative interviews to contextualize the quantitative results (Draucker et al., 2020). Paper surveys were administered to farmers by one CREW researcher and the HFP director at the end of the program, with surveys delivered at the time of produce purchase and collected during the following week's purchase. A similar design was used for program participants at months 3 and 6, with surveys delivered with food boxes and completed copies picked up during the following week's delivery.

The CREW researchers shared aggregated farmer and participant survey results with HFP farmers for validation. Together, the project team and HFP farmers decided to implement additional telephone interviews with willing farmers and participants to get more detailed responses and allow participants with low English literacy the opportunity to share their experiences. This approach is consistent with explanatory sequential designs and participatory qualitative methods used in rural food system evaluations to capture lived experiences and inform responsive program adjustments (Draucker et al., 2020; Quiroz et al., 2025). One CREW researcher conducted the telephone interviews. All interviews were digitally recorded and transcribed verbatim using Trint transcription software (Trint, n.d.).

Data Analysis

The project team used triangulation to analyze farmer and participant data from surveys and interviews (Carter et al., 2014). Because responses from both farmers and participants were used to answer the same research questions, the data were analyzed together. First, Likert scale data were numerically entered into a spreadsheet. *Very Dissatisfied* was coded as a 1, *Dissatisfied* was coded as a 2, *Neutral* was coded as a 3, *Satisfied* was coded as a 4, and *Very satisfied* was coded as a 5. The project team calculated the mean for each survey question in each group of participants and used SPSS to run a paired-samples *t*-test with $\alpha < .05$ (Norman, 2010; Pearson, 1931).

Second, qualitative survey responses and interview transcripts were analyzed using inductive content analysis to identify codes and categorize codes into themes (Schutt, 1999). Two members of the project team coded the transcriptions. The coding process involved reading and rereading individual qualitative responses and identifying underlying concepts (codes) (Kleinheksel et al., 2020). Categorizing codes into themes involved reviewing concepts across farmers and participants to group similar codes into themes (Kleinheksel et al., 2020). The project team used Microsoft Excel to organize codes and themes.

The project team used farmer and participant validation to verify conclusions drawn from survey analysis; following survey analysis, the project team conducted telephone interviews in which researchers explained survey results and read anonymized quotes to participants. The participants were asked

to confirm whether the identified themes and key quotes accurately represented their experiences (Carter et al., 2014).

Results

As shown in Table 1, 17 of 20 participants completed the mid-point survey, 14 completed the end-point survey, and eight agreed to participate in post-program interviews. The 12 remaining participants were not interviewed because three participants had switched phone numbers, one participant had passed away, and eight participants did not answer the phone or return the phone calls. All five farmers completed the survey, and one farmer participated in a post-program interview. Two farmers did not answer or return phone calls, and another two farmers returned calls but were unavailable for interviews.

Table 1. Number of Respondents per Data Collection Method

Participant Group	Data Collection Method	Number of Respondents
Food Program	Mid-point survey	17
	End-point survey	14
	Interview	8
Farmer	End-point survey	5
	Interview	1

Likert Scale Survey Data

While 17 participants completed the mid-point survey, only 14 completed the end-point survey. The mean and standard deviation of participant survey responses for each question in the mid-point and end-point surveys are shown in Table 2. Participant ratings of their program experiences remain high, indicating positive experiences throughout the study.

Descriptive statistics were not conducted for farmer surveys because each farmer ranked all categories as 5, *Very Satisfied.*

Qualitative Survey and Interview Data

Interviews and qualitative survey responses across farmers and participants identified 5 overarching themes: *Community Connection*, *Innovative Approach*, *Financial Access, Participant Knowledge*, and *Health Behaviors*.

Community Connection

The food box program created a sense of connection between participants and farmers delivering food boxes, and farmers felt a stronger connection with their community. As homebound older adults, participants valued the weekly personal interaction and made comments like this one from Participant 10, "It is a joy to look forward for box delivery. The delivery person is very kind and respectful," and Participant 13, who said, "The young man [who delivers the food boxes] is very courteous

Table 2. Central Tendency of Food Program Participant Survey Responses

Survey Questions	Mid-point Survey Response Mean (*SD*) (*n* = 17)	End-point Survey Response Mean (*SD*) (*n* = 14)
1. How satisfied are you with your overall experience?	4.94 (.24)	5.00 (0)
2. How satisfied are you with food box delivery?	5.00 (0)	4.93 (.27)
3. How satisfied are you with the patient recruitment process?	4.93 (.27)	4.93 (.27)
4. How satisfied are you with the food quantity in each box?	5.00 (0)	4.86 (.36)
5. How satisfied are you with the food box delivery frequency?	4.88 (.5)	4.86 (.36)
6. How satisfied are you with the types of food in each box?	4.88 (.5)	4.93 (.27)
7. How satisfied are you with the recipe cards in each box?	5.00 (0)	4.85 (.36)
8. Please rate the impact the program has had on your wellbeing.	5.00 (0)	5.00 (0)

and friendly. He is always on time with a smile." Farmers were also encouraged by participants. Farmer 2 stated,

> I know that the work that I do is having a positive impact in the community in which I live. The program has given my farm [the opportunity] to reach out into the community and provide positive experiences to my fellow residents.

Innovative Approach

Participants and farmers alike complimented the program's innovative design taking the nuances of location and needs of farmers and participants into consideration through active engagement with the relevant community (as is required in CBPR). Participant 1, who had to pay a neighbor to drive them to the grocery store, stated, "This is a blessing to have the delivery to our front door. It's simple and easy. And I don't have to worry about getting to the store." Farmers focused on the program's systematic details, like payment and scheduling. Farmer 3 said, "The food box delivery system is well put together. The food box delivery is always on time. The payment is fair. It's easy and understandable. The planning is well thought out." Farmer 4 stated, "When we dropped off produce, we were paid the same day. I wish we could have grown more."

Financial Access

Access was a topic of discussion for both participants and farmers, although in different ways. Participants lacked access to produce due to income. Participant 10 stated, "[The program] has brought fresh vegetables to me, which I would not have had. It helps me so much. The fresh food is so good." Participant 2 stated, "We all living on a fixed income. We're senior citizens here and it's hard coming up with what you could spare. … It's enough veggies to keep me out the grocery store for a week."

Farmers were previously limited in their access to local markets and, by extension, income. Farmer 5 stated, "I have been able to get my produce into the hands of more people in the community. My farm is able to reach people that I may not have otherwise had contact with." Having a guaranteed market helped expand some farmers' production; as Farmer 1 stated, "It motivates me to grow more knowing that I can definitely sell my produce weekly without a doubt."

Participant Knowledge

Lack of health or cooking knowledge was not a barrier for participants, as they each reported feeling comfortable with the produce in the food boxes. Participant 8 said, "I cook everything in my box. Delicious every week." Participants explained that the recipe cards were helpful but not necessary, as Participant 9 said:

> [My diet has] changed considerably because I don't have the best food that I used to have [before getting the box], and the canned vegetables aren't really good for you. I am enjoying the recipe cards; I can have different varieties of meals with this. Fruits and vegetables are extremely nutritious; this is serving as a very positive impact on my life. Healthy eating and living are extremely important.

Participant 11, like most others, reported cooking frequently and used the cards as a supplement, stating, "I have tried some of the recipes and we enjoyed them. We get to the point we want change up, so the recipes have been a plus for us."

Health Behaviors

Surveys from participants also discussed how their health behaviors changed during the program. Participant 1 stated, "We are eating more vegetables, and the quality of the vegetables can't be beat." Participant 3 explained, "I feel healthy; fruit and veggies are important for life." Post-program interviews also revealed the program made changes to some participants' lifestyles. For instance, Participant 5 said, "With those boxes, I'm trying to lose weight and eat more healthier. I exercise a little bit more." Participant 4 said, "I'm eating different and eating vegetables and stuff, like, that I haven't been eating. I make sure I get enough vegetables in my body."

Discussion

Over the course of our study, nonsignificant survey results suggest that participants' opinions of the home-delivered food assistance program did not change and remained highly positive throughout. This stability in perception likely reflects a ceiling effect: participants entered the program with meaningful unmet needs and responded positively early on, maintaining satisfaction as the program continued. Future studies should consider incorporating baseline surveys prior to program enrollment to capture the full arc of participants' experiences.

While this study's findings align with a growing body of literature on home-delivered food assistance (Bell et al., 2014; Briefel et al., 2021; Vos et al., 2024; Zimmer et al., 2022), it also advances the field in three ways: by demonstrating that accounting for local nuance in food program design improves health behaviors; by identifying access—rather than knowledge—as the primary barrier to healthy food consumption; and by establishing farmers as equal partners whose inclusion strengthens both program quality and community outcomes. Many of our findings are consistent with prior research, while also offering important points of comparison. Like Vos et al. (2024), participants in this program valued the predictability of home delivery and the relief of avoiding grocery store trips—a convergence across geographically and demographically distinct populations that strengthens the case for delivery-based models as a structural intervention rather than convenience. Notably, however, this study served a rural population where transportation barriers are compounded by geographic isolation (DiNatale, 2022; Stuff et al., 2006; Wright, 2018), suggesting that the logistical relief of home delivery may carry even greater significance in rural contexts than in the urban and suburban populations studied by Vos et al. (2024) and others. Program designers working in rural settings should treat delivery infrastructure as a foundational investment.

The social benefits observed here also reflect findings from Bell et al. (2014) and Ross et al. (2022), who found that regular delivery interactions helped reduce social isolation among homebound participants. Yet while these studies document social connection as an incidental benefit of delivery programs, this study's community-centered, farmer-led design suggests that social connection can be more deliberately cultivated. Future research should examine whether it is the delivery model itself, the relationship with delivery staff, or the broader sense of being cared for that drives social connection, and if that produces stronger and more sustained social outcomes.

This study further corroborates findings that home-delivered food box programs allow participants to prioritize health despite financial barriers (Bell et al., 2014; Briefel et al., 2021; Vos et al., 2024; Zimmer et al., 2022). Briefel et al.'s (2021) finding that their program served as a gateway to broader nutrition assistance enrollment is particularly worth noting alongside our results. Together, these studies suggest that food box programs can function not only as standalone interventions but as entry points into larger safety net systems. Replication studies examining whether community-led programs lead to higher rates of downstream benefit enrollment would be a valuable contribution to this literature.

Dietary improvements observed in this study are consistent with Kempainen et al.'s (2023) finding of increased fruit and vegetable intake during a food box program, and with Vos et al.'s (2024) report of sustained healthy cooking behaviors after program completion. Lasting behavior change remains one of the more elusive outcomes in nutrition intervention research. As consistently recommended in food security research, future community-based studies should consider monitoring the sustainability of health behavior and food access changes after project completion (Doustmohammadian et al., 2022). Additionally, we suggest that future studies systematically examine which program features—duration, food familiarity, food quality, or convenience—are most predictive of long-term change, especially across subgroups such as older adults, families with children, or individuals with chronic illness.

Farmers in our study reported increased access to an untapped market and a greater sense of community connection through serving homebound neighbors, findings that parallel Bell et al.'s (2014) documentation of food box personnel feeling deeply committed to their community role, and

Tripp et al.'s (2021) observation that uncompensated farmers in another program expressed positive reactions and recruited other farmers to donate food. However, this study diverges from Tripp et al. in a meaningful way: rather than relying on farmer volunteerism, this program compensated farmers at a fair market value. Positive farmer outcomes—motivation, community connection, peer recruitment—were achieved through equitable compensation rather than goodwill toward their community, which may improve program sustainability, as Tripp et al. suggested after their program ended.

This pilot study advances the literature on food assistance and rural community-based programs through three novel contributions.

Participant-led design improves food utilization. By engaging participants throughout program planning, we ensured that all foods provided were culturally familiar, seasonally appropriate, and paired with recipes suited to local cooking practices and available appliances. Participants in this study reported using every item in their food boxes and expressed confidence in preparing meals with or without the provided recipes. This stands in contrast to charitable food systems such as food banks and pantries, where unfamiliar or inaccessible items often lead to underutilization or waste (Grier-Welch et al., 2021; Wade et al., 2022). This finding aligns with food system research demonstrating that the cultural relevance of food increases program adoption and impact (Molenaar et al., 2023; Tursunova et al., 2020; Ziso et al., 2022), and reinforces the argument that participant co-design is not simply a procedural nicety but a mechanism for improving outcomes. Future studies should test whether the degree of participant involvement in program design—from consultation to full-co-development—is associated with proportional improvements in food utilization and health behavior improvements.

Access, not knowledge, is the primary barrier. Many nutrition assistance interventions are premised on the idea that limited dietary knowledge drives unhealthy eating (Munt et al., 2017; O'Leary et al., 2025; Shepherd et al., 2006). This study's findings challenge that idea, as participants already understood the value of healthy foods and expressed a desire to consume more fresh produce but lacked consistent access. While recipe cards and nutrition education have shown benefit in some contexts (Bell et al., 2014; Briefel et al., 2021; Cabili et al., 2021), other research confirms that knowledge without access yields minimal change (Dong et al., 2022; Munt et al., 2017; Shepherd et al., 2006). This study contributes a perspective from a rural, low-resource region to that debate, suggesting that in contexts where structural access barriers are pronounced, interventions should prioritize removing those barriers before layering on educational components (Brown et al., 2019; Payán et al., 2021). Practitioners designing programs for rural or underserved populations should critically examine whether their program theory of change accurately reflects participants' actual barriers.

Farmers as equal partners in program delivery. Unlike many food assistance models that position farmers solely as suppliers, or, in some cases, as uncompensated donors (Tripp et al., 2021), this program compensated farmers at fair market value and included them in all stages of planning and evaluation. This approach increased farmer motivation, diversified market opportunities, and deepened community connection. Comparable models in local food system literature have shown that when farmers are treated as equal stakeholders, programs can simultaneously advance community food security and farm viability (Quiroz et al., 2025). This dual benefit represents an important message for the field: food assistance programs do not need to extract value from farmers to serve communities. Future research should examine the long-term economic and programmatic outcomes for farmers in compensated versus uncompensated models and explore how fair-market farmer partnerships can be structured to support program scalability.

Taken together, these findings carry clear implications for both researchers and practitioners in local food system development and food assistance. Programs that engage stakeholders—both participants and farmers—from the earliest stages of design are better positioned to achieve buy-in,

cultural relevance, and sustainability. Researchers interested in replicating or building on this model will find established methodological guidance in the CBPR framework, which provides a well-documented approach to equitable stakeholder engagement throughout the research process. This study also has direct practical implications for funding and program sustainability. The research team used findings from this pilot to secure larger grant funding to explore the home-delivered food assistance model as a sustainable business avenue for farmers, demonstrating that rigorous, community-grounded pilot work can serve as a foundation for scaling impact. Future studies should examine replication across diverse rural contexts, test the model's adaptability for different agricultural seasons and crop types, and evaluate long-term outcomes for both participant health and farmer economic stability.

Limitations

The sample size for both food program and farmer participants was fixed due to funding limitations; thus, the statistical analysis was limited. In-person survey delivery and pick-up may have persuaded participants to inflate their survey responses to continue receiving food boxes. Limited literacy was reported by several participants at the conclusion of the program, which may have led participants to choose the exact same rating (e.g., "strongly agree") all the way down, to finish the questionnaire as quickly as possible or not respond at all. This limitation was somewhat mitigated by the interviews after the program's conclusion.

Conclusion

Our exploratory mixed-methods study used CBPR to examine the functionality and impact of a farmer-designed and -led home-delivered food assistance program. Farmers who participated identified the food assistance program as innovative due to its inclusion of stakeholders throughout the program development process. Participants shared changes in their finances, lifestyle, community connections, and access to fresh produce due to the program. Moving forward, future studies should involve stakeholders, including potential participants, in the design of food programs and examine whether this design limits food waste, improves healthy eating behaviors, and encourages community connection among participants.

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Understanding caregiver perspectives to improve food security screening in healthcare settings: A focus group study

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Abstract

Healthcare institutions are increasingly engaged in efforts to screen patients for food insecurity and connect households to supportive resources, often in direct collaboration with community development practitioners and aligned with Food Is Medicine initiatives. Evidence of the effectiveness of these efforts, however, is limited. Drawing on data from six focus groups with a total of 42 participants, conducted in both English and Spanish, this study explores how low-income parental caregivers experience and understand food security screenings within healthcare settings. From there, it identifies communication barriers and opportunities for improvement. The analysis was guided by communication infrastructure theory (CIT), a framework for understanding how a community's "storytelling

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network," consisting of local residents, organizations, and media, can be harnessed for health promotion. Findings revealed a complex mix of trust and skepticism. While some caregivers appreciated efforts to connect families with resources, many expressed concern and fear related to stigma, privacy breaches, and potential intervention by child protective services. Spanish-speaking participants also highlighted linguistic barriers that increased frustration with the process. Participants recommended that screening processes prioritize choice and provide follow-through with tangible resource connections, ideally facilitated through trusted community intermediaries. Applying CIT, our analysis suggests that healthcare institutions can strengthen food security outreach by building relationships with familiar individuals and organizations in the community's storytelling network. Doing so requires fostering trust through transparent, empathetic engagement. Overall, the findings demonstrate an important role for practitioners in food systems and community development to develop community-based communication strategies with healthcare institutions. This study both advances theory and offers actionable guidance to make food security screening more equitable, effective, and responsive to caregivers' lived realities.

Keywords
caregivers, communication infrastructure theory, community-based research, Food Is Medicine, focus groups, food insecurity, food security, healthcare, social needs screening, storytelling

Introduction

An estimated 13.7% of all households in the U.S, (18.3 million households) were considered food insecure in 2024, meaning they had difficulty at some time during the year providing enough food for all household members due to a lack of resources. Food insecurity rates are even higher in households with children, at 18.4% (6.7 million households) (Rabbitt et al., 2025). Rates of food insecurity are highest among households with incomes below the poverty line, as well as those headed by single mothers (Rabbitt et al., 2025). Yet, several million Americans who are eligible for food assistance programs, including the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), do not participate. Notably, estimated SNAP participation rates vary widely between states, as low as 59% and as high as 100%, while immigrant families of varied legal status show pronounced gaps in their uptake of eligible services (Bovell-Ammon et al., 2019; Cunnyngham, 2025).

Food insecurity prevalence is associated with negative health outcomes, and children from households who face food insecurity report poorer health than children from food secure households (Gundersen & Ziliak, 2015). Given these concerns, there has been recent increased emphasis on the role that healthcare providers can play to screen patients and their families for food insecurity and other social risk factors, including stability related to housing, transportation, and safety. Following screening, providers have also sought to connect patients in need to supportive resources (De Marchis et al., 2020). Such efforts have emerged as part of a broader "Food Is Medicine" (FIM) movement (alternately, Food As Medicine), in which health care professionals provide patients with healthy food resources to prevent, manage, or treat specific clinical conditions (Volpp et al., 2023). Preliminary research on the value of FIM is promising, but further evidence to support the efficacy of FIM initiatives, in general, and screening initiatives to improve household food security, specifically, is warranted (O'Connor et al., 2025; Sharma & Sharma, 2024). Indeed, a growing body of research has identified a number of communication barriers, emerging directly from the clinical setting and on account of larger structural inequalities, that stand in the way of accurate social needs screening and effective resource connection in healthcare settings (Drake et al., 2021; Steeves-Reece et al., 2022).

Drawing from a community-based research approach, this article explores the communication dynamics of food security screening in healthcare settings. The analysis is grounded in data from six focus group interviews with a total of 42 low-income parental caregivers in Southern New Jersey, with three groups conducted in English and three in Spanish. Guided by communication infrastructure theory (CIT), the work offers recommenda-

tions for improved screening and resource connection by highlighting how healthcare providers can tap into a neighborhood "storytelling network"—composed of residents, community organizations, and local media—to facilitate conversations and outreach related to food security with hard-to-reach community members (Ball-Rokeach et al., 2001; Wilkin et al, 2011). The project has clear relevance for food system and community development practitioners focused on local health promotion, who have increasingly collaborated with healthcare institutions on Food Is Medicine initiatives and other projects that aim to bolster healthy food access (Koempel et al., 2022; Shostak et al., 2025). The insights from this work, therefore, may be useful for both healthcare providers interested in tackling food insecurity and food system professionals engaged in partnerships with healthcare institutions.

Food Security Screening in Healthcare Settings

Healthcare institutions often serve as one of the anchor institutions within a neighborhood, not only in their clinical role but also as core contributors to community development and the building of resilience, particularly during periods of escalated food insecurity and supply chain disruptions (Cunningham et al., 2022). Providers increasingly recognize that the social contexts of their patients have a substantial impact on their health, and engage in concerted efforts to screen patients for unmet social risks such as food insecurity and to develop programs at the intersection of food and healthcare (De Marchis et al., 2020; Warsaw and Morales, 2022). A suite of Food Is Medicine (FIM) initiatives have been advanced within the healthcare sector—including "cashlike" benefits programs such as produce prescriptions, as well as in-kind interventions such as medically tailored groceries or meals—as ways to leverage both the nutritional importance and community development influence of food (Volpp et al., 2023).

Despite the well-intentioned desire to connect patients to food security resources, however, patients have reported that food security screenings and the interventions that follow are often inadequate, irrelevant, restrictive, or inaccessible (Cullen et al., 2020). In some instances, patients have raised concerns related to stigma, discrimination, and fear of deportation or intervention by child protective services. They have also described unsatisfactory information sharing practices and poor experiences with healthcare staff (Steeves-Reece et al., 2022). These findings align with scholarship on the experiences of low-income populations, which finds that they are more likely to avoid healthcare, educational, and social service institutions due to poor experiences or institutional distrust (Lazar & Davenport, 2018). Low-income parental caregivers, in particular, report concerns that institutional surveillance may lead to state interventions that could endanger their parental rights or residential status (Elliott & Bowen, 2018; Fong, 2019).

Investigations into the perspectives of healthcare professionals have shown that substantial majorities support social needs screenings in clinical settings. However, only a minority of these providers are actually confident in their ability to address social needs, noting that they are constrained by lack of time and resources (Schickedanz et al., 2019). In light of these barriers, researchers have explored ways to facilitate more effective food security screening and resource connection. Interviews with patients and clinicians highlighted some pathways for improvement unique to the clinical setting, such as shared decision-making, empathic communication, and accurate information (Drake et al., 2021). They also pointed to broader structural approaches, notably multisector coalition building to advance policy changes that reduce institutional mistrust. A study of parental caregivers at a children's hospital emphasized the need for intentional steps to provide anonymity and reduce stigma in the screening process, as well as for practical ways to better connect patients to resources, such as through mobile health technology, locally accessible resources, and personalized connections (Cullen et al., 2020). Other empirical research and reviews of the literature have further affirmed the importance of building trust between caregivers and staff, giving patients choice in screening methods, helping caregivers navigate benefits applications, and ensuring that provided resources are adequate and relevant to their needs (Knowles et al., 2018; Steeves-Reece et al., 2022).

Research has shown that caregivers have a particular interest in synergies that connect their providers to community-based resources, an approach that has been pursued in the healthcare community but still lacks universal application (Barnidge et al., 2020).

While research has provided a useful foundation for understanding the barriers and facilitators to effective food security screening in healthcare contexts, significant knowledge gaps remain if healthcare providers are to improve their processes for assessing needs of parental caregivers and connecting them to resources. Food insecure adults are already more likely than food secure adults to report worse patient-provider communication experiences in general (Park & Berkowitz, 2025). To improve screening and resource connection, practices such as building trust, destigmatizing interactions, leveraging personal and community connections, and ensuring that information provided is relevant and accurate add complexity to an already challenging communicative interaction.

More broadly, as FIM approaches continue to gain momentum in healthcare settings of various types—including emergency departments, health clinics, pediatric care settings, and specialty providers—systematic evaluations of their effectiveness nevertheless show areas for potential improvement in both clinical and community-based contexts (Fischer et al., 2024; Seligman et al., 2025). More robust engagement with concepts and perspectives from the field of communication, combined with community-based research approaches, can help develop grounded and actionable strategies for food security engagement and outreach.

CIT and Community Health Promotion

This study is informed by core concepts from CIT, a framework for understanding the role of storytelling in building and maintaining community, as well as for advancing community-based social change and health improvement efforts (Ball-Rokeach et al., 2001). As visualized in Figure 1, CIT asserts that a neighborhood contains a "story-

Figure 1. Communication Infrastructure Theory, including the Storytelling Network and Communication Action Context

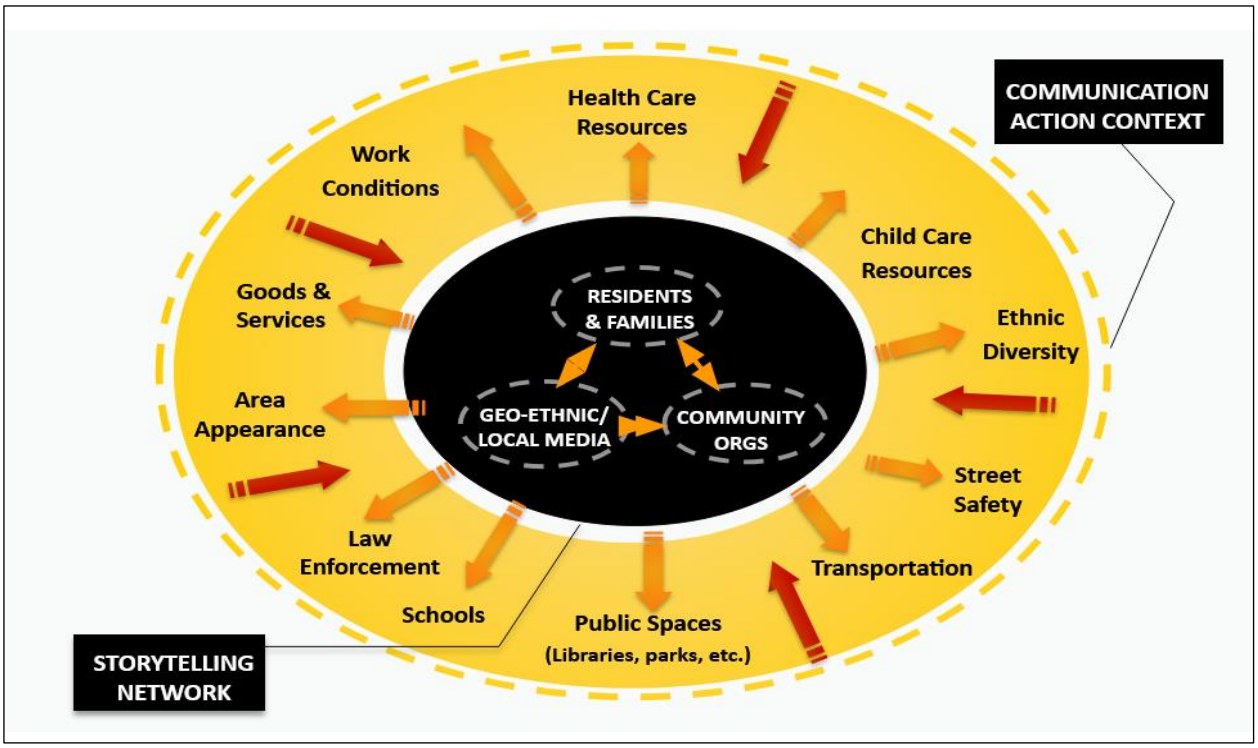


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telling network" with three main components—residents and their interpersonal networks, community organizations, and community-focused local or ethnic media (sometimes referred to as geo-ethnic media). A storytelling network is situated within a "communication action context," a wide range of elements of the built and social environments that can enable or constrain communication between and among the components of the storytelling network, including but not limited to healthcare resources, schools, public spaces, transportation, and sites for goods and services. The dynamic relationship between the storytelling network and the communication action context forms the foundation of what is termed the local communication infrastructure.

According to CIT, when issues of public concern are addressed productively through shared conversations between the three primary community storytelling components, as well as supported by the communication action context, then a "strong storytelling network" helps residents experience higher levels of neighborhood belonging, civic participation, and collective efficacy (Kim & Ball-Rokeach, 2006). A disjointed storytelling network, by contrast, or one that propagates "bad stories" that are unhelpful or disempowering, can have a negative impact on overall community well-being, depress community participation, or promote stigmatization (Broad et al., 2014; Matei & Ball-Rokeach, 2005).

Not just an academic framework, CIT and related concepts have been employed by applied researchers and community collaborators interested in strengthening the local storytelling network or leveraging its power to advance community health initiatives (Wilkin, 2013; Wilkin et al., 2010). It has proven particularly useful as a guide for targeting "hard-to-reach" community members, including members of low-income communities, immigrants, and linguistic minorities (Katz et al., 2012; Wilkin et al., 2011). CIT-oriented scholarship has investigated how different elements of the storytelling network and communication action context can be used to improve the flow of communication and motivate constructive action. At the individual level, for instance, an important task of scholars has focused on describing the "communication ecologies" of residents—that is, the networks of communication connections that groups or individuals depend upon in order to achieve a particular goal (Broad et al., 2013). Through qualitative, quantitative, and network analytical methods, researchers have used the communication ecology concept to understand how residents engage with trusted elements of the storytelling network to achieve health-related goals (Katz et al., 2012; Spialek & Houston, 2019; Wilkin, 2013).

Additional work has focused on the communicative role of local organizations, community organizers, and peer health advocates in their efforts to advance a range of social justice and health intervention initiatives, including food access and food justice (Broad et al., 2013; Broad, 2016; LeGreco et al., 2021; Matsaganis et al., 2014; Wilkin et al., 2018). Elsewhere, scholars have looked at the role of local media, ethnic media, and community-oriented social media as a force for catalyzing conversations about problems and local resources (Lim et al., 2022; Nah et al., 2021). A related strain of research has demonstrated the importance of the communication action context as a contributor to health and social outcomes (Wilkin et al., 2025). In some instances, this research has involved direct collaboration with community-based organizers as a way to identify local "communication assets," where health information can be effectively shared between members of the storytelling network (Burgess et al., 2021; Villanueva et al., 2016).

Taken together, the background on healthcare providers' interest in serving as a site for effective food security screening and resource connection, combined with the theoretical perspective of CIT, sets the guiding research questions of this study:

RQ1: How do low-income parental caregivers understand and describe the communicative context of food security screenings in healthcare settings?

RQ2: How might insights from low-income parental caregivers inform recommendations for healthcare providers and collaborating food system practitioners to improve food security outreach, screening, and resource connection?

Methods

All elements of the research process were approved by the lead author's institutional review board (PRO-2024-209). The project was carried out by a multidisciplinary team of academic researchers and community research collaborators, representing a range of scholarly and practical areas of expertise, including on the topics of community food security, children and families, immigrant rights, and qualitative research methods. The project built upon previous research efforts, conducted in part by members of the lead community organization partner, that gathered data on the food security screening practices undertaken by staff at New Jersey Federally Qualified Health Centers (FQHCs). That work identified a need to better understand patient perspectives on the screening processes, as well as a need to offer recommendations on ways providers can more effectively connect those patients to supportive resources. With that in mind, focus groups were selected as an optimal method due to their ability to identify shared group experiences and differences, produce nuanced insights on complex topics, and promote solidarity among and between research participants and researchers (Hall et al., 2023; Lunt & Livingstone, 1996). In addition, the convening of a focus group itself was designed as a site for community outreach that could connect participants to additional supportive resources.

Participants were recruited by two partner organizations, both based in southern New Jersey, through their social media channels, e-mail contact lists, posted flyers, and participant snowball sampling. To be eligible, focus group participants had to be at least 18 years old, have at least one child under the age of 18 currently living under their care, report an annual household income of approximately $50,000 or less, and have attended a doctor's appointment for themselves and/or their child at a health clinic or primary care facility. Participants confirmed their eligibility during the informed consent process, and they were compensated for their time with a $50 gift card, refreshments, and childcare during the group discussion. For both methodological and privacy reasons, we did not screen the participants directly for food insecurity, using household income as a proxy instead. Table 1 provides an overview of the study's moderator guide, linked to key objectives and specific prompts used in the focus group interviews.

Focus group study design followed standard procedures as outlined by Krueger and Casey (2001). A total of 42 participants across six focus groups participated in the study, with group size

Table 1. Overview of Focus Group Moderator Guide Sections, Objectives, and Prompts

Moderator Guide Section	Objectives	Sample Prompts
Introductions and Warm-Up	- Build rapport between and among the moderators and participants. - Begin conversations focused at the intersection of food and caregiving.	- Can you tell us about a specific meal you prepared for your family recently? - What are some challenges you face when it comes to feeding your family?
Responding to Food Security Outreach Materials From Local Government and Healthcare Organizations	- Investigate baseline understandings of food insecurity terminology. - Explore experiences with food security outreach and screening processes in healthcare and other contexts. - Examine barriers and challenges for effective food security screening in healthcare contexts.	- We'd like to hear your honest responses to these posters and outreach materials. What do these terms mean to you? What is clear or unclear? - Can you tell us about times and places where you have been asked these questions? - Are there any reasons why you might not want to answer these questions?
Improving Outreach and Connection to Resources	- Identify trusted community communication sources. - Offer strategic recommendations for healthcare organizations and community practitioners.	- What specific people or organizations do you trust to give you information and connect you to resources? - What advice would you offer to healthcare organizations to improve these experiences?

ranging from four to ten participants. Due to the sensitivity of the topic, limited demographic information was collected; in general, the groups were primarily female and included a range of ages, from young adult parents to grandparents serving as primary caregivers. Two focus groups were held in person in English in an urban municipality with an estimated overall poverty rate of 34%, three groups were held in person in Spanish in a dense suburban municipality with an estimated overall poverty rate of 35%, and one group was held virtually in English with participants recruited from both sites. Each focus group lasted approximately 90 minutes and focus group moderation was shared collaboratively between several members of the research team, with practice sessions held to ensure consistency across groups. Research team members concurred that theoretical saturation had been reached following the sixth focus group, which also aligned with the planned and budgeted methodological design.

All focus groups were video and audio recorded using Zoom conferencing software, which created an initial transcript. A research assistant reviewed the transcripts, made corrections while listening to the audio, and replaced identifying information with unique IDs. The focus group conducted in Spanish was translated from Spanish to English using a generative artificial intelligence chatbot (a password-protected version of Microsoft Copilot) and then reviewed and verified by a bilingual research assistant.

The analysis process took place in multiple stages, starting with initial reflections from moderators and community collaborators following the focus group meetings. Several members of the research team analyzed the transcripts in depth to create a report focused on core findings. Then the lead author analyzed the transcripts following the framework outlined by Braun and Clarke (2006), starting with familiarization with the data, then generating initial codes, then searching for themes, defining and naming themes, and finally producing the report. Specifically, the analysis followed "codebook" thematic analysis (Braun & Clarke, 2021), characterized by a structured approach to manual coding, early theme development, and the articulation of themes as topic summaries, in conjunction with a reflexive and interpretive analytical perspective. The analysis was guided by the motivating research questions and the project's theoretical orientation, with a central focus on the perspectives of respondents, levels of intensity, and instances of agreement and disagreement both within and across groups (Krueger & Casey, 2001). We did not strive for objective intercoder reliability, but members of the research team were given opportunities to provide feedback at various points as a way to test and sharpen theme development (Braun & Clarke, 2021), while the initial report was further consulted to ensure overall conceptual and empirical alignment. Illustrative quotes from respondents were extracted to exemplify key perspectives within the themes, lightly edited for clarity with pseudonyms in place of real names.

Results

The results of the focus group analysis are organized into two primary themes: (1) challenges of food security screening, and (2) recommendations for strengthening food security screening.

Challenges of Food Security Screening

Within the theme focused on challenges of food security screening, sub-themes highlighted previous experiences and barriers within healthcare settings, as well as indirect enablers and obstacles to screening that emerged due to forces outside of the healthcare domain.

Experiences and Barriers in Healthcare Contexts

Focus group respondents expressed a range of perspectives related to their knowledge of and experience with food security screening in healthcare settings. Most were familiar with the concept of food insecurity in general, some recalled being asked food security screening questions at healthcare institutions, while others did not recall such instances. Across all these levels of familiarity, participants offered a mix of positive and negative assessments as to whether healthcare facilities represented an ideal site for such outreach. In an example of a positive experience, Rafia (English group 2) discussed routine visits with her newborn child to the doctor, where she was provided with a set of questionnaires on a digital tablet: "You fill all

the information and they give all the resources, it's just like 'open if you want to apply'…I think it's very clear—they do ask all these things, they make it easy, so you don't have to search for it."

Others, however, reported a range of reasons for skepticism about the healthcare setting food security screening process, some noting potential dangers to their family well-being and others noting a lack of faith in the utility of the process. Several raised the specific concern that the information could be used against them in a way that would endanger their parental rights. "That's just so iffy," Nicole (English group 1) offered in response to a question about food security screening at a doctor's office. "It's kind of like, why do you want to know? Like, are you gonna low-key call DYFS [Division of Youth and Family Services] on me?" Similar sentiments were offered by Marcus (English group 3): "This is me basically telling you that I'm unable to get food when I want to. That's by extension telling you what my financial status is. … So I'm concerned about who has access to this before I'd be comfortable filling it out."

Across multiple groups, participants discussed a general lack of confidence that healthcare providers were equipped to use the information provided in a food security screening to actually support respondents' food access. Especially among those who attended health clinics rather than having a long-standing relationship with a family doctor, respondents stated that providers did not pay sufficient attention to the unique needs of the respondents due to the fast pace of interactions. Evelyn (Spanish group 1) put it this way: "They're just worried (about) their medical bookings, basically. They are not really gonna worry like, 'Here's all the services.' They're just gonna (say), 'You need to eat more, you gotta change your diet.' But not really guide you." Similarly, for those already familiar with navigating support resources, healthcare providers were not seen as adding much value in terms of connecting respondents to unique services. As Vanessa (English group 2) described it: "Most of the time you're like, 'Oh, I already did that. Oh, I already looked online.' And then that's all they know. Yeah, right, you're gonna have to contact them (the resource provider). They send you back to them. So what's the point? And then they just invaded your privacy. And you answered all these questions honestly, for no reason, and it's like a waste of time, right?"

Indirect Enablers and Obstacles to Screening in Healthcare Contexts

Another key driver of skepticism came not specifically from healthcare institutions, but rather from the broader resource environment, which many parental caregivers struggled to navigate without feeling like they were compromising their dignity or safety. For instance, most participants had extensive experience with major food-related benefits programs, notably SNAP and WIC, as well as elements of the emergency food assistance system, such as food banks, food pantries, and other charitable food giveaways, or other community institutions that offered connections to services. To be fair, respondents in multiple groups were able to recount positive encounters and stories of productive engagement that improved their access to food as well as other overlapping resource needs related to general financial or housing insecurity, transportation barriers, and other household goods and products necessary for healthy food preparation. For example, Carly (English group 3) described the value of community resource fairs where service providers were available for direct conversation: "You can get real answers, instead of sitting on the line on the phone or going online looking. There is one day set where you can go down and get all the information needed, and ask questions, and they even offer other things you still need assistance with."

In Spanish-language groups, most of the focus group participants had immigrated to the U.S. For several of them, support initiatives like the school lunch program were seen as a particularly positive example of state support. As Monica (Spanish group 3) explained: "I tell (my daughter), be grateful. I say, because in Mexico, if your mom didn't bring you your lunch, your breakfast, you went without eating until the end of the day. And here, thank God you are in a country that still gives you a juice, something at school."

Across the groups, however, many respondents described how negative experiences predominated in their customary engagement with these

support institutions and programs. Several reported an internal sense of stigma and shame that made it a challenge to reach out for support to begin with, a feeling that could be compounded by stories of intervention by a child protection agency or of poor service in general. Nicole (English group 1) admitted she was sometimes hesitant to offer information about her financial situation: "You can tell one person something, and it can go left," she explained. As an example, she described the story of a friend's daughter who complained to a school employee about not having food the night prior, an admission that Nicole asserted led to a visit to that family's home from DYFS.

Natasha (English group 1) attended the focus group alongside her close friend Nicole, and together they described feeling disrespected by their treatment at a faith-based food bank program, where the quality of food was substandard. She was also frustrated by the SNAP program, due to a history of delays in receiving benefits and a perception of discrimination: "If you give them an attitude, your paperwork won't go through, it won't even be touched. … You got people that really rely on resources there. And the staff are treating people like that, like they're better than us." A member of that same focus group, Ameera (English group 1), had previously worked for the SNAP office and had received benefits herself. This dual identity gave her particularly powerful insights into the dynamics of what was often a stressful environment: "People are already coming there upset because they probably didn't get their food stamps in months. … I loved working there, but I know the struggle. … I used to get people cussing me on the phone trying to say about how broke they are, and I tell them, listen, you think it's cause I work here, I'm still broke too. I'm still struggling as well."

Among the Spanish-speaking Latino/a and particularly the immigrant focus group participants, a whole new set of challenges were presented as they attempted to navigate the system. At a basic level, the term "food insecurity" (translated as "inseguridad alimentaria" on some of the sample outreach materials) was not as universally recognized as it was among the English-speaking respondents. When pressed on its definition with little additional context, multiple respondents equated the idea to being insecure about body weight or body image, while others thought it referred to children feeling insecure about their traditional food cultures in the context of school meals. "These are not basic words in the community," Isabella (Spanish group 3) explained.

In addition, several Spanish-speaking participants described phone calls to service providers, in healthcare and other contexts, that claimed to offer Spanish-language support but that failed to come through. Maria (Spanish group 2) stated: "We ask for someone in Spanish, they say yes, and then it stays there, and the call is lost." In another telling example, Veronica (Spanish group 1) described her experience with the WIC program, which is legally available to non-citizens and should have no effect on an individual's immigration status. Questions from the program, however, deterred her full participation: "I received [WIC] before, but I stopped accepting it because then they started asking more questions about social security and all that. And unfortunately, we are immigrants here without insurance. So I stopped receiving it."

Recommendations for Strengthening Food Security Screening

In the theme focused on recommendations for food security screening, sub-themes included suggestions for practice in healthcare settings and those focused on external collaborations.

Suggestions for Practice in Healthcare Settings

Respondents offered a host of suggestions for ways that healthcare providers could facilitate and improve upon the communication strategy of their food security outreach, screening, and resource connection efforts. At the level of patient-provider interactions, a key insight expressed by participants in multiple groups involved the need to balance respondents' desire for privacy with their interest in engaging in substantive conversations about their needs and potential support resources. Idalis (Spanish group 2) outlined this tension: "For me, having meetings, you express yourself better. But many times in the clinic, if you start talking about something with someone, you don't have that, how do you call it? You don't have the freedom to

express yourself because there are more people next to you who don't know you." When asked whether they preferred responding to food security screening questions through face-to-face interactions or, alternatively, by completing a questionnaire with pen-and-paper or a digital tablet, most preferred the latter options since they provided more confidentiality. Nevertheless, and as noted previously, both kinds of option were often viewed as a bureaucratic requirement rather than the starting point of a useful exchange. In other instances, respondents were completely unsure of how the data might be used, as Rose (English group 2) posed: "I have a question. So, if they do ask, but they don't do anything, is it like information for them, like their own data? Or like to the census or something?"

A recurring desire expressed by participants was that food security screening be treated not as a mere checklist, but rather as the start of a conversation—significantly, a conversation into which they could choose to opt in or not, have clear privacy protections, and that could be handled at their own pace. This could mean starting with an in-office flyer with information, or an invitation to fill out an in-office survey with a question that specifically asked whether they would like to speak with a social worker, or a link to an online survey that they could fill out when they were not directly in a medical setting. Harriet (English group 3) explained how she would feel pressured and "put on the spot" if she had to immediately talk about her situation after filling out a screening, preferring instead a multi-step process that begins with an online survey taken off-site: "That was the first step of admitting it. Like, all right, I need the help. And right now I'm in privacy, and I can say it, and then I can work my mind up to talk to someone about it…You can gather yourself before having a conversation. You can prepare yourself for what you're expecting."

Regardless of the specific process, a clear majority of respondents felt it was important that they were given the autonomy to determine when and where the conversation was held, as well as to be informed why the questions were being asked and who would have access to the information. Just as important, they wanted to be sure who would *not* have access to the information, guided by specific concerns about child protective services or immigration officials. Ideally, any face-to-face follow-up would be done by a person known and trusted by the individual, or by someone skilled and experienced in working in community health and social service settings. On this point, respondents were far from unanimous in who exactly they deemed trustworthy—some cited their family's doctor, others a nurse, others social workers affiliated with a local hospital's child well-being program. These perspectives also once again highlighted a tension between caregivers' preference for confidentiality and their desire for substantive engagement, a paradox unlikely to be fully resolved but that might be addressed by building questions about trusted resources into the screening process itself. Finally, respondents insisted that if a screening determined they were experiencing food insecurity, it should be followed through by offering appropriate support, tailored to the individual parental caregiver's needs, with follow-ups delivered in clear and understandable language, and resources offered that were accessible based on their location and schedule. This follow-through had multiple perceived benefits—not only was it simply the right thing for providers to do, but it would also help encourage participants to answer screening questions in the future fully and truthfully, potentially creating a more positive story about such interactions that could spread through their broader social networks.

Indeed, the power of peer storytelling was consistently identified as a vital tool for promoting effective engagement in food security screening and resource connection. The focus groups themselves were frequently pointed to as an example of valuable interpersonal dialogue that was often lacking in their interactions with healthcare professionals and service providers. As Alana (English group 1) suggested: "It helps people feel not so insecure. Like, okay, there is a group of us—we're all struggling some sort, but we all have the strength to come and get that help." Gwen (English group 1), a parent in the same focus group, added: "It's not like you're getting picked on, like one parent. All the parents can talk."

Opportunities for External Collaboration and Coordination

A related set of strategies highlighted by participants across multiple groups were the possibilities of collaboration between healthcare providers and other trusted organizations in the community, including their children's schools, local churches, family success centers, and even local businesses. Such institutions could play a valuable bridging function, as sites where information about food insecurity and resources could be shared, as well as transferring some of the built-in trust in the institutions to the healthcare collaborators. Several participants suggested that the institutions were preferred as the actual sites where screening could take place, because of their existing comfort level as compared to in a medical facility, as Janice (English group 2) proposed: "I feel like they should ask them in school, not in the doctor's office. … You know, like when they have a parent conference, have them (medical providers) come in and talk with the parents, to have like a little meeting with them and talk about the services. Cause you know we probably trust the school more." Having a healthcare provider presence at other community outreach events and resource fairs was also seen as offering a safe and effective space for discussions of food insecurity, as well as potentially discussions with other families in similar situations. As Carly (English group 3) described, these venues were particularly appealing for busy parents: "If people know that it's not gonna take up all their time and it's fast, it's effective because they can get it all done in one setting."

Closely associated with these organizational collaborations were recommendations related to media outreach. Respondents frequently noted that flyers and other informational materials about food insecurity resources were helpful, and suggested they be made available in healthcare settings, at collaborating community institutions and resource events, as well as through the e-mail newsletters and social media of the involved organizations. Social media sites such as Facebook, YouTube, and TikTok were cited by some parents as valuable sources of information about food and cooking in general, platforms where they could get recipes and food preparation tips. In response to prompts about sample food insecurity outreach materials, the participants offered a range of suggestions—they called for clear and concise language; direct narrative appeals to "you" as a parent or caregiver; the use of QR codes, website links, or social media integration to make it easier for people to take immediate action; and more visually oriented designs that could catch their attention as well as be accessible to those with lower literacy levels. Given the diversity of potential audiences, they encouraged diverse modes of communication, as Tiana (English group 3) stated: "Not everyone is tech savvy enough to know how to use the QR codes, especially older parents. … I may want to use the QR code, and the other person may just want to read, just for everyone's comfort. But then so much information could discourage someone. So less words, but more information."

Especially in the Spanish-language focus groups, radio was identified as a media platform where they would often hear about available resources and opportunities for support, but, in general, legacy media such as television or newspapers were rarely mentioned as core sources of information, especially as compared to social platforms. Interestingly, among the most frequently cited media sources was their children's school's classroom management app. These apps were used as a platform to track student progress, allow multi-way messaging between school staff and parents, and post information about upcoming events. Several parents noted that the apps had already been used to post information about free resource giveaways, and in at least one case to provide vouchers to a local farmers market that was co-sponsored by a healthcare institution. As Janice (English group 2) remarked, "There's teachers that post a lot of things, like recently they posted about free coats, you know, and people do go. Because you trust the school."

Discussion

Two central themes emerged from our research on low-income parental caregivers' perspectives on food security screening in healthcare settings. The first theme focused on challenges to food security screening, with a key sub-theme that indicated why many participants were directly skeptical of the

healthcare system and its ability to be supportive. Specifically, respondents questioned the capacity of providers to conduct social needs screening and connect them to useful resources. In some instances, they also raised concerns about data privacy and stigma. Beyond the healthcare interaction, participants described frustrations with social service institutions and fears of child protective services, which deepened their mistrust of the screening process. This finding further reinforced a core insight from Drake et al. (2021), that broader structural considerations are often at the root of communication barriers between patients and providers.

The second theme focused specifically on recommendations to address these concerns. Participants expressed a range of ideas related to direct patient-provider interactions, calling for health care professionals to communicate with empathy, provide accurate and linguistically tailored information, and promote patient autonomy and privacy through shared decision making. Respondents also highlighted opportunities for engagement beyond the clinical setting. They emphasized the role of trusted organizations, community-focused media, and shared community spaces as crucial to improving communication and building trust.

Principles and concepts from CIT further inform the implications of these findings and provide a foundation for theory-guided and evidence-based recommendations. The framework helps to explain the important role of storytelling as key to effective food security screening in clinical healthcare settings, particularly among traditionally "hard-to-reach" community members. Notably, focus group participants shared a range of "bad stories"—about fears of child protective services, negative interactions with SNAP, immigration anxieties, and others—that had circulated through media and interpersonal networks, creating feelings of fear, distrust, and stigma (Broad et al., 2014; Matei & Ball-Rokeach, 2005). By acknowledging and validating the concerns of patients, ensuring confidentiality, and clearly demonstrating how the information provided will be used to support their well-being, providers can potentially change the narrative that pervades the local storytelling network over time.

Participants frequently pointed to trusted community organizations and shared spaces as key to forging connections between providers and caregivers. This finding aligns with research on healthcare institutions as community anchors, emphasizing the need for system-level collaborations and the role of local intermediaries as bridging agents (Cunningham et al., 2022; Matsaganis et al., 2014). With this in mind, healthcare providers should recognize the long-term planning and relationship development required to bolster food security outreach and resource connection. Trusted food system and community development practitioners who collaborate with healthcare institutions can play an important role by sharing insights into residents' everyday interests and concerns. These perspectives can help medical professionals better understand community experiences outside clinical settings, and can also benefit policymakers and the policymaking process, particularly at a time when more states are considering implementing FIM programs through Medicaid waivers (Sharma & Sharma, 2024).

One way to advance the bridging function is to analyze and leverage the food and health-related "communication ecologies" of the local caregiver patient population (Broad et al., 2013; Wilkin, 2013). This means working directly to ascertain the trusted organization and media platforms that residents rely upon to receive information and navigate their social environment. Some might be relatively obvious; schools and churches have a particularly well-documented role as trusted institutions, as well as the news and information platforms upon which community members rely. Others might require more investigation to uncover, whether it is a particularly influential radio host or social media account, a local business that serves as a site for community conversation alongside service provision, or any number of other community storytellers that might not be on the radar of the healthcare facility staff. This investigation could be built into the screening process itself, particularly when patients express an interest in accessing additional services.

Relatedly, respondents in the focus groups described a range of obstacles to healthy living that emerged from challenges in the "communication

action context," to use CIT terminology. This included issues related to finances, housing, safety, transportation, linguistic barriers, and local food access. Collaborations that create physical spaces or nurture social support groups in which residents identify, discuss, and address these challenges can help build credibility and optimize the impact of healthcare institutions that want to improve patient food security (Wilkin et al., 2025).

Reflecting on these challenges, it may be possible that leaders of healthcare institutions could conclude that they are simply not positioned to be effective partners in advancing food security, and are better off ceding such tasks to other community-based groups. This conclusion, however, would undermine their positioning as community anchor institutions, as well as stunt the growth of the Food Is Medicine movement, which even in its nascent years has demonstrated promising potential (Seligman et al., 2025). Through thoughtful and deliberate cooperation, healthcare institutions can leverage their wide range of financial, physical, and human resources—the latter extending well beyond doctors and nurses to include public health professionals, nutrition and dietetics practitioners, medical students, and others—to amplify the work of food systems and community development and drive impact across shared areas of concern.

Conclusion

This study drew on a series of focus groups with low-income parental caregivers to explore their perceptions of food security screening in healthcare settings. The findings highlighted key barriers to effective screening, pointing to mistrust within clinical encounters and structural challenges in external systems. The study offered a set of actionable recommendations for providers, particularly that the screening process should offer multiple privacy-protective modalities for data collection and include clear explanations of how the information will be used. Providers' communication practices should emphasize empathy, transparency, patient autonomy, and linguistic accessibility. Recommendations included opportunities for collaboration with trusted community partners, as well as comfortable community spaces and audience-centered media outreach as ways to improve engagement. The study employed CIT as an analytical guide, demonstrating how an understanding of the local storytelling network of residents, community organizations, and media could inform healthcare institutions' community engagement practices.

This study also has several notable limitations. Principally, the generalizability of the findings is limited by its focus group methodology, which relies on a small and non-representative sample. Low-income parental caregivers from southern New Jersey likely share many of the same challenges and desires as those from across the country, but these findings should be understood as contextual and preliminary. In addition, aligned with the project's collaborative community-based research approach, we employed multiple focus group moderators, and while efforts were made to promote consistency via a structured moderator guide, differences in facilitator style were present, particularly between the English and Spanish-language groups. Further, while the codebook thematic analysis approach employed in the study aimed to be systematic, it retains subjective characteristics inherent to the method and cannot offer statistical precision (Braun & Clarke, 2021). Future research could further examine the utility of the findings by testing and evaluating recommendations for change in randomized controlled trials and with the addition of quantitative measures. In addition, the timing of this study is notable, with the focus groups held just after the second election of Donald Trump to the presidency in 2024 but prior to the implementation of a variety of executive decisions related to both food security and immigration. These changes are likely to present a number of new barriers and concerns worthy of future study and that will likely require programmatic adaptation.

For those working in healthcare, the many recommendations outlined in this article may seem like a tall task for an already strained system. It is urgent, nevertheless, that healthcare institutions and providers should not go it alone in their efforts to tackle food insecurity among their patient population. Indeed, if they move forward in isolation, they are unlikely to have much success at all. The experience, expertise, and existing

community-based relationships of food system and community development practitioners are essential to ensure the effectiveness of FIM initiatives, a perspective supported by both the CIT literature and the collaborative nature of this study, which demonstrates the value of participatory approaches that link academics, healthcare institutions, public health and nutrition professionals, and food system and community development organizations in the process of inquiry and intervention (Villanueva et al., 2016; Wilkin et al., 2018). While such partnerships introduce new layers of logistical complexity, collaborative and action-oriented research projects forge valuable interorganizational relationships, enhance engagement with hard-to-reach populations, promote more authentic community responses, build diverse methodological skills, and help to disseminate knowledge more widely. Ultimately, strengthening both clinical communication practices and community partnerships can help improve food security screening and contribute to healthier, more resilient communities.

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Food bank member agencies' orders change after implementation of culturally responsive labels and procuring practices

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Abstract

The charitable food system serves an estimated one in seven adults in the U.S. (Feeding America, 2024). In many cases, this system is made up of a food bank (an organization with centralized procurement, management, and delivery systems) that in turn supplies local food agencies (food pantries) with a portion of their inventory. A common concern in food pantries is that they may not offer culturally appropriate foods to their clients. Initiatives at the food bank level provide opportunities to improve the cultural relevance of foods available in the charitable food system. The purpose of this study was to evaluate whether agencies were more likely to order culturally responsive foods (e.g., foods procured to align with cultural groups' traditions or norms), and a greater number of unique culturally responsive items, after implementing procurement practices and labels in a central food bank's online ordering system. A one-group pre- and post-test natural experiment utilized three 45-day phases: (1) Baseline: no changes to the ordering system; (2) Labeling: the introduction of labels in the ordering system to identify culturally responsive items; and (3) Procuring: introduction of foods procured to be culturally responsive to Eastern European and Hispanic/Latinx clientele. Data from a central food bank based in Rochester, New York, included 31,958 items in 720 orders made by 274 unique member agencies (e.g., food pantries, soup kitchens, group homes) from January 16–May 31, 2024. The proportion of orders with culturally responsive items increased during the labeling (*OR* = 4.79, *SE* = 1.40, $p < 0.0001$) and procuring phases (*OR* =

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19.96, $SE = 7.16$, $p < 0.0001$) when compared to the baseline phase. The proportion of culturally responsive items within agencies' orders also increased during the labeling ($\beta = 0.23$, $SE = 0.099$, $p = 0.019$) and procuring phases ($\beta = 0.81$, $SE = 0.092$, $p < 0.0001$) in comparison to the baseline phase. Results suggest that culturally responsive initiatives taken at the food bank level can affect the foods ordered to be available in community-facing programs. Additional research can build on these findings to better align foods with community needs and address household food insecurity.

Keywords
charitable food system, food insecurity, health promotion, culturally appropriate foods

Background

The charitable food system—a private network of central food banks and local agencies, which redistribute food received to individuals—seeks to ensure that all households have access to enough food. The reach of these assorted efforts is substantial. In 2023, more than 50 million people are estimated to have received charitable food services in the U.S. (Feeding America, 2024). Studies estimate that 28%–40% of clients' diets come from the charitable food system (Fan et al., 2021; Liu et al., 2021). Historically, the system focused on meeting "emergency" needs, although it has been criticized regarding the types of foods and distribution approaches the system has employed (Poppendieck, 1994; Simmet et al., 2017).

In the face of often precarious and constrained funding throughout the system, diverse professionals support the charitable food system's evolution to better serve its clientele (Campbell et al., 2015; Nguyen et al., 2023, 2024; Nikolaus et al., 2018, 2021; Wetherill et al., 2019a, 2019b). Many initiatives have focused on nutrition, by providing metrics or instruments to assess nutrition qualities (Schwartz et al., 2020) or promotion strategies (Nguyen et al., 2023, 2024; Nikolaus et al., 2018), and developing interventions to support healthy choices at food pantries (Caspi et al., 2022; Coombs et al., 2021; Hampson & MacNell, 2022; Nikolaus et al., 2021). Initiatives to improve the charitable food system also go beyond nutrition. These include maximizing client choice of food items received (Carroll & Schichtl, 2022; Remley et al., 2013), incorporating wraparound social services (Martin et al., 2013), and addressing the upstream drivers of inequities (Strickland & Whitman, 2019; Swords, 2019).

The capacity for the charitable food system to serve clientele well is contingent on the appeal of foods in the system. What makes foods appealing is often rooted in one's cultural norms and does not always align with the inventory of the charitable food system (Jones et al., 2022). Providing foods that lack cultural relevance is a documented barrier to service (Scherer et al., 2024; Schwartz et al., 2024) and so providing them is integrated into food banks' and food pantries' assessment tools (Nguyen et al., 2023, 2024; Nikolaus et al., 2018) and guidance documents (Feeding America, 2021; Schwartz et al., 2024). Yet, effective and fiscally accessible interventions to improve cultural relevance of foods in the system and the impacts of these efforts have not been established.

Food bank–level initiatives provide ways to improve the cultural relevance of foods available in the charitable food system, since they are a key source of inventory for many community-facing charitable food agencies. In 2020, over 70% of Feeding America food banks were using online ordering platforms (Martin et al., 2021) that allow their member agencies to see the food bank's inventory and order items for delivery. Changes to the food bank's inventory or the ordering system that agencies interact with have the potential to affect the food items ordered by agencies and made available to clientele. In fact, the healthfulness of food pantries' orders from a food bank in New England improved when nutrition information was made easily accessible in their online ordering system (Martin et al., 2021). It was unknown whether information about the cultural relevance of items available would lead to comparable results.

This study was conducted in collaboration with Foodlink, a nonprofit food bank based in Rochester, New York (NY). Foodlink had recently surveyed its member agencies to understand the unmet food needs of cultural groups served by their agencies. In response to this survey, Foodlink

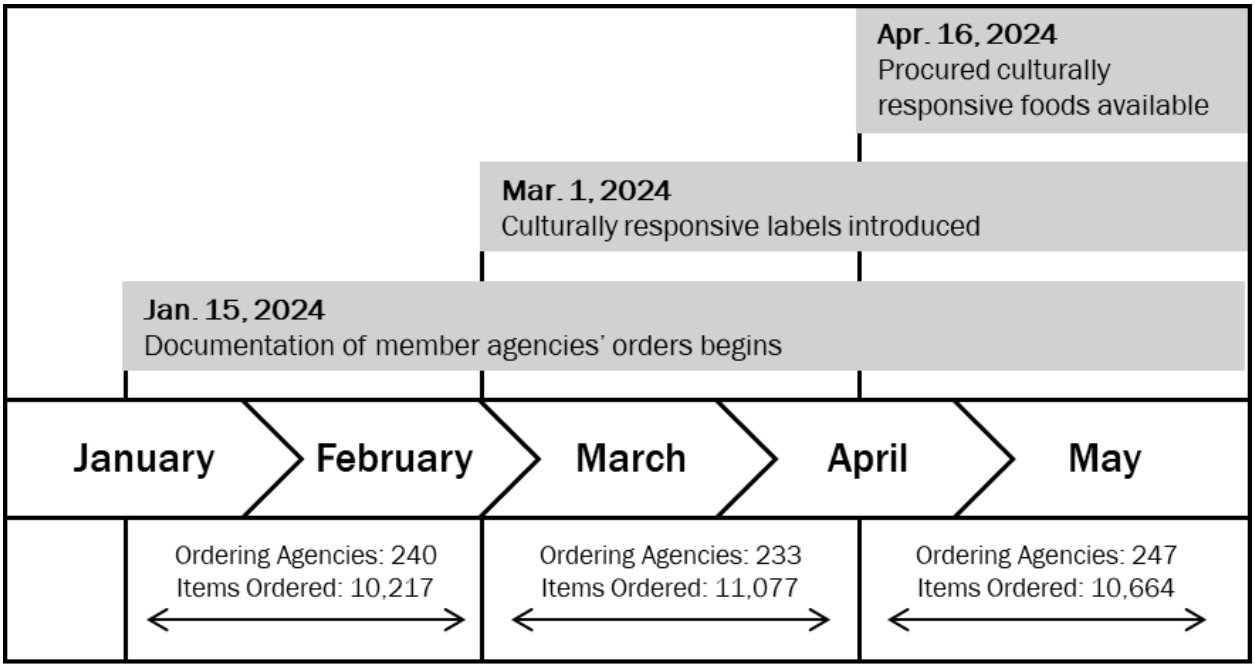
implemented procurement practices and labels in the food bank's online ordering system to respond to the cultural food needs of clientele. The goal of this study was to evaluate whether agencies were more likely to order culturally responsive foods (e.g., foods procured to align with cultural groups' traditions or norms), and a greater number of unique culturally responsive items, after the implementation of these changes.

Methods

A one-group pre- and post-test natural experiment was used to assess changes in all member agencies' orders from January 15 to May 31, 2024 (Figure 1). Member agencies select items to order from the food bank via an online database that lists the foods available. The study was composed of three stages: (1) Baseline, 1/16/24–2/29/24: no changes to the ordering system; (2) Labeling, 3/1/24–4/15/24: introduction of labels in ordering system to identify culturally responsive items; and (3) Procuring, 4/16/24–5/31/24: introduction of additional foods procured to be culturally responsive to Eastern European and Hispanic/Latinx clientele. The additional foods procured to supplement the existing cultural foods in the inventory included sauerkraut, canned beets, and smoked fish to respond to Eastern European cuisine, and cornmeal, tortilla flour balls, medium-grain white rice, and pigeon peas to respond to Hispanic/Latinx cuisine. For the purposes of this study, culturally responsive items were considered foods procured to align with cultural groups' traditions or norms. A member of the research team with community nutrition expertise consulted various resources online regarding Eastern European and Hispanic/Latinx cuisine and selected items based on those that were available at an accessible price in reasonable quantities through established food bank suppliers. On the first day of the Labeling and Procuring study phases, member agencies were informed of the changes to the ordering system via an e-mail announcement. The study did not involve human subjects, as data were collected on institutions, not about individuals, so oversight by an institutional review board and/or consent processes were not warranted.

Data on member agencies' orders were exported from the food bank's ordering system (Agency Express3, Feeding America and

Figure 1. Research Timeline to Evaluate Changes in a Food Bank's Member Agencies Orders as a Response to Implementation of Culturally Responsive Labeling and Procuring



TechBridge). Datasets included a unique item ID number, a description of the item, whether the item was culturally responsive to a specific ethnic group, a unique member agency ID number, a unique order ID number, the date when the order occurred, and the member agency program type. This dataset was collapsed such that each observation was an agency order. Dependent variables were calculated based on each member agencies' orders to reflect whether any culturally responsive items were ordered (0 = No, 1 = Yes) as well as the proportion of the items ordered that were culturally responsive (reported as a percentage that could range from 0–100%). The date of each order was used to generate an independent variable to identify the study phase. Member agency program types were categorized as Emergency Food Program (EFP) agencies if they were able to order items from the food bank with specific state grant funds or had access to certain food items provided via U.S. Department of Agriculture (USDA) programming at no cost to the agency. EFP agencies included soup kitchens, emergency shelters, pantries, and college-based pantries. In contrast, during the study period, no backpack programs, daycares, group homes, residential homes, rehabilitation centers, school-based pantries, or youth programs were EFP agencies. EFP agencies' orders were anticipated to potentially differ from non-EFP agency orders due to the agencies' access to additional financial and food resources, which may allow them to experiment with more diverse foods without risking funds raised by the agency.

To characterize the sample, mean and standard deviation (SD) were calculated for continuous variables, whereas counts and percentages were constructed for categorical variables. These descriptive statistics were generated overall, as well as by study phase and whether the order was from a member agency that was an EFP. To inferentially evaluate whether the study phase was related to the culturally responsive ordering outcomes, mixed-effects models were used to account for clustering of orders within member agencies across study phases. The presence of one or more culturally responsive foods in a member agencies' orders was assessed using a mixed-effects logistic regression model with study phase and EFP status as fixed effects and agency identifier as a random effect. Among orders with one or more culturally responsive items (283 orders across 160 agencies), the proportion of culturally responsive foods was assessed using a linear mixed-effects model with study phase and EFP status as fixed effects and agency identifier as a random effect. All statistical analyses were conducted in Stata/MP (ver. 18.5).

Results

From January 16–May 31, 2024, there were 31,958 items in 720 orders made by 274 unique member agencies. These items included 373 unique products, of which 10 were culturally responsive foods. Most agencies were food pantries (58%), but additional prominent program types included school-based pantries (18%), soup kitchens (8%), group homes (6%), and emergency shelters (4%). Among agencies, 73% (n = 200) were EFP agencies. During the three study phases, there was minimal variation in the number of agencies placing orders as well as the total number of items in each order (Figure 1). Each agency made a maximum of one order per study phase, with 75% (n = 205) making orders in all three phases, 13% (n = 36) making orders in two phases, and 12% (n = 33) making orders during only one phase.

Across all study phases, 39% of agency orders included at least one culturally responsive item. As shown in Figure 2, there were notable differences in the proportion of agencies ordering one or more culturally responsive foods across the three study phases. After accounting for between-agency variability (ICC = 0.45) and EFP status in a mixed effects model, orders that included culturally responsive items were more common during the labeling (OR = 4.79, SE = 1.40, $p < 0.0001$) and procuring phases (OR = 19.96, SE = 7.16, $p < 0.0001$) when compared to the baseline phase.

In each agency's orders, the proportion of culturally responsive foods selected increased across all three phases (Figure 3). Given that 61% of orders did not include one or more culturally responsive items, proportions are described both overall and solely among orders with one or more culturally responsive items. Among orders that included at least one culturally responsive item (n = 283), the log-transformed proportion was

higher during the labeling ($\beta = 0.23$, $SE = 0.099$, $p = 0.019$) and procuring phases ($\beta = 0.81$, $SE = 0.092$, $p < 0.0001$) in comparison to the baseline phase in the mixed-effects model while accounting for EFP status and between-agency variability. This corresponds to 26% and 124% higher proportions of culturally responsive items per order in the labeling and procuring phases, respectively.

Discussion

The objective of this research was to assess changes in agencies' orders of culturally responsive foods after a food bank's implementation of cultural food labels and targeted procurement practices. After introducing cultural food labels and procuring targeted items, the number of member agencies' orders containing culturally responsive foods as well as the number of these items within orders increased. Findings suggest that the items procured were responsive to interests among member agencies in distributing culturally responsive foods. More broadly, results suggest food bank–level culturally responsive initiatives can impact the inventory of foods available in community-facing programs.

Realizing the potential of culturally responsive initiatives may rely on accessible and flexible funds for member agencies and food banks to acquire specific foods. Traditionally, food banks have relied on food donations and government commodity foods (through the USDA's The Emergency Food Assistance Program [TEFAP]), but due to the limitations inherent in these sources, many food banks have increased their purchasing budgets to meet the needs of their communities. Purchases can be supported via fundraising or state-grant funding, although state-grant funding for food banks is not common across the country.

The 10 food banks in New York state are notable due

Figure 2. Proportion of Orders with Culturally Responsive Foods by Study Phase

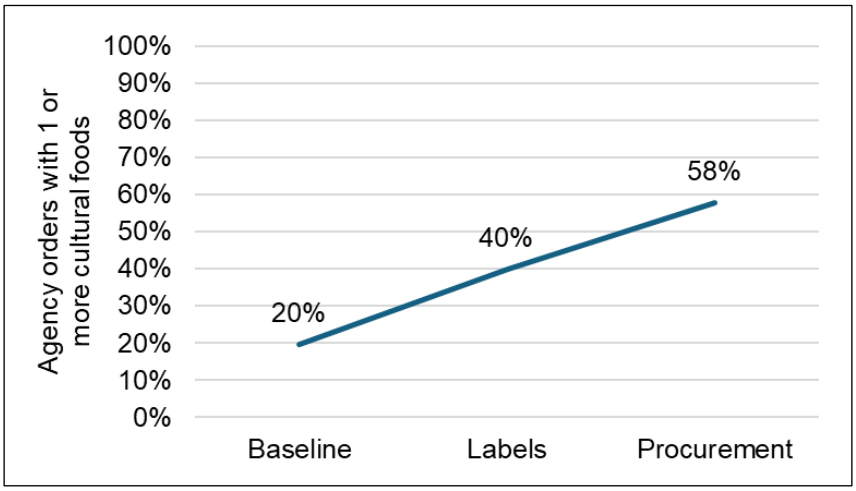
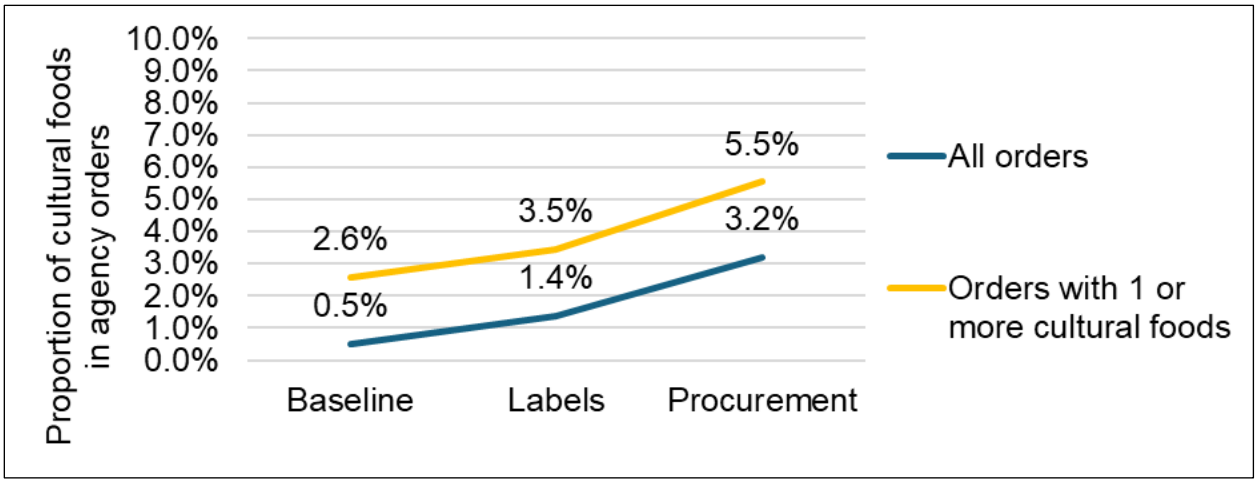


Figure 3. Proportion of Culturally Responsive Foods within Orders by Study Phase



to the robust state-grant funding most of them receive. The state has provided Hunger Prevention & Nutrition Assistance funding to food banks since 1984 and Nourish NY funding since 2021. In the 2024–2025 budget, both programs were funded at approximately US$28 million. In contrast, over 200 food banks across the entire Feeding America network reported only receiving approximately US$480 million in cash from state or local government funds in fiscal year 2023 (K. Gamperl, personal communication, January 3, 2025) to support their charitable food distribution as well as other food bank-based programs, such as workforce development training or community nutrition education.

Furthermore, many food pantries have no budget at all and rely solely on USDA TEFAP free foods, donated food, and, if available, grant-covered purchased food. Given these financial limitations, many charitable food organizations may not have the flexibility to offer targeted cultural food procurement like that investigated in the current study. However, the additional findings that introducing cultural food labeling on its own may make an impact on orders made by member agencies suggest that this may be a worthwhile no- or low-cost intervention for food banks to implement to increase their cultural responsivity.

To be culturally responsive, it is critical that an organization understands the cultural diversity, composition, needs, and assets of the individuals in their service area. The current study focused on specific cultures and corresponding foods as a direct response to an initial needs assessment of the food bank's member agencies. Some information can be gleaned or implied from secondary sources, such as distributions of racial and ethnic groups reflected in U.S. Census Data Profiles (U.S. Census Bureau, n.d.). However, surveying member agencies and/or clientele will identify individuals using agencies and can provide more detailed information, such as specific subcultures and food interests, to guide decision-making. Specific recommendations for providing cultural foods are available in a published guide from the UConn Rudd Center for Food Policy and Health (Schwartz et al., 2024). Notably, the types and numbers of foods needed for cultural responsivity of a food bank will be affected by the specific cultural groups and diversity of cultures represented by a food bank's service area. Thus, food banks will need to consider their internal and external resources when considering how they can best meet cultural food needs in their community.

The limitations of the current study should be considered. Findings relied on 45 days per study phase, which may not reflect member agencies' ordering behaviors over time. Future research would be strengthened by extending study phases to three-month or six-month periods to account for variation over multiple quarters. Separately, the culturally responsive foods introduced during the procuring phase were selected based on an internal review of items available at established suppliers. It is possible that results may have differed if additional financial and supplier resources were available to acquire specific items requested by clients. Additionally, results relied on orders from a single food bank. Incorporating a comparison food bank that did not make changes during the same period could serve as a control to increase the rigor of results. Finally, implications are restricted by the sole reliance on ordering information. The labeling and procurement practices were informed by a needs assessment survey of member agencies, but this was conducted anonymously, so it is not possible to establish if the agencies that ordered the items were the same organizations that initially requested these products. This work could be extended by following up with member agencies to assess (1) if clients noticed any changes to their inventory; (2) the rate at which the products were distributed; and (3) the demographic characteristics of clients receiving the culturally responsive items.

These results raise several key questions for future research and practice. Are these changes sustained over time, or do they simply reflect initial interest? Would agencies need to be reminded to check labels intermittently? Would other food banks see the same results? Would we see the same results with foods from other cultural groups? Do clients of food pantries notice the availability of culturally relevant foods? What are clients' reactions to the availability of culturally appropriate foods?

In summary, member agencies of a New York–based food bank increased their ordering of culturally responsive foods after the food bank introduced cultural food labels and procured targeted items for their online ordering system. Considerable barriers related to the stability and flexibility of charitable food funding will need to be addressed to sustain and expand these efforts. Efforts to overcome funding challenges to provide culturally appropriate foods is critical, as individuals' food security is best met not only by making enough food available, but by ensuring that the food is appealing, familiar, and usable by community members. The current project on culturally responsive foods is part of a wider effort to support the continued evolution of the charitable food system to better align with the communities they serve.



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"It's not just about groceries": Understanding perspectives on a planned food co-op in West Charlotte, North Carolina

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Abstract

Food insecurity is a serious issue in the U.S., particularly in communities that have experienced long-standing disinvestment and racial segregation. In historically Black neighborhoods in West Charlotte, North Carolina, supermarket redlining and urban neglect have contributed to limited access to affordable, healthy, and culturally relevant foods. In response, the West Boulevard Neighborhood Coalition (WBNC), a local nonprofit, developed the Three Sisters Market, a planned community-owned food cooperative (co-op) designed to address food insecurity, promote economic development, and serve as a community gathering space for West Charlotte residents. While community-owned food co-ops present a promising solution by expanding access to affordable food options in areas where no grocery store has been sited, there is a significant gap in research documenting resident perspectives on co-ops, particularly those planned in historically marginalized Black communities. To address the gap, this study used a community-engaged research approach in partnership with WBNC to explore local perspectives on the planned West Charlotte co-op. It aimed to answer

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the questions: (1) How do residents perceive community food co-ops; (2) What are the perceived benefits and challenges of a co-op in West Charlotte; (3) What services, attributes, and amenities do residents consider important for the success of the planned co-op. We conducted 34 semi-structured interviews with West Charlotte residents and local workers, and individuals from surrounding areas. Thematic analysis revealed both opportunities and concerns, that most participants were unfamiliar with food co-ops but would "very likely" shop there after learning more. Participants prioritized fresh produce, culturally relevant foods, and ready-to-eat healthy meals. They also envisioned the co-op as a hub for cooking classes, health education, and social connection in general. Concerns about the co-op's ability to sustain itself financially, affordability, and transportation access underscored the importance of inclusive planning and engagement. This study contributes to food justice and co-op development literature by centering resident voices and offering practical insights for community-driven food access solutions in historically marginalized communities.

Keywords
food justice, food co-op, resident perspectives, community food systems, community engagement, community-engaged research

Introduction

Food co-ops are a significant strategy for increasing access to groceries in low-resourced communities where grocery store redlining is prevalent, the practice in which large grocery retailers' calculations about potential profit margins and resident spending power lead them away from communities that tend to have higher populations of Black residents, lower rates of employment, and a disproportionate concentration of renters (Zhang & Debarchana, 2015). Consequently, residents of communities with limited access to fresh, healthy foods experience significant rates of food insecurity.

However, food insecurity, compounded with issues such as political exclusion, poverty and unemployment, is producing what has been called a fourth wave of Black cooperation in the U.S. (Nembhard, 2014). Cooperators are working at the grassroots level with locals to open food co-ops to increase food access in food-insecure neighborhoods. They offer an alternative to traditional grocery stores where community members can purchase an equity share of the co-op and become member-owners of the market. Member-owners participate in decision making such as choosing the types of products that the store offers, electing their board of directors, and voting on how store profits are distributed. Food co-ops often hire and purchase locally and reinvest in the community (Katchova & Woods, 2013). Thus, co-ops contribute to community wealth, appealing to low-resourced communities and offering an alternative to the extractive practices of dollar stores and large chain grocery stores that often pay poor wages and can negatively impact under-resourced communities by driving out existing grocery stores or deterring new ones from locating there (Institute for Local Self Reliance, n.d.).

Residents of the West Boulevard Corridor in Charlotte, NC, with the leadership of the West Boulevard Neighborhood Coalition (WBNC), a nonprofit that enables community-led economic development in the Corridor, are pursuing a food co-op to address food insecurity, health disparities, and limited community wealth. While substantial research documents the benefits of food co-ops, far less attention has been given to their implementation in historically Black communities such as the West Boulevard Corridor (Katchova & Woods, 2013; Zitcer, 2014). To encourage the success of the planned food co-op, the WBNC partnered with researchers in the Department of Earth, Environmental and Geographical Sciences at the University of North Carolina at Charlotte to study resident perspectives and needs.

This community-based research study aimed to answer the following: (1) How do residents perceive community food co-ops; (2) What are the perceived benefits and challenges of a co-op in West Charlotte; and (3) What services, attributes, and amenities do residents consider important for the success of the planned co-op. To address these questions, we conducted 34 semi-structured interviews with West Charlotte residents, local workers, and individuals from surrounding neighborhoods.

It was important to capture the perspectives of those living outside of West Charlotte, as WBNC recognized that support beyond the neighborhood is important for the co-op's sustainability. Through thematic analysis, we identified both opportunities and concerns surrounding Charlotte's proposed first food co-op.

We begin with a review of literature on food (in)access, sovereignty, and co-ops before providing more details on the research context and approach. We then provide the findings on resident knowledge and perceptions about co-ops, anticipated benefits and challenges, and the features desired by residents and prospective customers. The final two sections propose a holistic framework for co-op success and offer concluding recommendations for practitioners.

Literature Review

Limited access to affordable, fresh and nutritious food has received significant attention in public, academic, and policy spheres. Through different terminology—such as food deserts and swamps, supermarket redlining, and food apartheid—researchers and activists call attention to inequities in food access and the power structures that produce them (Eisenhauer, 2001; Zhang & Ghosh, 2015). The concept of food desert is particularly significant in focusing on food justice and equity. The U.S. Department of Agriculture defines food deserts as "areas with limited access to a variety of healthy and affordable food" (Dutko et al., 2012, pg. iii) and policymakers have responded by incentivizing grocery stores to establish locations in these areas (Shannon, 2014; Zurawski & Higgins, 2024). However, these efforts have produced inconsistent results in improving access and health outcomes (Chrisinger, 2016; MacNell et al., 2017; Zenk et al., 2011), and have been described as inattentive to political and economic structures that have disinvested in communities of color for decades (Hammelman, 2018; Reese, 2019; Shannon, 2014). Accordingly, there are increasing calls for empowering communities to build their own food systems grounded in principles of food sovereignty. Food sovereignty has been taken up by food producers and activists worldwide since the 1990s, calling for local ownership and management of food system resources and for autonomy, solidarity, and dignity for food system actors (Brant et al., 2023; Chaifetz & Jagger, 2014; Coté, 2016; Hammelman, 2018; Jones, 2019). While emerging from landless peasant movements in the Global South, the ideas of food sovereignty have more recently galvanized some urban food activists pursuing alternative solutions to food access (Block et al., 2012). For them a more holistic approach to addressing food system inequities, that is grounded in self-determination, sovereignty, and sustainability, is critical for building more equitable food systems.

In parallel, agricultural and consumer cooperatives have a long history in the U.S. food system and in struggles for food sovereignty (Hale & Carolan, 2018; Pitman, 2018). Co-ops are self-sustaining businesses in which member-owners maintain control over the business and benefits are distributed to members (Deller et al., 2009). They emerged as part of the Black populist movement in response to White supremacy (Nembhard, 2024) and as a movement to overcome the inequities of the Industrial Revolution by shifting power toward local ownership and giving consumers more control (Zitcer, 2017). Today, many co-ops follow seven cooperative principles established by the International Cooperative Alliance: voluntary and open membership, democratic member control, member economic participation, autonomy and independence, education, training and information, cooperation among cooperatives, and concern for community (International Cooperative Alliance, 2025).

Co-op grocery stores are distinct from traditional grocery stores in several important ways. Typically, a member purchases an initial membership share that entitles them to participate in the management and decision making of the store and to receive any store income that is distributed back to members. Most co-ops are committed to their communities and pursue food system relationships, such as with local suppliers, that are values-based rather than exclusively economic-based, as is more common in traditional groceries (Katchova & Woods, 2013). The market shares and collective impact of retail food cooperatives have increased in the past decades (Meter, 2014). Today, the

National Co+op Grocers, an association supporting retail food co-ops, has 166 members operating 240 stores in 39 states (2025).

Co-op groceries have been lauded for serving as alternative economic spaces that can contribute to food sovereignty, improve access to local and organic foods, and serve as spaces of hope (Zitcer, 2014). They have also been critiqued, however, for exclusivity and inaccessibility. Nevertheless, in recent years some communities of color with limited food access have turned to co-ops to reclaim their food systems. A pioneering store in this movement is the Detroit People's Food Co-op, a Black-led and community-owned grocery that opened in 2024. However, given the fairly recent advent of co-ops, there is limited research on the role of co-ops in addressing limited food access and historical disinvestment in food systems in communities of color.

Context

Neighborhoods in West Charlotte experience some of the highest rates of food insecurity in Charlotte as a result of decades of disinvestment and supermarket redlining that precluded access to affordable, fresh, and nutritious foods. The area has not had a full-service grocery store in operation in over 30 years. A Harris Supermarket operated from 1961–1976, but left to follow wealthier residents to the suburbs when the neighborhood's demographics shifted. The last neighborhood grocery store was a Wayne's Supermarket, which closed in 1989 after government seizure of the strip mall in which it was located (Moore, 2021). Today, residents primarily purchase food at low-cost retailers (i.e., Family Dollar), corner stores, gas stations, and a Walmart that is primarily accessible by car or a lengthy bus ride.

For decades neighborhood residents, community leaders, and local organizations, including WBNC, have fought to bring a grocery store back to the neighborhood. In 1998, the City of Charlotte's West Boulevard Corridor Plan specifically called for a grocery-anchored shopping center in the neighborhood as a critical part of their revitalization plan (Charlotte-Mecklenburg Planning Commission & The West Boulevard Corridor Team, 1998). In 2000, the Charlotte Housing Authority (now Inlivian) purchased a vacant lot to attract a grocery store to the neighborhood, but one never arrived. In 2016, Inlivian leased part of that lot to WBNC to operate the Seeds for Change urban farm and a prospective food retail project. That same year, residents also began to actively pursue a food co-op for the West Boulevard Corridor. Community volunteers of the Reid Park neighborhood and WBNC had been steadily building community influence and capacity and working towards gathering the necessary resources and support to launch a food co-op. As a direct result of residents advocating for their needs and cultivating partnerships with Inlivian and the City of Charlotte, recommendations for a West Charlotte food co-op were incorporated into Inlivian's 2018 Annual Plan and the Center City 2040 Vision Plan. Two market studies—the City of Charlotte's 2019 West Boulevard Market Assessment and a second market study commissioned by WBNC—confirmed the potential success of a food co-op.

In late 2020, a participatory-action research project was developed with community leaders representing community-based development corporations, resident associations (including WBNC), a church and a non-profit that works with youth, and faculty researchers in multiple disciplines from UNC Charlotte and Johnson C. Smith University to address the challenges of food access in West Charlotte and build a food ecosystem grounded in principles of food sovereignty. With funding from Mecklenburg County, this collaborative met regularly in three distinct phases during 2020–2021 to examine the conditions needed to establish a full-service grocery store, identify the most promising model (which was decided to be a food cooperative), design the co-op and develop an implementation plan (Anderson et al., 2025). The final plan was presented to the Mecklenburg County Board of County Commissioners in late 2021. Since then, the WBNC has garnered more than $5 million in funding, hired a general manager, secured land, and completed design steps in anticipation of opening the store in 2026. This study extends these efforts by exploring local perspectives on the co-op, its perceived benefits and challenges, and the services, attributes, and amenities critical for its success.

Materials and Methods

A community-engaged research design was carried out to ensure that data collected would be helpful for the WBNC's food co-op planning efforts. Students and faculty met with staff from WBNC to learn more about the community and efforts to launch the co-op. Both university researchers and WBNC then developed preliminary research questions and a plan for data collection. Methods include semi-structured interviews and a review of relevant reports. Data gathering was conducted from October to November 2024.

Interviews

This study relies on 34 semi-structured interviews conducted with West Charlotte residents (47%), local workers (6%), and residents from the greater Charlotte region (41%), and one participant each from nearby Franklin, NC (3%) and Gastonia, NC (3%). The goal was to capture a diverse and in-depth range of perspectives that are analytically representative of the study participants, rather than statistically representative or quantifiable. Data collection continued until thematic saturation was reached.

Participants were recruited primarily from two WBNC-hosted community events. Flyers, social media posts, and word-of-mouth recommendations from WBNC employees also helped with recruitment. To minimize bias, researchers aimed to interview those who had not been involved in food co-op planning processes. Interviews were conducted on Zoom, recorded with permission from participants, and transcribed. After completion of each interview, participants were emailed a $40 Visa e-gift card. On average, interviews lasted 30 minutes. Developed in partnership with the WBNC, interview questions followed an interpretivist approach (Yanow & Schwartz-Shea, 2014), exploring participant insights regarding food co-ops, the benefits and challenges they perceived to be associated with them, and what they hoped to see and experience in the planned co-op. This study was approved by the University of North Carolina at Charlotte Institutional Review Board (IRB-25-0191). Table 1 presents the demographics of our study participants and how they compare to the Mecklenburg County population.

Data Analysis

The research team conducted a thematic analysis, using NVivo 15 to code the 34 interview transcripts. The research team first analyzed the data inductively, reading over transcripts for what themes emerged. Then the data was analyzed a second time to specifically search for how participants discussed topics of interest. Three main themes served as the framework for organizing the coded data: (1) knowledge about and attitudes toward co-ops, (2) perceived benefits and concerns, and (3) desired services, products, and amenities.

Codes were grouped thematically based on similarities in meaning and relevance to the study topics. For RQ1, codes such as affordable/reasonable and expensive were categorized under Price*;* excited, interested, welcomed, positive, and negative concerns were grouped under Perceptions/ Attitudes; and not familiar, limited understanding, expert, and confusing were placed under Knowledge. For RQ2, codes reflected perceived benefits and challenges of a co-op. Benefits included access to fresh foods, community building, economic growth, improvement in health, and community pride; challenges included accessibility, sustainability, lack of information, concerns with cost, and product availability. For RQ3, codes were organized into four themes: expert-led guidance (e.g., cooking classes, nutrition classes, and food growing instruction), products (e.g., organic, cooked foods, culturally appropriate foods, unique items), services (e.g., volunteer exchange, vendors, communication channel), and Amenities (e.g., patio area, kitchen, and classroom space).

After coding, the data was exported to CSV format and R was utilized to produce more refined and customizable visualizations. Though NVivo has some basic tools for code frequency, R was used to create visuals that made it easier to compare various themes, enhancing our ability to interpret and present the data visually for a broader audience, including community partners.

Positionality

Our research team includes three non-West Charlotte researchers who approach this study with humility and a commitment to learning from local residents. This study was also guided by two coau-

Table 1. Study Participant Demographics (*N* = 34)

Category	Group	Study Sample (%)	County Population Share (%)
Race/Ethnicity	Black or African American	47%	32%
	White	21%	57%
	Asian	12%	7%
	Prefer not to answer	9%	N/A
	Hispanic or Latino	6%	17%
	Two or more races	3%	3%
	American Indian or Alaska Native	3%	1%
Gender	Woman	56%	48%
	Man	38 %	52%
	Prefer not to answer	3%	N/A
	Non-binary	3%	N/A
Income (US$)	Prefer not to answer	18%	Median household income: $87,005
	$35,000–$49,999	18%	
	$50,000–$74,999	18%	
	$25,000–$34,999	12%	
	$100,000 to $149,999	9%	
	Less than $10,000	6%	
	$15,000–$24,999	6%	
	$10,000–14,999	6%	
	$150,000–$199,999	3%	
Education	Bachelor's degree	27%	32%
	Associate's degree	21%	8%
	Graduate or professional degree	21%	19%
	High school graduate degree (includes equivalency)	18%	17%
	Some college/No degree	15%	16%

Source: Demographic survey conducted by researchers; U.S. Census Bureau, 2024.

thors who during the study period held leadership roles at WBNC, including Community Engagement, Research, and Organizing Director and Interim Executive Director.

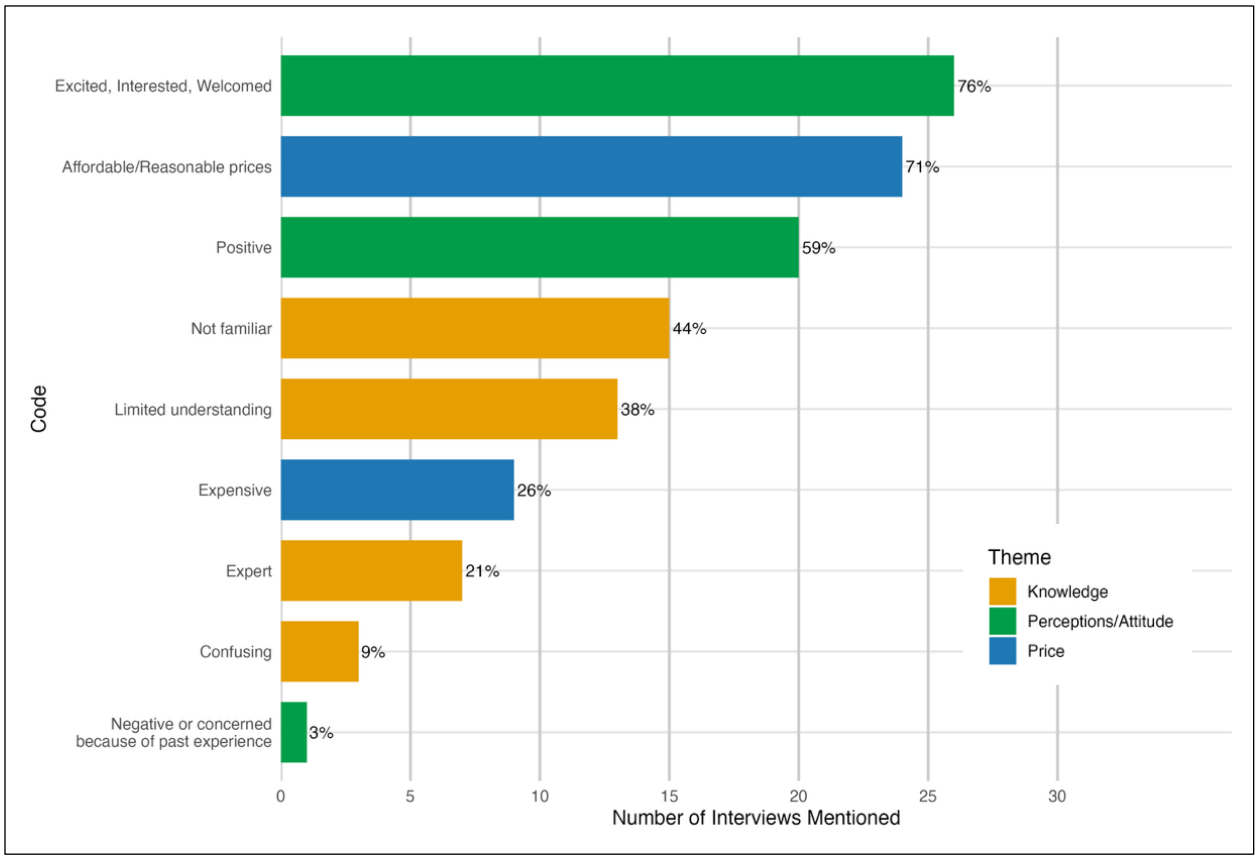
Results

Knowledge and Perception of Food Co-ops

Participant knowledge of food co-ops varied, ranging from complete knowledge to no prior awareness. As seen in Figure 1, food co-ops were unfamiliar to 15 (44%) of the 34 participants. A longtime West Charlotte resident remarked, "I've heard the term, but I have a very limited understanding of how they actually function." Similarly, other long-term residents expressed unfamiliarity: "I don't really know much about them, or who owns it" and "To be honest, I am not very familiar with food co-ops." Nevertheless, most participants were open to learning more, and many expressed interest in shopping at the food co-op after hearing about its mission from the interviewer.

Some participants had prior understanding of food co-ops, though 47% found the concept confusing, with 20% describing themselves as knowledgeable or experienced in the topic of food co-ops. Some participants expressed confusion between farmers markets and food co-ops. One long-time resident shared, "Yes, I've shopped at one before and my perspective of food co-ops is like a market, similar to a farmer's market setup." Nevertheless, 59% described co-ops in favorable

Figure 1. Perceptions of the Planned Food Co-op



terms, highlighting benefits such as community empowerment, local investment, and improved food access. In total, 65% of interviewees were classified as "Excited/Interested," indicating a high level of emotional investment. Participants who expressed the most excitement about the planned food co-op were primarily local residents, especially Black and Latina women, and those who reported low to moderate household incomes.

However, a few participants voiced skepticism. One participant expressed concerns rooted in community conditions: "You are dealing with poverty areas that have been affected by drugs and violence…people are only thinking about their safety." She added, "Anything that beautifies the community can be difficult for them to accept to have a co-op," highlighting the role of social and environmental realities. A young professional involved in community outreach recalled a prior co-op visit as "pretty mundane," lacking emotional resonance. However, they valued the co-op's broader mission of shared ownership, affordability, and accessibility. Their support was based more on the practical role of a grocery store meeting their needs than from excitement about what more the food co-op could be.

Affordability

Regardless of support for the planned food co-op, affordability was a recurring concern, with nearly 70% of interviewees expressing hope that the co-op would offer prices either lower than or at least competitive with traditional grocery stores. Participants often stated that they did not want the co-op to mirror the high prices of upscale chains. One long-term resident explained, "I would not want to see a co-op…like a Fresh Market or Whole Foods," hoping it would be "a little more affordable for the community." Similarly, a newer resident envisioned a balance between quality and cost, saying they would like to buy the "quality of Harris Teeter meat…at the price of Walmart." Many par-

ticipants stated that they would support and shop at the co-op if it met these expectations, one resident remarking, "If it's affordable and community-focused, I'd definitely shop there. It feels like a way to give back to the neighborhood." However, about 26% expressed concerns that the co-op might be more expensive due to its smaller scale and lack of buying power. A participant acknowledged that while a co-op could offer substantial community benefits, that "probably isn't going to completely outweigh the cost … if [prices] are significantly higher than a typical grocery store." Another participant expressed that prices at the co-op "have to be reasonable," or else people might continue to shop at conventional grocery stores, suggesting Trader Joe's as a pricing model that balances affordability and quality.

Nevertheless, many participants viewed the planned co-op as a valuable addition to their community, with the most frequently cited advantage being better access to affordable, fresh food. A North Charlotte resident envisioned the co-op offering "fresh produce, tomatoes, fruits, maybe meats, or if they have any farmers that are making their own jams or peanut butters and things like that." Similarly, another participant expressed enthusiasm for a "good selection of fresh fruits and vegetables, especially ones that are affordable and locally grown." These responses demonstrate a frequent desire for healthier, better-quality food options that do not rely on expensive or distant grocery stores. A North Charlotte resident noted, "If they can provide more fresh and naturally grown food options, that would be a strong selling point for the co-op, especially when it comes to marketing."

Community Building

Beyond food access, 68% of participants cited as a major advantage the co-op's potential for building community. A West Charlotte resident shared, "I definitely think it's a benefit to the community … a community building endeavor … a good opportunity to help people make connections to each other." Others saw it as a place that could foster a sense of identity and belonging. A Southwest Charlotte resident stated, "It's like a community initiative where people can come in and see that this is happening in their neighborhood, not anywhere else." These responses indicate that the co-op is viewed as a potential social hub, much more than simply a market.

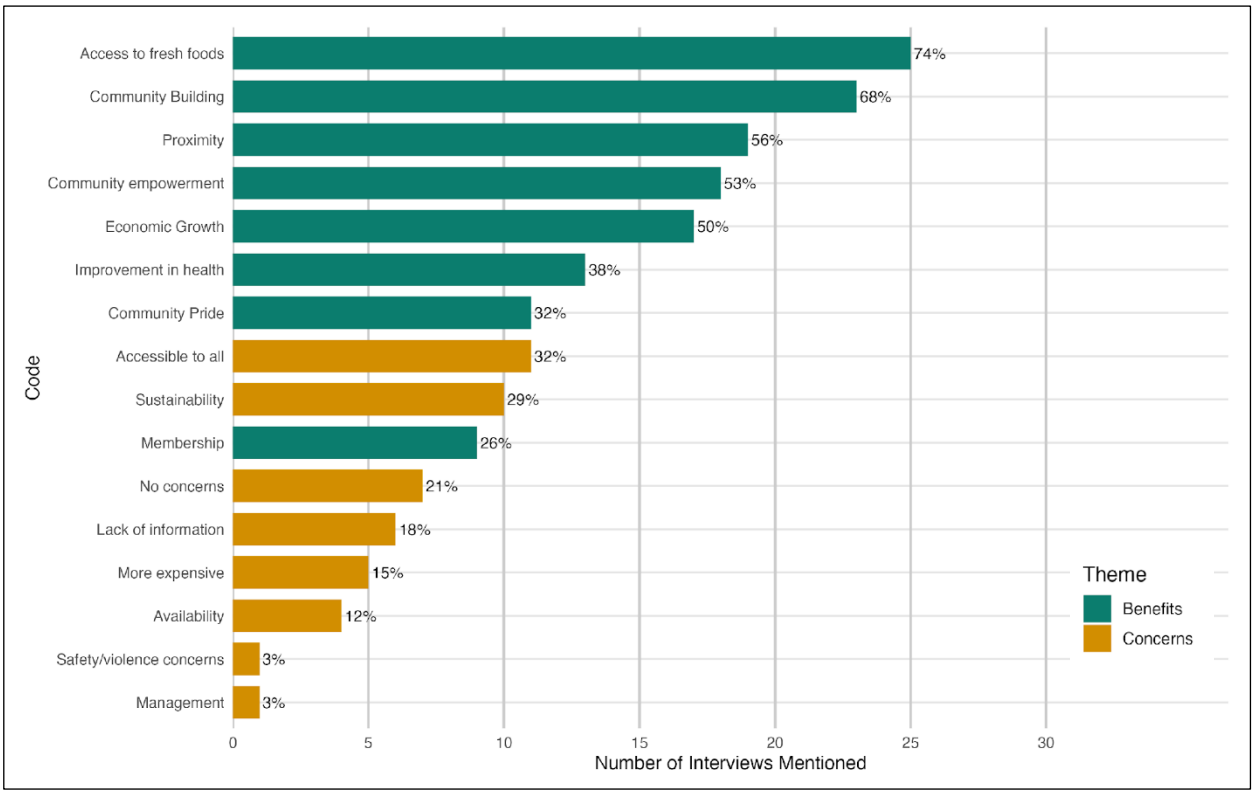
Many also saw the co-op as a way to give residents more control over the local food system. A South Charlotte resident explained, "I can understand that having the opportunity to be part owner of the store gives members of the community more decision-making power." Similarly, a Southwest Charlotte resident said, "If it's member-driven … the members might have a bit more input on what's sold or maybe even get certain benefits."

Participants also identified the co-op as a source of community pride and economic opportunity. A longtime resident of Southwest Charlotte said, "It could offer jobs to some people who have a hard time finding employment," and another participant added, "It would create jobs which will benefit the economy, especially the local economy." For others, the co-op represented a place of emotional connection, legacy, and belonging. A South Charlotte resident affirmed she would shop at the food co-op because "I grew up in that neighborhood…Every chance I get to give back, I try to do that." A resident from Northeast Charlotte added, "If it were well-stocked and well run, it could definitely be a point of pride, a place where people feel connected to their community. It would empower people to use the resource and be involved in making it as good as it can be." These insights suggest that participants see the co-op as more than a grocery store. It is envisioned as a space of empowerment, healing, local investment, and community pride.

Perceived Challenges of Food Co-ops

The question of whether the co-op would be accessible to everyone was one of the most often raised concerns, as reported by 32% of interviewees (Figure 2). A newer resident of West Charlotte highlighted transportation challenges: "People who have issues with transportation, that would be a problem … you're not gonna go on a city bus to go grocery shopping." Others questioned whether there would be sufficient inventory to meet community needs, asking, for example, "Is there enough to go around for everyone?" Concerns

Figure 2. Perceived Challenges and Benefits of the Planned Food Co-op



were also raised about the co-op's ability to manage deliveries and stock levels, one participant noting, "They don't really have huge trucks coming in, so … it's limited." These comments reflect underlying concerns about physical access and supply reliability as potential barriers to equitable participation.

Concerns about the co-op's long-term viability were also common, with roughly 30% of participants questioning its financial and operational sustainability. A longtime West Charlotte resident shared, "I don't know how sustainable it's going to be. … We've seen a lot of things like that happen in the past and then closed because of lack of big support." Some participants also raised practical concerns about the need for skilled management and operational leadership.

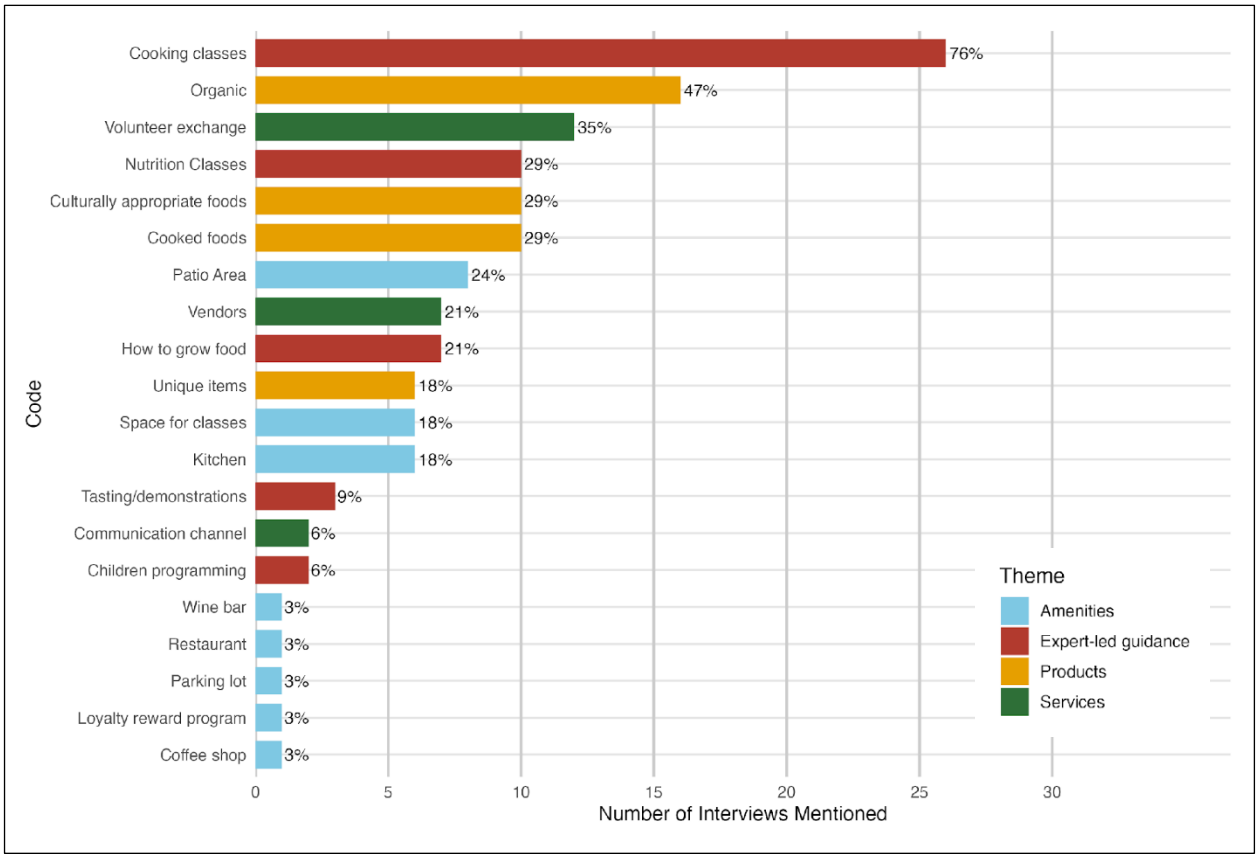
Features that Matter to Participants

Expert-led guidance

Participants expressed a strong interest in expert-led guidance, particularly in the areas of nutrition, cooking, and food-growing practices (Figure 3).

Cooking classes emerged as the most frequently mentioned educational component, 77% of participants identifying them as a key need. Many viewed cooking not only as a practical skill but also as a social and enjoyable activity that could support healthier lifestyles. A participant explained, "Cooking will be pretty fun. And I know a lot of people may suffer from high blood pressure and diabetes, so you can kind of tailor it to those people. Teach them how to make healthier meals." Others emphasized the value of workshops focused on food planning and budgeting to help households cope with food insecurity. A participant commented, "It would be great if the co-op offers some budgeting or meal planning workshops. Learning how to make affordable healthy meals could really benefit the community." Learning how to grow food was a frequently cited topic, with 21% of respondents indicating interest in gardening or farming. A smaller number of participants (6%) recommended children's programming, noting the benefits from involving youth in farming and market-related activities.

Figure 3. Desired Services and Amenities in the Planned Co-op



Amenities

One of the possibilities most often suggested was a community kitchen for shared cooking, events, and small business opportunities. A West Charlotte resident proposed, "It would be nice to have a community kitchen and mobile service…to see how everything is run." Similarly, another participant saw the kitchen as a space for community ownership and entrepreneurship, suggesting, "It could be like multiple Black owners … anybody in business selling foods."

Other frequently mentioned features included parking, gathering places, and seating areas. A Southwest Charlotte resident emphasized the importance of convenient parking: "As long as it has parking." A patio space was also seen as beneficial for hosting events, with one participant connecting it to workshops and engagement. Several participants advocated for dedicated spaces for group learning and decision making. A West Charlotte resident said, "I do believe everybody needs…the space to have meetings, to decide the future for a lot of things." Some participants also offered creative ideas, such as opening a small café or restaurant within the co-op.

Products

Culturally relevant foods were also important, with 29.4% of participants identifying them as an offering related to belonging and identity. A West Charlotte resident said, "You know the kind of foods I grew up on and are familiar and comfortable to me…If you are not from this area and you crave food from your childhood, then there might not be things as easily found." Also, organic products were seen favorably by 24% of interviewees. One participant shared, "I am trying to eat less processed foods and make sure that the food I'm consuming is as organic as possible." Others liked having the opportunity to get items that were unique or very difficult to find. Overall, the responses demonstrate the importance of a comprehensive

approach to stocking products that balances diversity, affordability, cultural familiarity, and healthfulness.

Services

Notably, 35% of interviewees indicated that they would like to actively participate in a volunteer exchange program. A Southwest Charlotte resident enthusiastically expressed, "Please let me know if you need another volunteer. I'll try to sign up for it." This strong sense of engagement and ownership suggests that service-based models can help build shared responsibility. Vendorship was mentioned in 21% of interviews as a way to support local entrepreneurs and diverse product offerings. A West Charlotte resident suggested, "I could see having some sort of specialty vendor … handmade candles … kind of those smaller [items]." Such comments reflect interest in using the co-op as a platform for local entrepreneurs. Other service ideas, including a loyalty reward program (3%) and sampling or demonstration events (9%), also pointed to the importance of engagement. A West Charlotte resident noted, "I think it makes me more likely to come and check it out." Additional services such as communications channels (6%) and on-site coffee shops (3%) were also mentioned as ways to promote social interaction and keep residents informed.

Discussion

This study examined the perspectives of a sample of West Charlotte residents and of the broader community on a planned food co-op in a historically Black neighborhood that has been without a full-service grocery store for decades. Findings indicate that while many residents remain unfamiliar with food co-ops, concerns regarding affordability, sustainability, and management are prominent. Participants would like more than a grocery store; they want a space for community building, safety, and belonging. These perspectives align with previous research that highlights calls for local ownership and management of food systems (Brant et al., 2023; Chaifetz & Jagger, 2014; Coté, 2016; Hammelman, 2018; Jones, 2019) and alternative solutions to food access (Block et al., 2012).

Previous research has delineated co-ops as self-sustaining businesses where member-owners hold decision-making power and benefits are distributed among members (Deller et al., 2009). However, our findings demonstrate that much more research is needed to understand how co-ops operate in historically underinvested and redlined communities where structural challenges are distinct. Participants raised concerns such as violence and safety, illustrating how environment shapes the role and expectations of a planned food co-op. Beyond access to groceries, participants expressed a desire for a community space that promotes safety and belonging, aligning with the International Cooperative Alliance's seven co-op principles, particularly the principle of concern for community (International Cooperative Alliance, 2025). Prior research also has emphasized that food co-ops are committed to food system relationships and their local communities (Katchova & Woods, 2013). Our findings extend this work in illustrating specific ways food co-ops can demonstrate their commitment to community. Suggested approaches include volunteer opportunities, gardening, cooking and nutrition classes, provision of culturally relevant foods, and community kitchens, as well as access to fresh, quality, and affordable food items, all of which can strengthen community relationships and reinforce the co-op's role as a trusted entity.

These insights are important as WBNC continues planning and as more organizations across the U.S. propose food co-ops. Accordingly, the study suggests that a holistic approach will be necessary to ensure that similarly positioned co-ops meet community needs. From this study, five areas of recommendations for a holistic approach emerged: (1) education and outreach, (2) affordability strategies, (3) comprehensive offerings, (4) community engagement and trust building, (5) sustainability planning. These considerations reflect the concerns and perceived challenges and highlight pathways for aligning a co-op's development with community priorities.

Education and Outreach

More than half the respondents expressed confusion or misunderstanding about what a food co-op is and how it functions. This gap shows the importance of targeted educational outreach to

ensure that residents feel informed and empowered to participate. Clear and accessible campaigns should communicate the co-op's structure, benefits, and operations. Workshops, informational sessions, and collaborations with local organizations, both within and outside the immediate community, are strategies to enhance understanding.

Affordability Strategies

More than half the participants emphasized concerns with affordability, and recommended affordability strategies such as tiered membership options, discounts for low-income households, and partnerships with local suppliers and farmers to balance cost and quality. Transparent communication about pricing structures and sourcing practices could also mitigate misconceptions that co-ops are more costly.

Comprehensive Offerings

Fresh, local, and organic produce, especially staple items such as leafy greens, tomatoes, and peppers, were identified as a top priority. Beyond produce, respondents stressed the need for culturally specific foods, including grains, spices, and sauces that reflect the area's diversity. Ready-made, minimally processed, and health-conscious meals were also suggested to meet the needs of busy households seeking convenience without sacrificing nutrition. By offering a wide range of products, co-ops have the potential to serve both the nutritional and cultural needs of residents.

Community Engagement and Trust Building

Building trust emerged as a significant theme, participants emphasizing the importance of hiring local people, ensuring community representation in leadership, and maintaining a strong neighborhood presence. Participants envisioned the co-op as a multifunctional space that integrates education, social interaction, and cultural exchange. Suggested initiatives included cooking classes, gardening workshops, nutrition seminars, and volunteer opportunities that would allow residents to contribute directly to co-op operations. Collectively, these strategies could strengthen a co-op's role as a trusted, community-centered institution and enable more holistic contributions to a complex food system.

Sustainability Planning

Concerns about long-term viability were frequently raised, with participants noting need for transparent operations, financial resilience, and diversified revenue streams. Governance structures that actively involve community members in decision making could reinforce accountability and shared responsibility. To ensure financial sustainability, participants suggested marketing the co-op to both neighborhood residents and the broader Charlotte community, diversifying revenue through special events and space rentals, and generating income from prepared foods. Volunteer programs could also simultaneously reduce operating costs and strengthen community involvement.

Conclusion

Our findings indicate a somewhat widespread ignorance of what food co-ops are, but, overall, positive perspectives of what the food co-op could be for locals, such as a space for community building, belonging and safety, and what the co-op could serve—fresh, healthy, and affordable produce. In terms of important products, services, and amenities needed, participants mentioned that culturally relevant foods, cooking classes, and hot ready-to-serve meals could be beneficial. Participants also underscored the importance of working together with the community and ensuring that the community benefits from the services, products, and job opportunities. Nevertheless, a few participants expressed concerns related to affordability and the sustainability of the food co-op in an area with unsafe neighborhood conditions. Without a recognition of neighborhood conditions and sound management practices, there is concern that the food co-op will fail.

A limitation of our study is that most interviewees were recruited from the WBNC community events. Accordingly, residents who are less engaged with WBNC may not have had their voices heard in this research. Future research could focus on door-to-door surveys to obtain perspectives from the broader community and to assess how the planned food co-op may complement and interact with residents' broader food access strategies, including farmers markets, food assistance programs, and informal self-provisioning practices.

Nevertheless, we present a holistic view of how participants view food co-ops and the comprehensive approach needed. A key takeaway for scholars and practitioners is the importance of centering local resident perspectives in the process of planning food co-ops so as to ensure their sustainability. Apart from resident perspectives, it is also important to consider contextual needs, including ease of transportation, sense of safety, and social concerns that may influence one's acceptance and use of a food co-op planned for their area. We present recommendations for practitioners seeking to plan food co-ops in U.S. communities similar to West Charlotte that have faced supermarket redlining and seek to address food insecurity. In doing so, we aim to advance more sustainable food co-op planning in the U.S. and contribute to the broader food systems literature. 

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Atsalugpiaq awareness: Food agency of cloudberry subsistence to support Indigenous food sovereignty

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Abstract
This study examines food agency of *atsalugpiaq* subsistence practices in the Indigenous community of Kuinerraq, Alaska. Food agency is the capacity of individuals or communities to define and achieve food and diet-related goals. While past research literature has limited the theoretical scope of food agency to cooking and consumption, this study expands the concept to encompass provisioning, addressing a theoretical gap in the literature. Through participatory co-developed research led by Nalaquq LLC, oral histories with Alaska Native community members identify new components of food agency: ethics, science and knowledge, and autonomy. These findings build upon and extend

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the existing framework of food agency that emphasizes individual skills, attitudes, and structural barriers, and offers a more holistic understanding of the drivers of food security in rural and Indigenous communities. Kuinerraq is committed to carrying forward *yuugnagpiallerput* (living a proper Yup'ik life) in response to environmental and social change to ensure their future generations' prosperity. The study highlights that efforts to build food security must center on supporting cultural enrichment, relational values, and lived practices rather than relying solely on externally imposed metrics and theoretical concepts.

Keywords
Rubus chamaemorus, cloudberry, food security, Yup'ik, Indigenous, Alaska Native, American Indian, participatory action research, climate change, circumpolar, foraging

Introduction

Each summer, Alaskan Native community members from Kuinerraq on the coast of the Bering Sea steward and harvest up to 75 gallons of *atsalugpiaq* (*Rubus chamaemorus*) per household from the tundra, caringly storing them for celebratory meals during the long Alaskan winters. A*tsalugpiaq* are found across the northern hemisphere, spanning the circumpolar sub-arctic. Known in southwest Alaska as salmonberry (not to be confused with *Rubus spectabilis*, also regionally referred to as salmonberry but commonly referred to globally as cloudberry), they are vulnerable to environmental changes, including desynchronization of flowering with pollinator activity, weather patterns, and habitat changes (Herman-Mercer et al., 2020; Mulder et al., 2023). The stewardship of *atsalugpiaq* by Yupiit (plural form of Yup'ik) people of southwest Alaska is guided by *yuuyaraq* (rules to live by), which when followed hold harmony and show respect between *Ellam Yua* (the spirit of the universe), the sentient land, and humans, thus maintaining a good harvest

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the following year (Ayunerak et al., 2014; Fienup-Riordan, 1995).

Indigenous communities are strengthening foodways as a means of resistance towards globalization and environmental change, through exercising sovereignty rights, language revitalization, celebration of traditional arts and crafts, and designing new technologies to support cultural enrichment (Reo & Whyte, 2012). Native communities have practiced a subsistence lifestyle for thousands of years, adapting to the tundra environment to live in ecological balance (Lindholm, 2019). Plant subsistence involves the activities associated with procuring, post-harvest processing, storing, and cooking of culturally significant wild edible plants (Burnette et al., 2018; Fienup-Riordan et al., 2021). Subsistence is a lifestyle and not just a means to an end for providing food (Lindholm, 2019). Extensive recent documentation by Yupiit of the cultural, nutritional, and medicinal importance of plants highlights the significance of Yup'ik plant subsistence and of continuing to pass knowledge to next generations (Fienup-Riordan et al., 2021; Jernigan et al., 2015). However, nutritional colonization, the long-lasting impacts of colonization on food systems, has caused decreased participation in subsistence activities, decreased consumption of culturally significant foods, increased food-related chronic diseases, sedentary lifestyles, dependence, and diminished control of local resources (Lindholm, 2019). In response, across North America (referred to by some Indigenous people as Turtle Island) Indigenous activists are leading efforts to revitalize indigenous foodways, and building agency and capacity to enrich traditional foodways for the next generations (Gwin, 2019; Plenty Sweetgrass She-Kills-De La Cruz et al., 2025; White, 2019).

Nutritional colonization continues through the concept of food security, which encourages the cultural genocide of traditional foodways (Lindholm, 2019; Maudrie, Clyma, et al., 2024; Power, 2008). Food security is the *state* of having stable, accessibly, available, and utilizable food (Food and Agriculture Organization of the United Nations et al., 2025). However, in its pursuit many crucial dimensions of food culture have been erased (Lindholm, 2019; Maudrie, Clyma, et al., 2024; Power, 2008). Indigenous food sovereignty recognizes the *right* of Indigenous peoples to choose how their food is grown, procured, processed, and cooked. To exercise and achieve food sovereignty, traditional foodways are nourished through Indigenous Knowledge (Reo & Whyte, 2012). Indigenous food scholarship; cultural, physical, emotional, and spiritual beliefs; and practices of food and nutrition rely on cultural vitality and sharing for food security (Nyholm et al., 2024; Teune & Walch, 2025).

A newer concept—*food agency*—may be a helpful way to understand food security (Ehlert & Voßemer, 2015), as it emphasizes underlying causes of food security and insecurity (Walch et al., 2018). Food agency is the *ability* of an individual, community, or nation to meet their food acquisition and preparation goals that support individual and community well-being (Morgan, 2020; Trubek et al., 2017). Agency is the capability, action, and capacity of an individual or community to take action to reach their well-being (Sen, 1999). The food agency concept recognizes that food-related behaviors do not just involve individual capacity but are also impacted by societal and institutional structures (Morgan, 2020; Trubek et al., 2017). Food agency is supported through social and cultural environments and technical and cognitive skills that support development of foodways, and the ability to meet foodway goals (Trubek et al., 2017). Food agency helps foreground underlying motivation and decision making that impact food sovereignty (Wolfson et al., 2023), such as participating in Indigenous traditional foodways, including subsistence lifestyles. Therefore, food agency is the action of realizing the *right* of Indigenous food sovereignty

Indigenous theoretical concepts specific to food sovereignty help facilitate culturally appropriate programming, education, outreach, and evaluation of cultural revitalization efforts for Indigenous scholars (Maudrie, Clyma, et al., 2024; Plenty Sweetgrass She-Kills-De La Cruz et al., 2025; Walls et al., 2019). How progress and change is measured is critical for Indigenous communities, as Western social-psychological scales do not align with Indigenous values and the ways of knowing of Indigenous communities (Walls et al., 2019). Strengths-based concepts and measurement tools are needed in food systems research for Indigenous communi-

ties (Maudrie, Caulfield, et al., 2024; Maudrie, Clyma, et al., 2024).

Food system research that focuses narrowly on consumption to try to understand Indigenous nutrition often excludes the understanding of motivation, skill set, and capacity that are involved in provisioning, thus oversimplifying Indigenous food systems (Vernon, 2015). In addition, the concept of food agency needs empirical research to understand the lived experience of food agency for individuals and communities that rely on alternative food systems and foodways (Morgan, 2020), investigating the strengths and empowerment of Indigenous food systems (Vernon, 2015). Further expansion of the conceptualization of food agency to include food acquisition and provisioning is needed (Trubek et al., 2017). Existing tools to measure and conceptualize food agency have not accurately captured the lived experience of those not participating in the dominant food paradigm (Morgan, 2020). Case studies across a breadth of specific foodways are needed to conceptually advance the term *food agency*.

In collaboration with an Alaskan Native-owned ANCSA 14(h) subsidiary, we developed a research methodology to support knowledge co-production through oral histories by weaving together Yup'ik and Western science (Gleason, Lim, Church, et al., 2023). Kuinerraq community members identified variable harvests of *atsalugpiaq* as a research priority (Gleason, Lim, Church, et al., 2023). *Atsalugpiaq* is the subsistence plant of most concern for Alaskan Natives in southwest Alaska due to its variable harvest, affected by habitat changes, weather patterns, and threats to pollination (Herman-Mercer et al., 2020; Mulder et al., 2023). Oral histories about subsistence provide an inclusive way to engage community members in research because they limit the time commitment required for stakeholder workshops and other co-production methodologies (Som Castellano & Mook, 2022) and can be used to ground Western scientific methods (e.g., remote sensing) in lived experience (Lim et al., 2021).

This study aims to advance the concept of food agency through the case study of subsistence berry picking, specifically *atsalugpiaq,* and to establish a baseline and documentation for the next generation on *atsalugpiaq* subsistence. Our research question is "How do Alaskan Natives describe and enact food agency in relation to plant subsistence?" The objectives of this research are to: (1) identify perceived barriers to meeting *atsalugpiaq* subsistence goals and (2) identify foundational elements that support food agency. In the next sections, we discuss Indigenous Knowledge , underlying motivators of subsistence, and food agency.

Literature Review

Yupiit have stewarded the coastal tundra in *Kuinerraq* (Quinhagak), Alaska for generations. Kuinerraq is located on the coast of the Bering Sea in the Yukon-Kuskokwim (Y-K) Delta. There are 56 Tribes located in the Alaska Native Claims Settlement Act Calista corporation region of the Y-K Delta whose lifeblood relies on subsistence culture. Colonization, first by Moravian missionaries and then *Kussaqs* (white people), in Kuinerraq marginalized Yup'ik worldviews and eroded culture through settlement, boarding schools, and forced acceptance of capitalism in the 20th and 21st centuries, impacting Yup'ik subsistence practices or *yuuyaraq* (our way of life) (Barnhardt & Oscar Kawagley, 2005; Smith & Gleason, 2021). In Kuinerraq there has been an increasing dependency on store-bought supplies (e.g., mosquito spray), and changing landscape and environmental cycles are impacting *yuuyaraq* (Smith & Gleason, 2021). However, Indigenous resilience supports *yuuyaraq* through spiritual beliefs, sharing, generosity, intergenerational knowledge sharing, and respect. Supporting consumption of traditional foods relies on embracing Indigenous palates (L. Black Elk, personal communication, November 7, 2022) through developing olfactory and gustatory preferences for traditional foods (Yamin-Pasternak et al., 2014). *Yuuyaraq* has always adapted and continues to adapt, such as making *akutaq* (traditional Yup'ik dish) with yogurt instead of seal oil or the colonizing replacement Crisco (Barnhardt & Oscar Kawagley, 2005; Smith & Gleason, 2021).

Indigenous Knowledge includes "physical and metaphysical" worlds linked by a moral code (Barnhardt & Oscar Kawagley, 2005), as Indigenous Knowledge is relational and strengthens our understanding of relational connection (Wilson,

2004). Indigenous Knowledge can be conceptualized in three components: ethics (values, moral code, and moral judgements), practice (skills, management systems, and techniques), and knowledge (place, biota, and ecosystems) (Reo & Whyte, 2012). Yup'ik Indigenous Knowledge is supported through the methodologies "observation, experience, social interaction, and listening to the conversations and interrogations of the natural and spiritual worlds with the mind" (Kawagley, 2006, p. 4). Yup'ik epistemologies include interbeing mobility (i.e., movement between human and animal forms), consciousness, intuition, visions, observation and spiritual interaction (Kawagley, 1990, p. 5). Yup'ik values are sharing, cooperation, respect for elders' wisdom, exploration of the natural world, family (Kawagley, 2006), and self-reliance (Kawagley, 1993). Additionally, fun and amusement (Vliet et al., 2022), future planning, intergenerational communication and skill formation, and self-determination/sovereignty (Whyte, 2018; Wilmer et al., 2024) are important components of subsistence activities (Vliet et al., 2022). Barrier or structures that impact subsistence include adopting Western dominant culture, environmental distancing, erosion of subsistence values (Alessa et al., 2010), and lack of including Indigenous viewpoints in federal resource management (Wilmer et al., 2024).

A recent development in Indigenous theory of food and nutrition is the Indigenous Nourishment Model, a strengths-based model that demonstrates the intersection of emotional, spiritual, relational, and physical domains underlying the subdomains of belonging, intentionality, food knowledge, sharing, and ancestral foods that support a holistic nourishment of the body and mind (Maudrie, Clyma, et al., 2024). However, capabilities of subsistence practices are not the focus of this model. As subsistence activities support Indigenous well-being, life satisfaction, cultural connection, and mental and physical health (Burnette et al., 2018), a model that focuses on provisioning may facilitate the identification of drivers of food security and contribute to Indigenous scholarship on food and nutrition (Reo & Whyte, 2012). Most research has examined the *outcomes* of subsistence rather than examining the foundational supports to *practicing* subsistence activities (Burnette et al., 2018). Underlying components of subsistence activities include sense of community, culture identity, positive experiences, enjoyment, values of self-sufficiency, intergenerational learning, physical activity, and spirituality (Bersamin et al., 2007; Burnette et al., 2018; Petrasek MacDonald et al., 2013).

Food Agency

Food agency is conceptualized currently as having three components: self-efficacy, attitudes, and socio-cultural barriers/structure (Morgan, 2016; see Table 1). However, ongoing research continues to identify components of food agency. An analysis of a college-level cooking class identified care and con-

Table 1. Review of Theoretical Components of the Concept of Food Agency

Component	Subdimensions	Source
Perceived Self-Efficacy		(Karlsson et al., 2023; Lahne et al., 2017)
	Provisioning Strategies	(Morgan, 2020)
	Cooking Strategies	(Morgan, 2020)
	Provisioning Habits	(Morgan, 2020)
	Intergenerational Knowledge & Skill-sharing	(Morgan, 2020)
Food Attitudes		(Lahne et al., 2017; Karlsson et al., 2023)
Socio-Cultural Barriers		(Lahne et al., 2017; Karlsson et al., 2023)
	Physical Environment Constraints	(Morgan, 2020)
	Lack of Time or Energy	(Morgan, 2020)
Care and Connection		(Finley, 2024)
Aspirations		(Morgan, 2020)
	Hope	(Morgan, 2020)
	Future Goals	(Morgan, 2020)

nection as underlying motivators or components of food agency (Finley, 2024). Studies of low-income residents of Philadelphia and Wisconsin identified additional components, including constraints (physical environment, lack of time or energy to provision food, and lack of skill in provisioning), supports (intergenerational knowledge and skill sharing, provisioning habits, provisioning strategies, and cooking strategies), and aspirations (hope and future goals) (Brenneman, 2024; Morgan, 2020). Food agency constituents are built heterogeneously over the lifetime of an individual (Wolfson et al., 2023). Food agency helps us understand the decision-making that underlies food security, such as buying prepared food versus procuring and provisioning one's own food (Wolfson et al., 2023). As food agency is realizing the *right* of Indigenous food sovereignty, this research explores adapting the concept to Indigenous foodways. Specifically, food agency is useful for understanding how individuals set plant subsistence goals and achieve them.

Identifying key components of subsistence food agency may help relatives across Turtle Island develop enriching cultural programming and education, as well as outreach, monitoring, and evaluation efforts that will support cultural revitalization and agency related to plant subsistence.

Methods

Context

Kuinerraq, population 774 in 2020 (U.S. Census Bureau, 2025 [as Quinhagak City]), an Alaskan Native Yup'ik coastal village in southwestern Alaska, heavily relies on *atsalugpiaq* (*Rubus chamaemorus*) for its nutritional and cultural significance. In Kuinerraq, Indigenous Knowledge predicts good years for *atsalugpiaq* harvest abundance when large amounts of cottongrass flag out small mounds bearing orange-laden fruits dotting the tundra (Fienup-Riordan et al., 2021). New infrastructure projects in Kuinerraq, such as the dump, have been built to avoid disturbing the best patches nearest to the village (Fienup-Riordan et al., 2021). *Atsalugpiaq* have numerous health benefits and cultural meanings; for example, the leaves are thought to provide powers to healers and are said to dry up breast feeding mothers (Fienup-Riordan et al., 2021).

Changing environmental cycles raise concerns about the sustainability of *atsalugpiaq* harvests, impacting food security and cultural practices (Herman-Mercer et al., 2020; Mulder et al., 2023). *Atsalugpiaq* harvests in Alaska are increasingly variable due to threats to pollinators, loss of permafrost, lack of snow cover, and warmer, drier summers (Hamilton et al., 2024; Herman-Mercer et al., 2020; Mulder et al., 2023). Kuinerraq faces increasing rates of coastal erosion, impacting transportation in and out of the community and loss of valuable allotments and berry patches (Gleason, Lim, Marsden, et al., 2023; Lim et al., 2021, 2023). Currently, Kuinerraq community members must travel hours by boat in the Bering Sea in order to access large healthy *atsalugpiaq* patches, which is increasingly difficult and unsafe to do because of coastal erosion, change in ocean currents, frequency of storms, increased gas prices, inflation, high cost of living, lack of commercial fishing, fewer jobs, and unpredictable extreme weather (L. M. Church, personal communication, July 17, 2025; Mulder et al., 2023).

Due to these challenges, as well as recent failed berry subsistence seasons (e.g., 2019), village leadership and Nalaquq LLC in Kuinerraq invited the first author to co-develop a community-led monitoring program of the health of *atsalugpiaq* in the face of environmental and social change. Nalaquq LLC, a Native Alaskan-owned Kuinerraq-based company dedicated to providing technological solutions for Yup'ik communities, is leading the way for supporting citizen science (Gleason, Lim, Church et al., 2023), and facilitates community-driven inquiry through a research process co-designed with partners. Initial research questions are developed by community members; community meetings establish priorities, then Nalaquq facilitates partnerships that take action through determining the most appropriate methodologies to find solutions. Community members are involved and are paid from beginning to end of collaborative research projects (Gleason, Lim, Church et al., 2023). An initial visit to Kuinerraq led to a multi-pronged solutions-focused co-production research plan based on Nalaquq's *Caliyarapiaput* (our genuine ways of working), in which a research vision, intellectual property determination, human research ethics approval, and data sovereignty approach

were developed (Gleason, Lim, Church et al., 2023). Nalaquq LLC decided to have the first author collect oral histories of *atsalugpiaq* as a first step in a long-term collaboration in order to develop trust and rapport between Kuinerraq community members and the research project, and as a methodology to facilitate co-production of knowledge by weaving together Indigenous Knowledge throughout the ongoing natural science *atsalugpiaq* remote sensing and modeling research projects (Gleason, Lim, Church et al., 2023; Kassama, Hunter, Friedrichsen et al., in review).

Etuaptmumk *(Methodology)*

This is a case study of unstructured oral histories of subsistence of *atsalugpiaq*. The first author visited Kuinerraq the previous summer in 2023 before collecting data, and participated in subsistence activities related to *atsalugpiaq* during both visits. The research was approved by Nalaquq LLC, a subsidiary of an ANCSA 14(h) corporation, and by the Institutional Review Board of the University of Alaska Fairbanks (#214867). A three-step informed consent process and data sovereignty plan were developed during the initial research planning process (Gleason, Lim, Church et al., 2023). Community members were selected by co-authors, Nalaquq LLC, and through snowballing sampling methodology using the criteria of identifying individuals in Kuinerraq known for their *atsalugpiaq* subsistence knowledge. A sampling framework designed by Nalaquq LLC ensured that every family in Kuinerraq was represented. Community members ranged in age from young adults to elders. Most oral histories were collected with several family members (e.g., mother, daughter, grandmother, husband, or wife) present.

This project was led by Lynn Marie Church, Indigenous CEO of Nalaquq LLC, and Jacqueline Cleveland, Indigenous filmmaker, both fluent in English and Central Alaskan Yup'ik. With over 70 years of combined experience living, working, and practicing subsistence in rural Alaska, they provided critical theoretical, cultural and ecological insights throughout the research process. Their bilingual fluency and deep connection to the region ensured culturally responsive engagement and helped integrate Indigenous Knowledge systems throughout the research process.

Data Collection

The interview guide was unstructured, with a preliminary list of questions and topics developed collaboratively and iteratively between co-authors. In summer 2024, 17 oral histories were audio recorded with debriefing by co-authors between interviews. Interviews were conducted in mutually agreed locations and lasted one to two hours. Data saturation was determined when no new topics further emerged from oral histories. The audio recordings are archived at the Quinhagak Heritage Foundation at the Nunalleq Museum in Kuinerraq (Hillerdal et al., 2023).

Data Analysis

The first author coded all interviews inductively and iteratively by hand, cross-comparing oral histories (Bernard & Ryan, 2010). Codes were grouped by theme, which arose through iterative conversations and discussions of the interviews and codes between co-authors during data collection and analysis (Charmaz, 2014). As part of the data sovereignty process, feedback on the manuscript was sought and consent for publication acquired for by each community member cited in the text and authorship was given to every quoted community member.

Results

The basic tenets of Yup'ik food agency support *yuungnaqpiallerput* (the genuine way to live) through subsistence of *atsalugpiaq* picking. It is getting harder for Kuinerraq community members to meet their harvesting goals of *atsalugpiaq* due to external threats to *yuungnaqpiallerput*. Additionally, *atsalugpiaq* are threatened now with extremely variable harvests due to changing environmental cycles:

> Sometimes there are none [*atsalugpiaq*]; last year we had nothing. So it depends on the weather. You can't predict the weather. Some years we'll have berries and some years we won't, and some years we'll have plentiful and some years just enough to get by. Depends on the weather. (Grace Hill)

However, Yupiit preserve and continue to practice *yuugnagpillerput* despite the external threats. We identified six themes that facilitate food agency of *atsalugpiaq* subsistence: sovereignty and self-reliance; knowledge and learning; mindfulness and attitudes; caring and sharing; ethics, and hands into action (Figure 1). Yet Yup'ik food agency is in jeopardy in the face of changing environmental cycles, capitalism, colonization, and globalization.

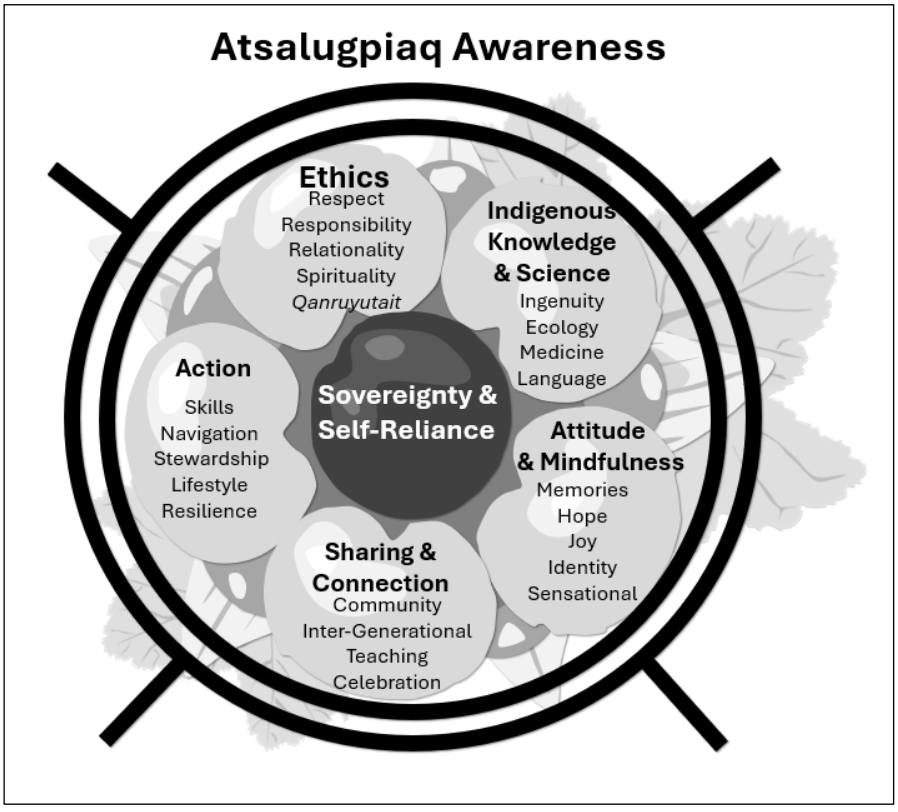
Sovereignty and Self-Reliance

Kuinerraq community members shared that sovereignty and value for self-reliance are the basis of Yup'ik food agency, and they deeply value their ability to be self-reliant and to not need to buy from stores. Willard Church shares, "We want freedom. That is what we grew up with. That is what we want for our future generations, to be able and go out and live free, harvest freely just like we've been doing."

Community members shared that Yup'ik sovereignty was violently attacked by colonization through missionaries, forced settlement into villages, and boarding schools. Now, they expressed, Yup'ik sovereignty and the practice of *yuugnagpiallerput* is undermined by climate change, globalization, capitalism, and gentrification of their region. Willard Church discussed how capitalism and globalization are structural barriers undermining food agency of Yup'ik people through lost sovereignty and self-reliance. Yup'ik people must fight for their right to subsistence:

> The outside world is slowly coming in and taking us, changing us, molding us into what they want us to be. Re-educated. We're living it [*yuungnaqpiallerput*] but not as much as the elders have lived through it. I think that has affected the berries. There is only one solution. Leave us alone. Tell the government to stay away. … Pretty soon you'll see less and less natives out there, and more and more people from outside the region coming in and taking over picking spots. Then, pretty soon, there will be land disputes. 'Don't be harvesting berries on my land!' Right now, we are free to go harvest where we want, even on private land and on corporation land. Maybe one day they will say you can't do that anymore. (Willard Church)

Figure 1. Components of *Atsalugpiaq* Subsistence Food Agency
The model is based on the Yup'ik eye of awareness. The six drupelets of the berry are the components of food agency for *atsalugpiaq* subsistence. The inner ring of the eye of awareness signifies the continuance of life and the outer ring is the continuance of awareness. The spokes represent the four seasons.



A change in environmental cycles is causing extended periods of hot and dry weather during summer. In 2024 a wildfire burned the best berry

patch that was near Kuinerraq. Firefighters came from Anchorage and dumped flame retardant on the most prolific and healthy berry patches to prevent the fire from spreading to the village. As a result of the flame retardant, "We have told people not to go around that area. Just not to go because they said that thing causes cancer. It would probably take forever to get it out," shared Grace Hill as she sadly reflects on the loss of her favorite berry spot, and therefore the loss of her opportunity to harvest enough *atsalugpiaq* for the coming winter.

With policy makers far removed from Southwest Alaska, unfortunately Kuinerraq has little control over the progression of changing environmental cycles. Therefore, "We have to change. 'Cause we cannot change this [changing environmental cycles]," said Jonathon Mark. Environmental change threatens *yuugnaqpiallerput*, but Yupiit will continue to adapt in the hopes that the land will continue to provide for them as it has always done. When there are years with limited *atsalugpiaq* for harvest, Yup'ik continue to make *akutaq* (a traditional Yup'ik dish), but "We just go to the store and buy blueberries, strawberries, and blackberries," to replace *atsalugpiaq*, shares Grace Hill.

Community members expressed a deep sense of self-reliance. If they don't participate in subsistence activities then they are not Yup'ik. In order to uphold the value of self-reliance and not depend on a wage economy to buy berries, Lynn Marie Church, CEO of Nalaquq LLC, questions if they will have to learn to be farmers in order to continue to celebrate the important moments in Yup'ik life with *atsalugpiaq*. She reached out to the co-authors of this manuscript to find ways to weave together Western science with Yup'ik science to adapt to the new challenges of globalization and capitalism and overcome the challenges of environmental change. As part of this larger research project, a remote sensing modeling technique (see. Kassama et al., in review) is being developed to facilitate Kuinerraq to monitor the health of *atsalugpiaq* as a form of adaptation to support self-reliance and food sovereignty in Kuinerraq.

Community members perceived sovereignty and value for self-reliance to be the center and grounding force for Yup'ik food agency, although social-cultural barriers of changing environmental cycles, capitalism, colonization, and globalization do tend to undermine aspirations to meet annual *atsalugpiaq* subsistence goals.

Ethics

Community members shared that Yup'ik cosmology is based on respect, responsibility, and relationality toward the land and the spiritual world. From the oral histories, the importance of Yup'ik cosmology, ethics, and moral codes as foundational elements of food agency ensure the ability to maintain harmony with the land while meeting their yearly harvest goals. Community members have faith that the land will continue to provide for them as long as the land is respected, through Yup'ik moral codes consisting of *alerquutet* (protocols), *inerquutet* (prohibitions), and *eyagyarat* (abstinence rules).

Yup'ik cosmology includes the belief that *atsalugpiaq* willingly give themselves for subsistence when people show respect toward the tundra and take great care in storing berries:

> Remember one thing—don't ask for anything. You can willingly accept when it is truly given. But you never ask for a resource. And they choose to give it to you, that is ok but never ask for it. … There will always be enough. May not be this year or next year, maybe next year or the year after. It is just a matter of time. The world takes care of itself. The land takes care of itself. The land provides when it is ready to provide. We just need to be prepared so we're ready to go when its time. Like the elders say. (Mary and Willard Church)

Atsalugpiaq will willingly give themselves for harvest when people show respect toward the tundra and take great care in storing berries. Respect can be shown to *Ellam Yua* (the universe) by "Not squishing around the tundra too much or don't leave your trash. Bring back. If you go camping, bring back your trash with you. That is all I know about protecting [*atsalugpiaq*]," said Frank Roberts. Yup'ik protect *atsalugpiaq* and maintain balance and harmony with the land by taking great care in their post-harvest management. No matter how tired Yup'ik are after picking berries, Yup'ik properly

store them immediately when they come home. Dorothy Mark advised, "When we pick berries, we clean them and then put them away so that they won't spoil or get bad. We put them in Ziplocks and put them in the freezer." Eleanor Merrit shared, "Those peels, instead of putting them in the trash, next time you go out, throw them in the tundra. That is, that way more will grow from the peels. They will be growing [from the peels]."

Yup'ik moral codes ensure that Yup'ik not only respect and take responsibility towards the land but also towards the most vulnerable in Yup'ik communities. Yup'ik take care of their community. "We can invite them to come with us—the ones that don't have a boat motor. And not only that! We can give them [berries] to our elders, relatives —share the stuff. That is what they [Yup'ik ancestors] always did," shared Johnathon Hunter. *Eyagyarat* (abstinence rules) and *inerquutet* (prohibitions) prohibit going to the tundra the first year after the death of a family member, invoking other Yup'ik community members to come together and share their harvest with the family members of the person who died.

Yup'ik recognize that at certain times of their life they have power that can impact their relationship with the land (Fienup-Riordan, 1995). An example of such *alerquutet* were shared by Lucille Mark:

> If you have your first period, you are not supposed to pick anything off of the ground. They said they'll [*atsalugpiaq*] hardly grow any more or they will fall off or they'll hardly grow [if we don't follow the rule], so we have to. [One way to prevent the power of the individual from impacting *atsalugpiaq* harvest is] I had my daughter and grandchild tie one hair around a berry. And tell them that my mom used to say if you don't tie one around a berry and you pick before your one year is up with menstrual cycle the berries will hardly grow anymore.

Following these cultural codes fosters Yup'ik ability to maintain the harmony between humans and the spiritual world.

However, if people do not follow *qanruyutait* (wise words) of Yup'ik elders, people may unintentionally create a forbidden bridge with the spiritual world, which Willard Church advised to avoid:

> Make sure you're not camping on an old shaman's camping spot. They might come and bother you in your dreams if you camp on a shaman's camping spot. They will visit you in your dreams. I know that for a fact. That happened a couple of times. My first cousin is still looking for the sock that he is missing. It was a nice wool sock. Disappeared in the middle of the night and he hasn't found it to this day. A shaman was in his dream. Woke up and his sock was missing and he never found it. So don't camp on an old shaman's camping spot. They will bother you in the middle of the night when you sleep.

Finally, Yup'ik are intentional with their harvest, making sure to not overharvest and to share their harvest with those less fortunate. If Yup'ik are privileged to have a boat, they must travel outside the community to pick berries so that those without a boat who pick on foot can still have access to berries and harvest them within the village. Dorothy Mark sums up Yup'ik ethics:

> We give thanks. We ask it, it's your [god's] will. Give us abundantly. Let there be berries where we go. And he does answer. After we had nothing last year, I know most of the people were praying too for the berries. I grew up with my parents praying daily…That is how I was with my children, too. The way I was brought up. What to believe, what not to believe. Most of the things they used to say when I was a little girl and what they would say like, the land will get thin. In Yup'ik, that means the land will change and the people will change. And today it's changed, everything has changed from the way we grew up.

Yup'ik cosmology and adhering to Yup'ik moral codes ensures that they will have a good harvest of *atsalugpiaq* next year. Ethics and moral codes are essential elements of food agency. Food is culture.Ethics and moral codes ensure that har-

mony, sustainable management, and just distribution of resources are maintained so that everyone in the community can have access to food.

Knowledge and Learning

Yup'ik value observation, consciousness, and awareness of fellow beings—plants as well as animals—as the basis of their knowledge of joint existence. Yup'ik Knowledge of the topography of the land, weather cycles, biota, ecological indicators of harvest yields, soil, and ocean conditions allow them to live in symbiosis, balance, and harmony with flora and fauna to support the thriving of all beings. Knowledge and their pursuit of learning support their food agency. Through intergenerational extended families, Yup'ik youth are taught and encouraged to develop the necessary skills, land-management practices, and techniques for *atsalugpiaq* subsistence. Youth quickly value self-motivated learning to support self-reliance:

> When Mary and I first started picking Salmonberries together, I didn't know where to go. I asked my late grandfather if he can go with us and show us where they pick Salmonberries up North on one of the rivers up there. He said he would do that. But he said, "I'll show you one time and one time only." And from that point on, you two are on your own. He brought us up there and showed us the different spots and where to look, different camping places. We picked. And that was one of the only times he went with us. Show you once and after that you have to learn the rest on your own. From that point on we had to remember the different routes on the river and the different branches on the river we had to take in order to get to where we're going. Sometimes it was kinda hard to do because back then we didn't use a map or GPSs, it was all based on memory. Today, the young guys can just use their GPS and set their route and follow it. (Willard Church)

As environmental cycles are changing on the Alaskan southwestern tundra, *atsalugpiaq* are becoming endangered. However, Yup'ik continue to use observation to record changes of the tundra and their impact on the growth of *atsalugpiaq*, to adapt and be resilient:

> They are getting less. That is what they used to say too. Like what we say now. There used to be lots of berries but now there is way less nowadays than what we used to have back then. And that is what my mom used to say too. I think this global warming started long ago. Because that is what some of them use to say to that, it doesn't get cold like it used to back then. (Dorothy Mark)

Not only is the quantity of *atsalugpiaq* changing but also the tundra around Kuinerraq. Kuinerraq, once a treeless grass-and moss-dominated permafrost river delta, is now a waterlogged ecosystem. Margaret and Mathew Roberts shared:

> There used to be hardly any trees around the villages. Now there is lots … '90s, I think, when she first came there was hardly any trees around the village. Now there is lots. Trees start popping up! I was thinking if they could trim those trees. [Trees make the salmonberries] smaller, gets smaller, less and less.

Yup'ik food agency is founded in never-ending curiosity and value of knowledge and learning about the environment and conditions that impact *atsalugpiaq*. Their knowledge of the medicinal qualities of *atsalugpiaq*, dedication to inculcating youth to the Yup'ik lifestyle of subsistence, and promotion of the Yup'ik language and culture through subsistence supports their self-reliance and food agency.

Attitude and Mindfulness

Yup'ik express and reinforce their cultural identity and interdependent relationship with *atsalugpiaq* through memories, culinary pleasure, and hope and optimism for the future of berry subsistence. These attitudes and the promotion of mindfulness through *atsalugpiaq* subsistence ensure Yup'ik food agency. Yup'ik share cherished memories of their childhoods, accompanying their parents and extended family to harvest *atsalugpiaq* across the tundra:

> My parents would take us across the ocean, and we would spend a week or so, and we would pick 30, 40, 50 gallons at a time. … I miss the time when we were younger when my parents were here. We would go through the ocean. Oh my gosh the boat would be so plump full of us just hanging on. And there would be how many tents too? There wouldn't just be one family there. How many families? That is how they use to do it in the older days. More families would go together. (Eleanor Merrit)

Yup'ik community members cherish memories of multi-day camping trips when families would travel by boat across the Bering Sea to reach plentiful and healthy berry patches, harvesting more than 50 gallons each visit. Yup'ik share pride in the ingenuity of Yup'ik science in the old ways of harvesting, storing, and preserving berries in grass baskets and wooden barrels that were buried in the permafrost and sunk into the cold water of nearby lakes. The Yup'ik continuance of *atsalugpiaq* subsistence is a conscious act to maintain the vitality of their identity, and their sense of freedom and autonomy from the cash economy.

Community members recall old recipes for preparing *atsalugpiaq* and excitedly share new cooking preparations, such as smoothies and cinnamon rolls. Yup'ik share memories of gastronomic pleasure, and delight with enthusiastic vocalizations of the sensory pleasure of *atsalugpiaq*. Frank Matthew shared:

> They [*atsalugpiaq*] are our ice cream. They come once a year. They are definitely our dessert. … The salmonberries, the ones that you don't pick, they will start turning white and some people like the white berries. Some people pick even the white 'cause they like them that way. And some people, me, I like them even hard and too hard, semi-hard, and soft inside.

Community members shared strong preference and opinions on berry ripeness and how to prepare berries of varying ripeness, but all Yup'ik agree that, as Jessica shared, "They are gold to us. When you have salmonberries, it's like having gold in the freezer."

As Yup'ik thoughts and conversations shift towards the reality of dwindling *atsalugpiaq* harvests—the difficulties of harvesting them in a melted permafrost landscape, and decreasing quality of berries as the consequences of climate change—they nevertheless carry with them a sense of optimism and hope for the future. "I assume there will still be berries. I hope so. I hope Washington cares about what is happening down here and not try to eliminate us," said Eleanor Merrit. Jonathon Mark shared, "My grandparents told me not to worry about the future or the past, just to live in the present. How you pick berries is how they will turn out the next year."

Mindfulness while picking *atsalugpiaq* through the rhythmed action of picking and being present in nature supports food agency, while gastronomic pleasure, good memories, and pride in Yup'ik Indigeneity ensure that *atsalugpiaq* subsistence goals are met, filling freezers each fall to feed families throughout winter.

Sharing and Connection

Berries bring together Yupiit to enrich relationships through intergenerational teaching, sharing harvests, and forming the center piece for celebratory meals. Yupiit pick *atsalugpiaq* with parents, siblings, friends, and children, cherishing the moments of togetherness. Sharing and connection through food are a foundational element of Yup'ik food agency.

Community members shared that they bring their children with them to berry patches to crawl around while they fill their berry buckets and praise their children for filling their own tiny berry buckets. Eleanor Merrit shared:

> My three kids and I would pick. I would see them pick all excited, using two hands. And then when I would get home, I would have my three kids peel them for me. And this is another thing, even if you pick berries with peels, your kids will be bonding and helping you. … So they grew up knowing what berries are. They know where to go to pick them and when, and they know to put them away right

> after picking … how to prepare them, how to eat them. So they know how to take care of the berries.

Yup'ik also celebrate their children's first harvest with an *ineqsuyulria* (first harvest celebration). Community members shared photos of their children's grinning faces after their first berry harvest.

Yup'ik celebrate each holiday with *atsalugpiaq akutaq*. They ensure that *atsalugpiaq* is shared across their community so that no one goes without the taste of berries. Although now dwindling in practice since COVID-19, the practice of "passing of bowls" is when community members bring a bowl of *akutaq* to each household in the village, returning home with their bowls filled with the taste of each household's *akutaq*. *Atsalugpiaq* are not just the food served at celebrations, but the first harvest of the year is also a time to celebrate:

> After I pick my first bags, I make a big bowl of *akutaq* and I call all of my families to come in and eat. They really enjoy that. It's good to have berries. Caring and sharing. See happy faces all the time. Serve something fresh. Fresh berries. I like that. Especially when we are together and families are together. (Mary Church)

Several community members shared how they send their loved ones living in Anchorage and Fairbanks frozen berries so that they also can have a taste each year and join in the pleasure.

> If you share, you get ten times more fold will come back to you. If you share, I have noticed, you'll get more stuff. … The elders have always given you their blessing when we have share with them. They tell you that your harvest, your gathering, will increase so many fold. You'll be able to gather so much more. That is their blessing. Sometimes it is true you get so much more back. (Mary Church)

Community members shared that they pick *atsalugpiaq* with the people they most care about, traveling great distances across the Bering Sea to pick with them. In years with poor harvest in Kuinerraq, they rely on friends and families up North to share *atsalugpiaq* with them, ensuring food agency is met even in poor harvest years.

Hands into Action

It emerged from the oral histories that directly practicing *yuungnaqpiallerput* (the genuine way to live) is essential to food agency. Informants shared how important atsalugpiaq are, remembering stories of good berry harvests and the joy of picking them, emphasizing that without directly putting their hands into action, they might lose the opportunity to pick in the future, degrading their food agency.

> Cause when the berries are here, we have to go get them. They say if they are not being harvested, they will become less. They need to be used. I have heard that many times. If you are not using them, they will be less. (Willard and Mary Church)

Atsalugpiaq subsistence requires knowledge of management of *atsalugpiaq* patches, as well as techniques for picking, storing, and preparing *atsalugpiaq*. Community members shared that they have now shifted towards day trips instead of multi-day camping trips because of the need to take vacation days in order to pick *atsalugpiaq*. Adapting to a capitalistic economy demands that Yup'ik exchange time and labor for money.

To make the dangerous journeys up the coastline to better berry patches, community members shared how they rely on ocean navigation skills to manage unexpected weather conditions. Walking on the tundra requires skill and practice as well, so that they do not get stuck in the increasingly wet, muddy, and unstable landscape.

> [With changing environmental cycles] there is more bog water that is affecting the tundra for the berries—can't go places with the four wheeler anymore. People get stuck. *Onyugyak*, like tundra on the top and water underneath. The ground is like water but not. There is more of those kinds now 'cause the permafrost is melting. When permafrost melts, it is making *Onyugyak* [tundra on the top with water beneath]

> more. There is people out on the four wheeler that get stuck on those. There is more bugs now because there is more water. (Miles Bavilla)

Community members shared how important it is to be appropriately prepared with the right clothing, extra gas, and the mindset that they might encounter discomfort while picking. With environmental change, there are now more bugs and mosquitoes.

Yupiit rely on their skillsets to read the landscape and identify indicators of good berry harvests. As winter progresses, if Kuinerraq has had enough snow without periods of freeze/thaw they know the buds have been protected from sharp cold spells sufficiently to provide good harvests in the summer. Community members also use environmental indicators to know if it will be a good berry year, "when you see the cotton growing out there, you'll know there will be berries. If those cotton don't grow, no berries," shared John Hunter.

In oral histories, pride for family berry patches showed stewardship. Community members described that they must leave some berries for the wildlife so that they can reseed the berry patch. Jonathon Mark shared techniques for maintaining productivity with berry patches:

> Try not to pick every single one even if they are really small because you think you won't get any for the year, and when they come back next year, they will say there is no berries here and they will go to the other spot. There is no berries here because they picked out everything. But if you give them a few years break, everything will grow, grow … even if I over picked. I won't go pick those places. I don't pick where I picked the year before. I switch it. If you over pick them while they are hard there won't be any berries. And if you wait till they are ripe, there will still be lots the next year. Just like how the farmers wait to pick when their crops are ripe. … The berries have a cycle if you watch them—every seven years from start to finish. So every season I pick here one year and then pick from this [other] spot one year. It's [my berry patch] one big island where I camp. … That island provides almost 100 gallons a season. … We don't usually pick small ones but within the next year they are big. Then after even years they grow big right away. [That is] their grow cycle. That is what I learned from my grandparents.

Each community member shared how they had developed their own techniques for picking berries and preserving them for winter. Catherine shared, "I don't like to wait until they are too ripe because then it takes forever and forever to fill your bucket. They all squish and sink." Respect for those who have developed the talent to pick quickly was shared by Jonathon:

> I usually pick in one day maybe 20 to 25 gallons. I have fast hands. Most people like to pick bent over like this. I go like this [squat position]. I move it [the bucket] right in front of me and throw them and [head up] looking around as I'm picking. I'm looking for the biggest ones. I always try to pick the biggest ones. The smaller ones they still taste like planty [*sic*] or tundra. But when they get bigger they are more, almost like ripe flavor. I don't know how to describe the flavor but sweet crunchy, sweet, and crunchy tarty.

In addition to picking techniques, co-authors have storage and preparation techniques, including how long to boil white fish for the perfect texture of *akutaq*. "My favorite [*akutaq*] is with white fish instead of Crisco. Boil the white fish for five hours to break it down completely of its muscle fibers and mush it up just like you would Crisco. … Most people boil their white fish for an hour or a half hour but its mealy and overpowered with fish flavor," shared Jonathon. About the berries, Jonathon Mark continued, "I pick them until they are white (really overripe). You know people stop picking them when they turn white. That is the best time to make your jam. Pick all white berries right before they start tasting like homebrew or cheap alcohol. Right before, they are good for jam."

Community members recognized that food is medicine, that not only are there specific medicinal properties of *atsalugpiaq* berries, but their leaves are

healthy when consumed in tea. However, the physical act of picking berries is imperative for maintaining physical and mental health. Willard Church shares how an elder continues to live a subsistence way of life:

> He said it is good to eat fresh off of the land because you look forward to getting up and getting off of your bed and getting off of your chair, preparing for the day and going out to the land and gathering what you want. "It keeps me healthy that way." He is constantly going out and hunting and fishing and gathering. Keeps him lively. He is in his 80s now. He is still going like he is in his 40s; if he put a lot of food away in the freezer he wouldn't have to do that. Then he wouldn't be able to get off of his chair or off his bed. Said his bones are getting old and his muscles are getting weak. But he get up every day and prepare for the day. And goes out and gather what he needs. (Willard Church)

Community members shared that their bodies might limit their ability to practice subsistence, but that they work through the pains and limitations of their physical bodies, and realize that once in motion and fully consumed by picking, they enter a state of mindfulness. That realization of one's self-reliance and sovereignty is essential to being Yup'ik. It is as much of a medicine as any pill.

Picking skills, ocean and tundra navigation skills, management of berry patches, cooking techniques, adaptability to the changing environment, and embracing the subsistence lifestyle enable food agency through putting hands into action, supporting *atsalugpiaq* harvest aspirations.

Discussion

Kuinerraq oral histories engender an emergent novel model of subsistence food agency, which contributes to the broader generalizable theory of food agency. The model also incorporates an actor-oriented perspective of an alternative food system and the actors' realization of food sovereignty into the concept of food agency (Ehlert & Voßemer, 2015). The emergent subsistence food agency model themes that arose from the oral histories are similar to the Indigenous Nourishment model (Maudrie, Clyma et al., 2024). Both models assert that food consumption cannot be decoupled from culture and lifestyle. However, with challenges to the continuance of *atsalugpiaq* subsistence, it is imperative to understand the underlying subsistence capabilities and strengths contributing to Indigenous scholarship on food and nutrition (Reo & Whyte, 2012).

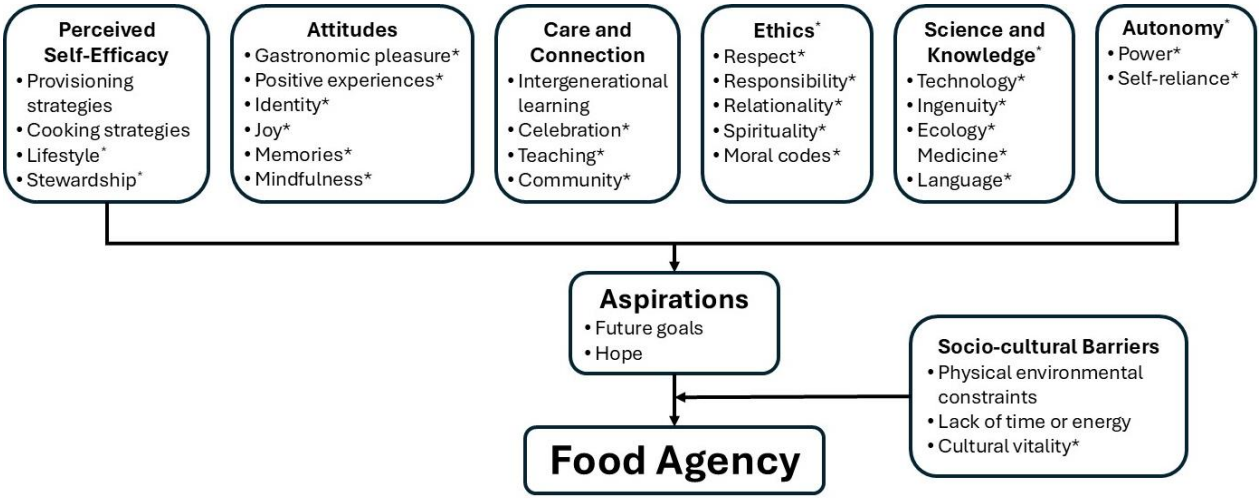
Application of Food Agency to **Atsalugpiaq** *Subsistence*

This context-specific case study of subsistence enables us to understand the generalizable theoretical concept of food agency (Figure 2). Food agency is the ability to act to procure and prepare food to meet desired diet related goals. To the existing theoretical components of food agency (perceived self-efficacy, food attitudes, socio-cultural barriers, care and connection, and aspirations), we weave in Yup'ik Indigenous Knowledge from the subsistence model to add three new components: ethics, science and knowledge, and autonomy. Additionally, subdimensions have also been woven together under each food agency component to create a holistic and generalizable conceptualization of food agency that combines Yup'ik and Western science. This research highlights the important skill sets linked to sustainable provisioning of food within the context of land stewardship of perennial wild edibles. *Kussaqs* (white people) can learn from the capabilities and strengths of Yup'ik people to better understand the underlying tenets of food agency. The holistic perspective of the capabilities that support food provisioning are imperative for understanding food security. To the existing components of food agency (see Table 1), we propose adding three new components to the existing conceptualization of food agency: Science and Knowledge, Ethics, and Autonomy, which are derived from the empirical Yup'ik subsistence food agency model (Figure 1).

We hope this research provides a "two-eyed seeing" approach to food agency, weaving together the strengths of Yup'ik and Western science (Bartlett et al., 2012; Yua et al., 2022) to identify the capacities that support food provisioning. From these data emerged the novel theoretical compo-

Figure 2. Food Agency Theoretical Model

To the existing components of food agency (perceived self-efficacy, attitudes, socio-cultural barriers, care and connection, and aspirations), we weave in Yup'ik Indigenous knowledge from the subsistence food agency model to add three new components: ethics, science and knowledge, and autonomy. Additionally, subdimensions have also been woven together to create a holistic and generalizable conceptualization of food agency that combines Yup'ik and Western science.



* denotes components and subdimensions derived from the Yup'ik subsistence food agency model.

nents of science and knowledge, ethics, and autonomy, which have been previously excluded from scholarship on food agency. We recognize that the concepts of perceived self-efficacy, attitude, care and connection, aspirations and socio-cultural barriers are variants of the currently recognized components of the concept of food agency (Lahne et al., 2017; Karlsson et al., 2023). Additionally, we highlight that the Yup'ik subsistence food agency model contributes significantly to fleshing out the attitude component of food agency, to include subdimensions of pleasure, joy, and mindfulness associated with food. These novel subdimensions of the attitude component contribute to our understanding of how to develop positive attitudes for individuals who are building food agency.

Western knowledge focuses on predetermined key competencies and subdividing tasks into parts that can be objectively measured. However, Indigenous Knowledge focuses on the actualization of desired outcomes (Barnhardt & Oscar Kawagley, 2005). In the following section, we explore each of the novel emergent themes of food agency, and the context of how Yup'ik lived experiences may be helpful to conceptualizing and theorizing food agency as related to provisioning of food.

Science and Knowledge

Yup'ik people value action and learning by doing (Fienup-Riordan, 2007), which aligns with the previously identified component of food agency—perceived self-efficacy. Indigenous Knowledge often conceptually separates out knowledge from effective action (Barnhardt & Oscar Kawagley, 2005; Plenty Sweetgrass She-Kills-De La Cruz et al., 2025; Reo & Whyte, 2012). In a Western worldview, knowledge is often conceived as actionable effective skill. Breaking apart knowledge and effective action as two separate components of food agency, as Indigenous Knowledge indicates, may reduce the oversight and mismeasurement of self-efficacy and knowledge (Maudrie, Clyma, et al., 2024).

Additionally, breaking knowledge from perceived self-efficacy allows for a holistic inclusion of the vast amount of knowledge associated with food agency beyond provisioning, and cooking knowledge. Knowledge of the ecology of the food system, food as medicine, and language support cultural vitality and an understanding of how human nutrition, culture, and mother earth are interlinked, facilitating systems thinking (Maudrie, Caulfield, et al., 2024). Recognizing science as part of knowledge highlights the adoption, innovation, and

advancement associated with food through technology development, knowledge creation, and experimentation. Ingenuity, observation, experimentation, trial and error, and problem solving are critical characteristics and skill sets valued by Yup'ik people (Fienup-Riordan, 2007). Acknowledging science and ingenuity as distinctive components of food agency may help develop programming that nurtures innovation through close observation, attention to detail, systematic knowledge creation, creative thought and critical thinking as part of food agency capacity building.

Ethics

For Yup'ik, when ethics and spirituality are lost, the sense of what to do and sense of self diminishes (Kawagley, n.d.). Subsistence of *atsalugpiaq* is supported by Yup'ik Indigenous Knowledge, which can be conceptualized as respect, responsibility, and relationship (Fienup-Riordan et al., 2021). Yup'ik Knowledge recognizes and respects the interdependences and balance between humans, flora, and fauna. Recognizing that fauna and flora are sentient (Ayunerak et al., 2014; Barnhardt & Oscar Kawagley, 2005), Yup'ik cosmology asserts that plants respond to human action and humans must take responsibility by following *qanruyutet* (wise words for living) to protect the relationships between plants and humans (Ayunerak et al., 2014; Fienup-Riordan et al., 2021; Smith & Gleason, 2021). Jonathon Mark shared that global strife and war, and severe gossiping, are two additional causes of the poor harvests of *atsalugpiaq*.

Atsalugpiaq in Southwest Alaska are used in one of the most favored *akutaqs* (traditional Yup'ik dish), and known to have rules related to their consumption and special powers (Fienup-Riordan et al., 2021). The rules are similar to food taboos or moral codes in other cultures determining how foods are grown, who can eat them, and how they can be stored to be safe and clean to eat. Culture is often ignored by Western science, or Western culture is tacitly assumed to be the dominant culture (Morgan & Trubek, 2020); however, culture and moral codes determine individuals' and communities' abilities to access resources, and how they procure foods and consume them. Even in Western culture the food system relies daily on ethics for complex diet-related decisions that balance choices between social, political, economic, and environmental outcomes of technologies, such as biotechnologies, animal ethics, and lab-grown meat (James, 2018).

Subsistence foods offer themselves up for harvest to humans (Fienup-Riordan, 1995), and humans welcome subsistence foods into the human world through specific *alerquutet* (protocols), such as keeping the tundra clean and by taking care of the berries once they are harvested (Fienup-Riordan, 1995). *Eyagyarat* (abstinence rules), such as not picking berries after the death of a spouse, protect community members who are most vulnerable and ensure that the community comes together to support them through gifting berries during the period of abstinence. Important rules, such as not making a mess out of food, not harvesting more than can be used, not wasting food, not letting it spoil, and taking care to preserve food, maintain harmony with the land (Fienup-Rirdan, 2013). The land and the berries feel pain if inappropriately cared for and not shown respect. Therefore, the next years' harvests will be diminished (Fienup-Rirdan, 2013).

Food agency for an individual cannot be separated from their culture. As food taboos and dietary regulations are found in every culture, anthropologists have theorized that they play a role in resource allocation, food safety, and building social cohesion, forming group identities and belonging (Meyer-Rochow, 2009). Rules related to subsistence ensure that every person in the community is taken care of when they are most vulnerable and everyone has a way of contributing to the larger community well-being (Ayunerak et al., 2014). Ignoring these essential parts of food culture diminishes our understanding of how culture contributes to the capacity of individuals and communities to achieve their aspirations. Building food agency capacity cannot be done without a moral code or set of ethics that determines how to steward a resource responsibly, or how food is prepared and kept safe for eating. Today, in a globalized food system, food labeling, food safety laws, and cultural understanding of disgust create an ethic about what is good food, how to maintain food allocation and food safety (Negowetti, 2020).

Autonomy

Autonomy has two subdimensions as conceptualized by Kuinerraq: the ability to have control over one's food system, and the value of being self-reliant and providing for oneself. Both are conceptually critical components of food agency and align with its definition as the struggle to be independent from agribusiness capitalism (Goris et al., 2025). Bringing together sovereignty and self-reliance under the concept of autonomy may allow it to be more generalizable beyond Indigenous communities. Globalization has homogenized food culture, decoupling the people from the land and making consumers dependent on the industrialized neoliberal economy and global corporate food system (Calderon Farfan et al., 2023; Clapp & Scrinis, 2016). The concept of food autonomy, the act of exercising democratized control over the food system, originated from Indigenous scholars and political movements in Latin America (Calderon Farfan et al., 2023). The ability to operate and provide for oneself without the global food chain, creating resilient, adaptable systems, is critical today as we saw during COVID-19 (Clapp & Moseley, 2020). However, within the corporate food system we often do not have the right or ability to control how to provide for ourselves (Clapp & Scrinis, 2016), creating, for example, food apartheid (Gripper et al., 2022).

Autonomy is a critical dimension of well-being and an intrinsic motivator to support healthy habits (Deci & Ryan, 2012). Autonomy is linked to dignity within the food system (Calderon Farfan et al., 2023). Yup'ik self-worth is determined by their ability to be self-reliant and provide for their families (Fienup-Rirdan, 2013). Self-reliance is so essential to Yup'ik that it is the main determinant of where they chose their place to live—a choice based upon the availability and ease of food (Fienup-Riordan, 2007). Autonomy does not mean independence from others but supporting interdependence between community members in order to be independent from the corporate agro-industrial food system (Goris et al., 2025; Jansen et al., 2022). For example, in Yup'ik culture, to celebrate a child's first berry harvest, an *ineqsuyulria* (first harvest celebration) is held with gifts given to elders and community members to ensure abundant future harvests (Fienup-Riordan et al., 2021). Indigenous food systems are based on the interdependencies and sharing of the gift economy (Kimmerer, Robin Wall, 2024; Williams & Brant, 2023). Recognizing consumer dependency on processed food and working collectively to be self-reliant and free from them is critical to the realization of food agency.

Conclusion

The act of co-producing this research study is the community of Kuinerraq taking action for the next generation to carry forward subsistence as an expression of food agency. Food agency is the ability of an individual or community to set food and diet-related goals and meet them. This study expands the missing theoretical gap in the conceptualization of food agency to include not only cooking but also provisioning. The community of Kuinerraq shares important practices that support their capacity for food provisioning through *atsalugpiaq* subsistence. Existing identified components of food agency include perceived self-efficacy, attitudes, socio-cultural barriers, care and connection, and aspirations. Oral histories demonstrate the foundational skills, values, ethics, and worldviews that support annual *atsalugpiaq* harvest. New components of food agency identified from the case study of *atsalugpiaq* subsistence include science and knowledge, ethics, and autonomy. These concepts added to food agency provide a holistic understanding of the drivers of food security and how to support capacity for individuals to be food secure. Additionally, the theoretical concept of Food agency identifies the underlying capacities that support the action of realizing the *right* of Indigenous food sovereignty.

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Impacts of the Food Safety Modernization Act's Produce Safety Rules, exemptions, and behavioral insights among small-scale produce growers

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Abstract

While the Produce Safety Rule (PSR) of the Food Safety Modernization Act (FSMA) sets a regulatory framework to promote the production of safe produce, the exemption criteria it provides exclude many very small and small-scale farms from full compliance. Regardless of exemptions, food safety remains a shared priority across the food system. For qualifying farms, exemption status provides some benefits but can also introduce limitations which farms might need to navigate. To examine the cognitive components that shape the food safety decision-making processes of FSMA-exempt produce growers, the theory of planned behavior (TPB) was adapted as a framework in this study. Growers' beliefs and perceptions that influenced their intent to implement safe practices were investigated. Growers' responses to the benefits and limitations of the exemptions from the FSMA Produce Safety Rule were also explored as part of

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the cognitive analysis. Through a series of focus group discussions, information was collected from thirty Indiana FSMA-exempt produce growers. Study participants expressed deep commitment to providing safe food to their consumers. It was determined that the importance of their own personal values and relationships within the food system contributed to decisions that affect their customers. A recurring theme was the trade-off between the reduced regulatory burden of the PSR and the increased liability risks in the absence of regulatory safeguards. Findings also highlighted the intersection of perceived benefits and limitations, regulatory expectations, and how availability of resources collectively shapes approaches to food safety. The findings underscore the unique situation of FSMA-exempt produce growers and the importance of tailoring food safety outreach programs that offer support based on practical, trust-based approaches.

Keywords
small-scale growers, decision-making, on-farm food safety, Produce Safety Rule, food safety focus groups, theory of planned behavior

Introduction

Food safety has become widely recognized as a public health concern in the U. S. due to increasing reported cases of foodborne illnesses and recalls (U.S. Food and Drug Administration, 2024). Foodborne illnesses represent an annual burden to society of approximately US$36 billion (Minor et al., 2015). Numerous outbreak cases have been associated with harvested produce, such as cantaloupes, lettuce, and peaches (Centers for Disease Control and Prevention, 2012; 2020; 2024a; 2024b; 2025). To reduce microbial contamination of farm produce, the Food Safety Modernization Act (FSMA) bill released the Produce Safety Rule (PSR), aimed at providing science-based evidence on safe on-farm practices to address the occurrence of outbreaks (U.S. Food and Drug Administration, 2015).

Prior to the final passage of the PSR, however, some small farm operators raised concerns about implementation of the rule. To meet the PSR requirements, small farms would be more heavily impacted than large farms due to the reported expense of adapting the requirements (Astill et al., 2019; Chen, Kinchla et al., 2021). In response to those objections, the PSR listed requirements that, if met, could exempt small-scale farms. One of the criteria was that farms with an average annual sale of $25,000 or less would be exempt. This would allow 62% of small-scale produce growers to be eligible for exemption from PSR requirements (Astill et al., 2019).

Although some farms qualify for exemption from the PSR standards, they still face food safety expectations from marketing channels, such as retail and wholesale units (Low et al., 2015; Martinez, 2016; Minor et al., 2019), as well as from consumers (Global Agricultural Productivity Report, 2018). These channels continue to subject these farms to the same safety standards, irrespective of their standing as exempted farms (Bovay, 2023). A study by Tobin et al. (2012) reported that consumers perceived locally grown produce as compliant with prevailing on-farm food safety standards. It appears that consumers usually perceive exempt farms as being compliant. While these reported cases demonstrated the potential impact of the market and consumers on exempted farms, little documented information is available on the factors that drive them to perform on-farm food safety activities or the impact of the PSR exemption on qualifying farms.

Determining the cognitive and behavioral perspectives that influence produce growers' decisions in implementing on-farm food safety practices can be a complex process, but the perspectives are important considerations in the design of implementation strategies (Morelli et al., 2022; Rose et al., 2018). The theory of planned behavior (TPB) is one model that has been used extensively as a framework to analyze individuals' intent in adapting a behavior or practice (Archila-Godínez et al., 2022; Barrett & Feng, 2021; Bosnjak et al., 2020; Ledo et al., 2021). This model postulates that three constructs—attitude, subjective norm, and perceived behavioral control— can predict an individual's behavioral intent (Ajzen, 1985; Ajzen & Fishbein, 2005). Attitude in TPB is influenced by the behavioral beliefs of the individual. This belief reflects the possible consequences of adopting the behavior. Subjective norms are as a result of the

perceived social or peer influence in adapting a behavior. This construct explores the influence of the expectations of other individuals to the decision maker. The last construct, perceived behavioral control reflects the individual's belief to correctly perform the behavior (Bosnjak et al., 2020).

The objective of this case study was to generate insights, through the lens of TPB, into what shapes the on-farm food safety practices of qualified PSR-exempt produce growers in Indiana. Our team also analyzed the produce growers' perceptions of the PSR to better understand the impact of the exemptions on them. The overall study included different methods; however, this paper will report and discuss only the insights that emerged drawing on TPB. By taking a closer look at the impact and decision-making of produce growers exempted from PSR, policymakers, extension professionals, and other stakeholders will be better enabled to assist in tailoring strategies to enable growers to expand their business.

Applied Research Methods

The research team used focus groups to collect information from small-scale produce growers about what influences their produce safety decision-making process and their response to exemptions from the FSMA Produce Safety Rule. The Institutional Review Board (IRB) at Purdue University approved the study protocol (IRB-1810021180). Prior to sessions, the research team provided participants with consent forms as well as copies of the forms to keep for their records (Chen, Ellett et al., 2021; Thomas et al., 2025).

Focus Group Script

The authors developed a focus group script, with open-ended questions in two sections. The first included questions on (1) their perspective on food safety regulations, (2) challenges with food safety regulations, and (3) the impact of being exempted from the FSMA PSR. The second focused on participants' responses to consumer expectations on produce quality and safety. In section two questions were further grouped into two parts. The first part focused on participants' thoughts on consumer expectations of produce farmers in relation to produce safety and regulations. Participants were provided with a list of actors in the food value chain and were asked, "Who was most responsible for a produce outbreak?" They were required to rate each actor on a scale of 1–9 regarding their perceived responsibility (1 = *strongly disagree*, 9 = *strongly agree*). The second group of questions sought to determine participants' expectations of farmers in relation to produce safety and regulations.

Recruitment of Participants

The research team recruited study participants from three Indiana farmer conferences from January to March 2023 and in January 2024. We sent out a recruitment survey through the conference registration platforms to identify prospects interested in and eligible for participation. To be eligible for a focus group, farmers had to meet the following criteria: (1) grow produce (fruit and/or vegetables), (2) sell produce that is grown on the farm, and (3) have annual produce sales averaging less than US$500,000 in the past three years. We selected the qualifying participants and provided them with the date and time for the focus group session. In addition, we sent a short online survey to the qualified participants to collect demographic information via Qualtrics XM. Participants unable to complete the online survey filled out a printed version prior to the session. Participation in the sessions was voluntary. (This study procedure has been used by Chen, Ellett et al. (2021) and Stoll et al. (2025b).)

Focus Group Sessions

Five focus groups were conducted to reach data saturation (Guest et al., 2017; Hennink et al., 2019), that is, when no new information was elicited and data collection was complete. Three of the focus group sessions were organized at the Indiana Horticultural Conference and Expo, one took place at the Indiana Small Farmers Conference, and one took place at the Veterans IN Farming Conference. The research team held the sessions at the conference sites for convenience, each session in a quiet and private room that was reserved at each conference location. This was to ensure that participants in the sessions were not distracted by other activities at the conference. Sessions were scheduled so they would not interfere with the reg-

ular conference activities. The sessions were audio recorded and lasted about 90 minutes, with a moderator facilitating and a co-moderator taking field notes. At the end of the sessions, the moderator and co-moderator held debriefings to discuss notable quotes, key points, and concepts that emerged during the discussions (Barrett et al., 2020; Thomas et al., 2022; Thomas et al., 2025).

Focus Group Data Analysis

The first author used the qualitative method of "coding" to analyze the focus group data. A researcher first transcribed the audio verbatim, while another researcher checked the transcriptions to ensure that all details captured were accurate. The transcribed data were transferred to NVivo version 12 to be coded and analyzed using thematic analysis (Hatch, 2002). The first author analyzed the data using primarily an inductive approach—reading the transcripts line by line and assigning codes to quotes or paragraphs that addressed the objectives to obtain as much valuable information as possible (Azungah, 2018). In developing the codebook, mixed coding methods were used (Saldaña, 2016), to adequately capture the outcomes from the data, and included in vivo, process, value, descriptive, holistic, sub-coding, and emotion.

The data was analyzed by two researchers, to minimize biases in codebook development. The first author generated an initial codebook from three of the transcribed sessions by using NVivo software (version 12) (Thomas & Feng, 2021; Thomas et al., 2025). The initial codebook had the codes, definition of codes, coding method used, and participant quotes. Another researcher independently coded two transcripts using the initial codebook. The first author and the researcher then discussed any discrepancies and made changes to the codebook. Overlapping codes were refined and properly defined or clustered into another code. Both researchers came to a consensus on all the codes developed and agreed that the codes were clear and responded to the research question. The first author then used this codebook to code the remaining focus group session. The other researcher checked the final codebook to confirm that all codes generated were exhaustive (Stoll et al., 2025a; Thomas & Feng, 2021; Thomas et al., 2025). The final codebook is in Appendix A.

The first author categorized the codes into conceptual clusters based on the central ideas described (Stoll et al., 2025a; Thomas & Feng, 2021; Thomas et al., 2025). The conceptual clusters were further grouped based on the TPB construct that they measured. The codes that addressed the impact of the PSR exemption were classified into themes and subthemes. Codes generated were clustered into conceptual subthemes, which were further categorized into two main themes. The two researchers discussed the developed themes and subthemes and came to a consensus on what clearly answered the objectives of the study (Appendix B).

Survey Data Analysis

Survey data collected via Qualtrics was imported as a comma-separated values (CSV) document and analyzed using SPSS version 24. A trained researcher added the data that had been filled out by some participants on printouts to the dataset on Qualtrics. A second researcher checked the datasets to ensure data entry accuracy. We performed descriptive data analysis using SPSS version 24. This paper will report and discuss only the data regarding the first section of questions, which were developed to explore farm food safety practices and perspectives that influence small-scale produce farmers currently exempted from the FSMA PSR.

Results

Participant characteristics are shown in Table 1. A total of 30 qualifying Indiana produce growers participated in five focus groups for this study. A majority (87%) of the participants were white non-Hispanic. The annual production sales for more than half the participants (53%) were below US$25,000. Approximately 63% of growers cultivated crops on 1–9 acres of land, with the majority producing berries, vegetables, melons, squash, or pumpkins (Figure 1).

Sales Point and On-Farm Food Safety Concerns

Farmers markets and farm stands were the pre dominant produce sales locations for most of the participants. In addition to making sales from their

farms, some participants also sold their produce at roadside stands close to their farms. Very few participants reported that they sold their produce to restaurants and grocery stores. Apart from these locations, a few participants mentioned selling to close friends and family, and others also cited donating produce to food banks, food pantries, or soup kitchens.

Table 1. Characteristics of Study Participants (*N* = 30)

Characteristics	% (*n*)
Gender	
Male	43 (13)
Female	53 (16)
Prefer not to answer	4 (1)
Age range	
25–34 years	13 (4)
35–44 years	27 (8)
45–54 years	20 (6)
55–64 years	27 (8)
65 years and above	13 (4)
Race	
White non-Hispanic	87 (26)
Hispanic	3 (1)
Black or African American	3 (1)
Prefer not to answer	7 (2)
Highest level of education	
High school diploma/GED	10 (3)
Associate degree	10 (3)
Bachelor's degree	30 (9)
Graduate degree	27 (8)
Prefer not to answer	7 (2)
Some college (no degree)	16 (5)
Annual sale of produce (US$)	
Less than $10,000	43 (13)
$10,000–$24,999	10 (3)
$25,000–$49,999	10 (3)
$50,000–$74,999	7 (2)
$75,000–$99,999	10 (3)
$100,000–$149,999	13 (4)
$150,000–$199,999	7 (2)
Acres of produce-growing land	
1–9 acres	63 (19)
10–49 acres	30 (9)
50–99 acres	7 (2)

Participants cited biological and chemical hazards as the two major areas of concern with respect to on-farm produce safety. The most concerning biological hazards were animals—domestic and wildlife—invading their farms. Participants indicated that they had put in place protective measures such as fencing to control this problem, but those measures were not enough to eliminate the pests completely. Regarding chemical hazards, pesticide application was the predominant chemical food safety concern raised by participants. Some participants mentioned concern about chemical spray drift and exposure because of their proximity to farms that apply pesticides.

Factors That Influence Food Safety Decision-Making

Themes were generated using the TPB model to determine what motivated or impeded the decisions of small-scale produce growers to perform food safety activities. Figure 2 depicts a schematic representation of the factors that influence the food safety behavior. Appendix B gives further details of the themes generated.

Attitude and Personal Values

Behavioral beliefs were identified as motivating participants to adopt on-farm food safety activities. Participants discussed their own values of growing safe food for all. They reported that despite their potential exemption from strict inspections, they intended to maintain safe, responsible methods in the way they grow produce. Other than selling to consumers, the participants frequently stated that because they and their families consumed the food they grew, they were agreeable to raising and selling safe and healthy foods. One participant asserted that food safety was non-negotiable:

> At first blush, it makes me giggle. Because if it's about food safety, then we should all be practicing food safety. Just because I'm small, doesn't mean I should not be safe. (Female, 45–54 years)

Subjective Norms

Some participants also discussed their personal connection with their customers and cited the need to provide safe produce for them. Some participants who provide farm tours reported that growers must ensure that customers who tour their grounds trust their small business and what they sell. Growers indicated they make every effort to protect their customers, which necessitates the need to ensure that what they produce is safe. They

Figure 1. Description of Produce Grown by Participants (Types of Produce are Not Mutually Exclusive)

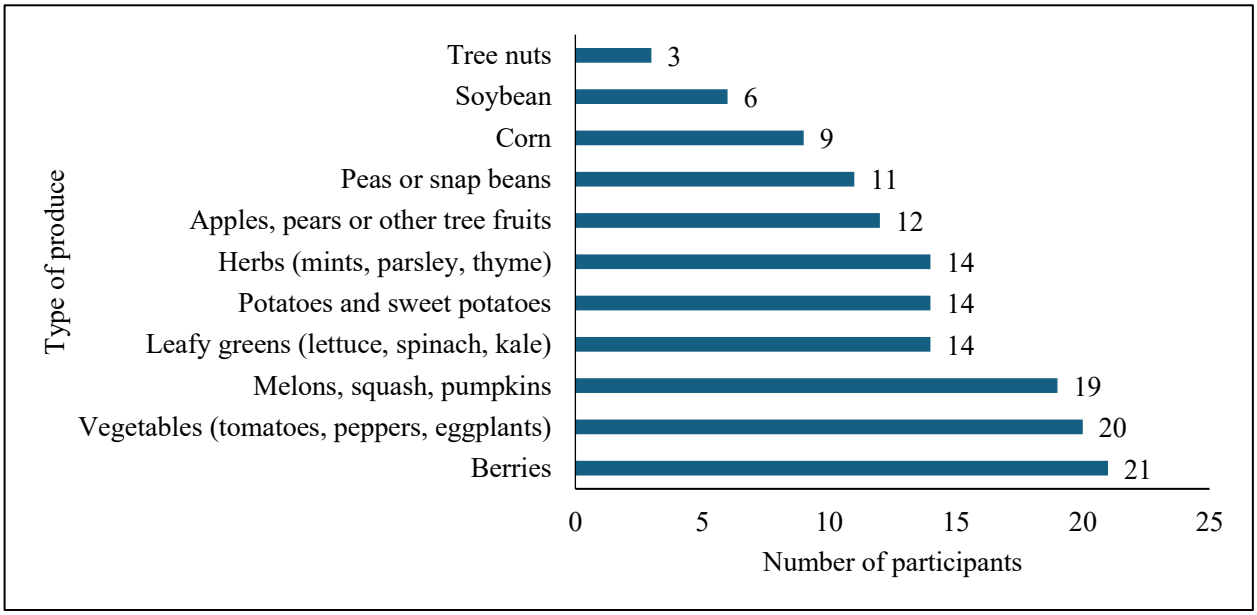
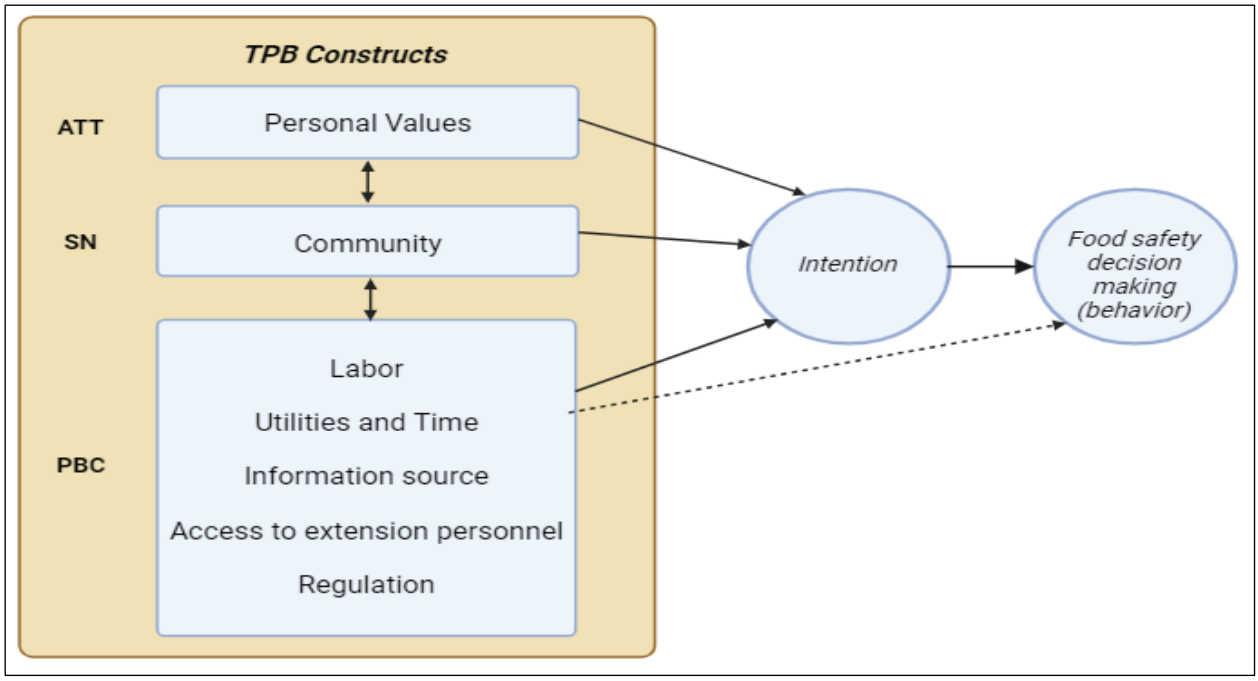


Figure 2. Factors that Influence Participants' Decisions to Perform Food Safety Activities, Adapted from the Theory of Planned Behavior (Ajzen, 1985)

ATT represents attitude; SN represents subjective norms; PBC represents perceived behavioral control.



further stated that some customers are neighbors and family members, and because theirs is a close-knit community, the welfare of these people is a priority to them: "My primary risk concerns actually I don't want people getting hurt, because [it affects] many children, families" (Male, 65+ years).

Some of the participants also reported that their concerns about certain practices, such as pesticide application, were partly because their customers had concerns about them. Participants indicated that this was an area about which their customers were very concerned, so it was a major concern to them as well. One identified a key focus: "Well, always pesticides, because the customers they always want to know what we sprayed on our crops" (Female, 45–54 years).

Perceived Behavioral Control—Labor

Perceived behavioral control (PBC) was a significant theme that emerged, reflecting how participants evaluated the ease or difficulty of performing food safety activities. Participants predominantly emphasized resource-related factors, such as labor, time, utilities, and access to information, as influential in their intent to adopt food safety practices. The following sections explore these dimensions of perceived behavioral control, shedding light on the challenges that growers face, and identifying potential strategies to respond to them.

Labor was identified as a PBC issue. Limitations in labor resources impeded many participants' ability to perform some food safety activities, with most growers reporting that they did not have enough farmhands to help with running regular on-farm activities. Participants said that their farms were family run, some reporting managing the farm with their partners. Because of wide-ranging responsibilities and demands on the time of small farm operators, ensuring consistency in performing produce-safe activities was a challenge for many growers:

> Well, it's really difficult. I mean it's just me and my husband. Trying to find help is impossible. So, it's just me and my husband, and we have two acres of orchard and two acres of vegetables, five acres of alfalfa, and, you know, other acreage with other trees and fruit, and it's just us and we're not young. (Female, 45–54 years)

Participants also identified communication challenges with on-farm workers and the difficulty of ensuring that proper produce-safe practices were being done. Growers reported inability to consistently ensure that their employees were performing produce-safe activities in their absence. One participant emphasized a language barrier as a concern because the workforce on his farm was predominantly non-English speaking.

Perceived Behavioral Control—Utilities and Recordkeeping

Some participants identified water and infrastructure as barriers that affected performing food-safe activities. These observations were closely tied to the financial cost involved. Participants explained that as they strive in carrying out produce-safe activities, they could not afford certain resources such as the infrastructure for marking off designated areas, especially in their post-harvest activities. Lack of financial resources can make it difficult to install improvements and adopt certain on-farm food safety practices, even if they wanted to.

Participants also reported that they did not have enough time to ensure that comprehensive good agricultural activities were incorporated in their daily farming duties. This coincided with the fact that they also did not have enough labor on hand, complicating their ability to fulfill day-to-day farming responsibilities while ensuring good agricultural practices.

Farm recordkeeping was the most common barrier mentioned. One small-scale grower regarded recordkeeping as overwhelming, explaining the main limiting factor:

> The time involved in keeping records. The thing that seems to be the hardest for me, and the time involved in that. I mean, it's like about 50 different sets of records. When you sit there and look at it maybe. I was in the meeting this morning down here. They were talking about digital recordkeeping. And it just overwhelms me to think about having the briefing written down, and I'm the only person doing it, and I'm the one keeping the records, and I am working around the clock almost. And I don't make any money. (Male, 65+ years)

Participants said they were aware of the importance of keeping records on the farm and want to continue, but as small-scale growers, record keeping adds an additional burden because of the limited number of workers they have available.

Perceived Behavioral Control—Information Type and Sources

Lack of relevant and updated information was a frequent theme in all focus group sessions. Participants reported a lack of up-to-date information on produce-safe practices, especially what is expected of small-scale growers. They were interested in learning what they could do to ensure safe produce but stated that acquiring the information was challenging and difficult:

> And then knowing when something changes, knowing that we will know about it, if something changes, right, just the updates themselves. And we can do that; we have somebody to come out and train our group. We learned about it then. But if something changes other than that, I don't know about it. (Male, 55–64 years)

Participants further reported that the channels to communicate updated information or resources to small-scale growers are not well established, making it difficult to include them in on-farm activities. A broad consensus among participants was that resource tools such as a centralized resource platform with all information and updates would be a good communication source for small-scale farmers. Participants emphasized a need for a "one-stop" platform to get a snapshot of all information needed, as they had to search on different platforms to find information. Some participants were quick to add they do not get timely updates on new information, and they would like to have a source where they can access it. Participants indicated they were willing to adopt some good agricultural practices provided they had the details of what was needed to achieve them.

Perceived Behavioral Control—Access to Extension Personnel

The theme of access to extension personnel, which emerged from the sessions, was closely related to participant desire for an improved channel for sharing information. Some participants reported insufficient numbers of state extension personnel to accommodate the needs of all farmers, and that they would prefer to have experts coming to their farms to see their daily practices and give advice on what was feasible for their farms. Some of the regulations were not clear to them and were difficult to apply even if they wanted to do so, particularly requirements related to record keeping and post-harvest sanitation. Participants reported that the requirements were not easy to understand, and emphasized that extension representatives could help clarify them with practical and hands-on demonstrations to adapt to their farms. However, due to the low extension representative-to-farmer ratio, they encountered difficulty in scheduling extension personnel to visit their farms, underscoring the importance of farm level guidance. They believe that having more personnel available to interact with them in the fields more often would be helpful.

Perceived Behavioral Control—Regulations

Participants reported that the inconsistencies and lack of clarity in the interpretation of regulations affected their ability to adopt better food safety practices on the farm. They indicated that they are confused about which food safety practices they are mandated to perform, and have encountered obstacles to obtaining technical assistance from extension professionals or other experts. Growers have said they are interested in engaging in certain food safety activities such as upgrading infrastructure like handwashing stations, water testing, and detailed recordkeeping. However, they found the regulations to be difficult to understand and impractical for small-scale growers to adapt.

Perceptions of Exemption from FSMA Produce Safety Rule

Further discussions assessed the implications of the FSMA PSR for the participants, most of whom were qualified for exemption (Table 2). Participants were asked if they knew about the FSMA PSR, and most of them had heard about it, with only one participant indicating otherwise. Interestingly, a few were not familiar with the requirements for exemp-

tion, and those who knew of the exemption said they were unclear about the criteria to qualify for it. Participants were then all briefed on the criteria for exemption, and made observations on how the exemption could influence their decision to perform produce-safe activities.

Benefits of Exemption

Numerous participants expressed a sense of relief at being exempted from the FSMA PSR. Those who had a clear knowledge of the FSMA PSR and what it entails expressed that they were glad that they were not required to comply, since the requirements would have been burdensome for their small farm. One of the cited benefits of exemption was access to direct sales. Some small growers indicated that their sales point is predominantly to their community, so they were able to continue selling directly to their customer base without having to worry about implications:

> We don't have to have it because we just sell

Table 2. Benefits and Limitations of FSMA PSR Exemptions for Small-Scale Produce Growers

Theme	Subtheme	Description	Quote
Benefits	Direct market sales	Ability to sell directly to consumers	We don't have to have it because we just sell directly to the consumer. So, we don't have to do any of that jumping through hoops. We don't even get visited by anybody. (Female, 45–54 years)
	Reduced time commitment	Less time involved in running activities	The time and effort required to know the law and to follow are all probably not feasible for someone who's more of a hobby farmer, right? (Male, 45–54 years)
	Fewer inspections	Fewer state or federal inspections/ audits on farms	They'll still do the on-site safety review of our farm, but they will do it every season, or every so many months, like they do on larger farms that are under that, you know, like I said, we're exempt. So, we don't have all that every so many months that they have to come out. (Female, 35–44 years)
	Reduced market struggles	Markets will struggle if there are no exemptions	I'm afraid that markets would really struggle. I know in [location] we, we struggle to have enough vegetable producers. If there were stricter requirements, people wouldn't do it. (Female, 45–54 years)
	Reduced financial burden	The reduced financial obligation of being exempted	Benefits, you do not have to pay. (Male, 35–44 years)
Limitations	Liability issues	The farmer is more liable, being exempted	Liability is really interesting too, when you think about it, because we aren't required, small farms aren't required to go through the training. We're not required to adhere to the rules of the training and so if one grower, I don't want to use me as an example, but I will because I don't want to use anyone else… But if maybe, I've gone through the training, I have the knowledge, but I'm still not legally required to do it. Is that on me? I would argue, yes, but legally I feel like that's a really gray area. (Male, 55-64 years)
	Reduced profits	Less generated income from sales	We used the wholesale as produce buyer and since GAP came into place, even though I'm technically exempt because we're small, we don't have the sales, they won't buy, so we lost a huge customer. My income went 50 [% less], like cut in half. (Female, 45–54 years)
	Reduced growth	Farmer mentions inability to expand as a business	It limits your growth, your size. (Male, 25–34 years)
	Discourages market reach	Inability to sell to a broader clientele, especially to larger retailers, due to FSMA restrictions	Yeah, you're limited, as a family farm; you're limited to direct sales because it's just not [not feasible to sell to other, large or wholesale retailers]. Yeah, and that's what we do [sell only to direct markets]. (Female, 45–54 years)

> directly to the consumer. So, we don't have to do any of that jumping through hoops. We don't even get visited by anybody. (Female, 45–54 years)

Another benefit of exemption was fewer inspections. Some participants noted discomfort with state inspections, and were relieved to have to undergo fewer comprehensive inspections:

> Your inspection process is not nearly as detailed order, comprehensive, or whatever word you want to use. I think that would be a relief to somebody who's a small farmer like, okay, we don't have to, you know, have you know this huge, expensive… (Female, 45–54 years)

Study participants further claimed that the exemption allowed them to stay in business, some stating that if they had to follow some of the FSMA PSR criteria, they would not be able to meet the standards due to the financial burden of complying. Because they are exempted, reduced financial obligations means for some of them more longevity to operate their farms. A few acknowledged that they farm as a hobby or to serve their immediate community, so the exemption allows them to continue their path.

The last benefit that participants reported was the reduced time commitment consequent to exemptions. A few claimed that some of the produce-safe practices required a large time commitment, including investing time in educating themselves as well as applying the practices. The exemption affords them the time to focus on other responsibilities.

Limitations and Future Opportunities with the Exemption

Participants acknowledged that exemption from the produce-safe practices requirement removes some protections by leaving them subject to certain types of liability. A few discussed the elevated risk of liability to which they are subject:

> I'm assuming that the people who made the exemptions talk to the insurance companies. I'm sure they didn't talk to the attorneys because nobody does. But that could be a huge liability issue and could be a major disadvantage. Whereas if you did qualify for those things and did those things (required food safety practices), then most of them (liability) would fall back on the customer as opposed to the producer or seller. (Male, 55–64 years)

Participating farmers further stated that liability protection could be a form of incentive to comply with food safety regulations whether they were mandated or not. Some inferred that having liability protection in place would make compliance more reassuring from legal consequences and encourage good agricultural practices following produce safety regulations. They stated that farmers are still liable for any possible production or distribution issue, even when following good agricultural practices:

> I mean if you were pulling all the FSMA requirements of that contamination, but you still had contamination outside the requirements, you are still responsible, and you will still be held accountable whether you're following FSMA or not, right? So, if there was some, there'd be more incentive on doing FSMA in the regulations if there was some sort of protection rather than just your limiting potential, limiting the damage. (Male, 35–44 years)

Other limitations include reduced market reach and diminished profit. A few participants said that because they are exempted, they are limited as to whom they can sell their produce, and therefore they are unable to make as much profit as they could have if they had more sales channels:

> I mean, I believe in food safety. And like I said, I want to follow the rules. It's just some of them, I don't know how to translate what they're saying for the larger places into something that is financially viable. (Male, 55–64 years)

The further commented that most retail stores and wholesale outlets require them to observe food safety regulations, accommodate any audits, and to

have regulatory certifications. However, because they are qualified for exemption, they usually are not subject to these requirements. Without these measures in place, growers are unable to sell their produce to these stores, and they have reduced access to market channels that are usually more lucrative than other retail outlets.

Some produce growers expressed that operating under the exemption restricted their capacity to expand as a business, confining them to operate as small businesses: "That's the only one there, because it keeps us really small, I mean a very small business" (Female, 45–54 years).

Some confided that due to reduced market reach and reduced profits, they were unlikely to expand as a business, although it was noted that expansion could also have its own challenges. Increase in sales or market access might shift them out of the exemption threshold, thereby necessitating full compliance with PSR, with which they often felt unfamiliar. The transition would necessitate a significant learning curve; thus, some hesitated to expand because they would be required to adopt complex standards they had never been required to understand. This perceived knowledge gap discouraged expansion for some growers, ultimately limiting profitability.

Discussion

This study investigated the perspectives of small-scale produce growers on carrying out food safety activities with respect to their exemptions from the FSMA PSR. Understanding the complexities of decision making among small-scale produce growers offers valuable insights into how various factors influence their on-farm food safety practices. This discussion explores the interplay of consumer influence, intrinsic and extrinsic perceived behavioral controls, and strategies to engage growers exempt from FSMA PSR. The findings, interpreted through the lens of TPB, suggest that attitudes, subjective norms, and perceived behavioral control influences growers' intent on food safety practices. From subjective norms shaped by consumer expectations to resource availability and regulatory barriers, these themes depict the multifaceted motivations and challenges faced by growers. Moreover, these findings emphasize the importance of community ties, personal values, and external support in shaping growers' behaviors. By fostering a deeper understanding of what motivates decision-making processes, this discussion seeks to identify actionable strategies that would enhance engagement and adoption of food safety practices among small-scale produce growers.

The Role of Consumers in the Decision-Making of Produce Growers

Subjective norms, particularly those shaped by consumers, play a pivotal role in the food safety decisions of PSR-exempt produce growers. The findings from this study show how consumer expectations, particularly regarding pesticide use, directly influence growers' implementation of food safety practices. Additionally, growers' emotional connections to their communities, and combined with their personal values, further demonstrate how both societal expectations and intrinsic motivations influence their commitment in ensuring safe produce. Subjective norms as a major predictor for behavioral decisions has been confirmed by previous studies (Khan & Pandey, 2023; Lin & Roberts, 2017; Martínez-Ruiz & Gómez-Cantó, 2016; Ong et al., 2022), one study finding that subjective norms were the major construct that influenced food safety behaviors among food service employees (Lin & Roberts, 2020).

Our findings showed subjective norms, specifically the food safety expectations of consumers, influencing on-farm food safety decisions. For example, produce growers reported pesticides to be a major food safety concern for their consumers. They explained that some of their customers asked about their production methods, particularly pesticide application because it concerned them. It was apparent that they wanted to meet their customers' expectations, to maintain trust, and protect them. This emphasized that customer expectations played a role in shaping their food safety practices. Some growers explained that they were more mindful of how they applied pesticides, ensuring the correct dosages and that trained personnel were applying them. They were transparent in communicating their practices to consumers, building continuous trust. A study found that lack of social pressure from farmers played a major role in influencing

farm advisors' intent to engage in farm and health safety discussions (Mohammadrezaei et al., 2023). Generally, consumers are known to contribute significantly to market decisions such as growth and prices (Dumitru et al., 2023); it is therefore likely that farm practices would also be influenced by consumer preferences and behaviors.

A study by Stojcheska et al. (2016) asserts the importance of involving the farming community in developing adaptable strategies for rural development policies. Similarly, in our study produce growers considered the safety and approval of their community when considering their safety practices. The majority of the growers in this study serve consumers within their community with whom they have an emotional connection. This further elicits a deep need to not only satisfy their demands as consumers but also to protect them. Produce growers described wanting to avoid harming their consumers in any way, a discussion that came from an emotional and moral perspective. The personal values of these growers motivate them and keep them accountable for maintaining safety. For small-scale farmers, this is an important norm that should be examined further to determine ways to involve their communities in their decisions to enact food safety (Chen, Ellett et al., 2021).

In a study of English farmers, Mills et al. (2018) asserted that their personal values served as an intrinsic motivation in performing some environmental management practices. Our study similarly showed that produce growers expressed a moral obligation in relation to on-farm safety. Though small-scale growers expressed the benefits of exemption from PSR, they contended that food safety was non-negotiable, that it was a basic requirement of farming, regardless of regulatory standards. Such personal beliefs contribute to their own food safety expectations and have the potential to be translated into practices. This resembles findings that farmers' positive attitude toward rural development support increased their intent to apply for it (Stojcheska et al., 2016). These findings show that personal belief systems and values play a role in individual decision making when performing a behavior (Rezaei et al., 2018).

Another interesting dynamic this study revealed was the intertwining between subjective norms and produce growers' personal values on performing food safety activities. PSR-exempt farmers were willing to grow safe produce for their consumers and for themselves. This interrelation also was reported by Mahasuweerachai (2022), who found that restaurant employees' moral norms were driven by social norms, and that their feelings of guilt for not following food safety standards were associated with social expectations. The interrelation of produce growers' values with societal expectations in this study might also be due to their consumer base being their community. Societal groups with ties among members have more impact on decision making than groups with no relationship to each other (Bell et al., 2016). The emotional ties of small-farm operators to their community might have enhanced their beliefs in implementing food safety practices.

Intrinsic and Extrinsic Perceived Behavioral Control in the Decision Making of Produce Growers

For produce growers in this study, perceived behavioral control was shaped by access to resources available to them that enabled implementing food safety practices (Sansom, 2024). These resources were intrinsic and extrinsic. Intrinsic resources involved growers' own operations, and included utilities, time, and labor. These were important to the grower in being consistent with on-farm food safety practices. Interrelations existed between the lack of or limited availability of these resources. For example, many of the participating farms were run by the grower and partner or spouse, or family, which was just enough hands to handle daily farming activities. Subsequently, growers did not have enough time to engage in as many safety-related practices as they would have liked. A study by Chen, Ellett et al. (2021) reported similar findings, indicating time and labor to be major barriers to small-scale produce growers in establishing or expanding value-added businesses. It was reported that growers had limited time and lacked the labor force to engage in a lot of activities other than regular farming production, which was also emphasized in this study. One of the reasons exemptions and modified requirements were provided for very small and small farms was to reduce

the administrative burden of the PSR and to allow these farms to continue to operate. The importance of the PSR to address this issue was further highlighted in this study, as growers clearly expressed the implications of this burden when discussing their efforts to adopt food safety practices.

The extrinsic resources were the external factors that can facilitate or hinder grower intent to practice food safety. These included lack of information, limited access to extension personnel, and regulatory inconsistencies. Produce growers showed an interest in learning more to improve their practices; however, they had limited access to information. Similarly, Handschuch et al. (2013) reported the importance of access to information for small-scale raspberry producers in adopting food safety and quality standards. In our study, information on improved best practices was available, but it was difficult for growers to easily access. Some platforms were not user-friendly, deterring farmers from searching for information. Various tools and resources have been developed to improve information availability (Chen, Gibson et al., 2021; Laury-Shaw, 2015; Nayak et al., 2015); but there is a demonstrated need to continue developing tailored resources for this population.

Growers indicated the need for more extension personnel to provide guidance in the fields to oversee food safety practices. Extension and other assistance is an important tool in engaging growers in farming activities, including food safety practices. demonstrated the As an example of the importance of external assistance, growers in membership associations benefited through improved skills that helped to implement food safety standards (Handschuch et al., 2013). Growers suggested that the continuous presence of extension personnel on farms improves information access and assistance for engaging in food safety activities. The Indiana Department of Health has a Produce Safety Program that inspects farms that must comply with the PSR, but provides outreach and technical assistance to all produce growers irrespective of compliance status (Indiana Department of Health, 2026). The study participants, who are from Indiana, may have experienced the benefits of the outreach component of this program, which may be why they suggest maintaining continuous support presence. Based on this observation, we encourage further investigation to determine more ways to better engage extension personnel in communicating and making information available regularly to growers.

Growers discussed the role that regulations play in adopting certain food safety practices. Growers regard regulations as inconsistent and confusing, increasing difficulty in understanding expectations that they must satisfy. Several growers stated that the language used was difficult to understand and lacked clear definitions of what was expected. They also noted a lack of alignment in regulatory information from different stakeholders. Inconsistent messages received from extension agents, inspectors, retailers, and other growers made them unsure of what was actually expected of them. The regulatory standards were also impractical for small farms to adopt even if they wanted to implement more practices. This finding aligns with other studies on the roles that growers perceive regulations have in adopting food safety practices. Chen, Ellett et al. (2021) reported that growers had limited understanding and time to implement regulations which formed a barrier to improving food safety. Baron and Frattaroli (2016) noted that inadequate regulations and enforcement regimes cause some individuals to continue with practices that could compromise food safety.

Strategies to Engage Small-Scale Produce Growers Who Are Exempted from FSMA PSR

This section explores the growers' perspectives on regulatory barriers, their concerns about liability, and the potential for incentives, such as liability protection, to encourage adherence to advanced food safety standards. Regulatory guidelines play a critical role in shaping food safety adoption decisions among small-scale produce growers, yet inconsistencies and unclear expectations present significant barriers to implementation. Although the participants are qualified to be exempted from the FSMA PSR, food safety was still an expected standard that growers intend to achieve. However, they found it challenging due to inconsistencies with regulatory requirements. This outcome resembles the finding that niche market producers found regulations to be undefined and with unclear meas-

urable objectives, making implementation more challenging (Young et al., 2011). Additional findings support the claim that regulatory requirements may hinder small produce growers' ability to adopt food safety practices (Chen, Ellett et al., 2021, Stoll et al., 2025a; Swinehart et al., 2025), and provide stakeholders with evidence of the challenges growers face with standards and demonstrate the need for support systems to encourage the adoption of food safety practices. This study also supports the argument that regulatory standards could be designed to be scalable and easily adaptable for farms of any size. Chen et al. (2022) recommended developing tailored standards for small farms to enable them to attain their goals. Such an approach could include user-friendly documentation, or record-keeping requirements such as checklists and seasonal logs, as well as a tiered compliance program structure based on characteristics such as farm size and market channels. These could facilitate adopting and maintaining food safety standards.

Liability protection was a major subject raised by producer growers, who contended that while exemption from the PSR had the benefit of reduced financial obligation and time commitment, nevertheless liability was a major concern. Our findings suggest that produce growers are more likely to engage in advanced regulatory standards if they are offered an added advantage, specifically liability protection. For example, produce growers suggested providing a form of insurance as an incentive for obtaining food safety certification. They believe that in the case of a foodborne illness outbreak, for example, they would remain liable despite compliance with or exemption from food safety standards. Many different perspectives have been reported on the impact of incentives in promoting intent to adopt a behavior. A study of the impact of financial profits on farmers' intent to adapt to climate change policies determined that they are more likely to adapt if they know the resulting benefits (Zobeidi et al., 2022). Contrary to this finding, a study indicated that economic incentives such as financial profits have lesser impact on farmers' behavioral intent than other cognitive factors, such as personal values and community influences (Buelow & Cradock-Henry, 2018). Based on participants' responses, our study supports the advantage of incentives in motivating produce growers' intent to perform food safety practices.

Limitations

Although focus group scripts were developed to assess the insights of produce growers, due to time limitations at a few conferences certain topics might not have been thoroughly addressed. Additionally, since focus groups were conducted solely with produce growers who attended these specific conferences in Indiana, the findings may not be generalizable to a broader population of produce growers. While the TPB framework guided this study, the qualitative nature of the research limited the ability to test predictive relationships of specific TPB constructs with grower behaviors or with other variables. Future more quantitative studies could further explore such associations and reach a higher number of growers.

Conclusion

The current study utilized the Theory of Planned Behavior (TPB) model to explore how small-scale produce growers in Indiana approach their on-farm food safety practices despite being exempt from the FSMA Produce Safety Rule (PSR). Key findings revealed the significant role of growers' personal values, community influences, and resource availability in shaping their intent to implement safety measures. Importantly, these factors are often intersected, emphasizing the interconnected nature of personal and social motivations. This study also highlighted growers' perspectives on PSR exemptions, revealing both benefits, such as reduced financial burdens, and concerns, particularly regarding liability risks. The findings suggest that strategies such as provision of liability protection, tailoring educational tools to small farms, and strengthening the presence of extension personnel may support these growers in their pursuit to ensure safe produce. Future efforts could also consider developing a centralized resource platform for PSR-exempt produce growers, with specific practical food safety guidance that aligns with their farm systems. These insights can inform strategies to promote food safety while addressing the unique needs of PSR-exempt farms.

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Appendix A. Codebook Generated from Focus Group Discussions

Code	Coding Method	Definition	Quote
Inconsistencies in the interpretation of regulations	Descriptive	Farmer mentions a lack of consistency in the interpretation of regulations.	One of the issues that I'm dealing with is depending on who you talk to, people in Purdue, you get one answer, you talk to somebody at the state level, you get a different one in somebody else's state level, you get a different one. So, I think it's consistency.
Lack of clarity on regulations	Descriptive	Farmer does not understand the regulations and expectations	And everything has limitations and exceptions. If those are very clear, that I know what this is I do and this is, I don't, that can make a difference in the world. So yes, it all comes down to communication, clear communication.
Lack of education	In vivo	Farmer mentions there is little to no education from regulatory agencies.	Here's what's been more, but there has not been a lot of education or help out there from the state or whoever. Sorry, no offense, there have been limited educational opportunities like this, or even help.
Lack of information sharing channel	Descriptive	Farmer mentions there is no channel to know when new updates to regulations are made.	And then knowing when something changes, knowing that we will know about it, if something changes, right, just the updates themselves. And we can do that, we have somebody to come out and train our group. We learned about it then. But if something changes other than that, I don't know about.
Lack of resources	Descriptive	Farmer mentions a lack of a consistent, standard resource with the needed information.	Like, there's no resource other than talking with other wineries and other people that are doing the work. But again, it might be inconsistent. One person might say one thing, you know.
Lack of utilities	Descriptive	Farmer mentions the unavailability of amenities such as water	I mean, it's difficult for farmers on my farm. I don't have running water. I don't have a well, so any water I have, we buy, and it's stored in tanks. Water is super, super precious to me. So since I don't have a fresh water source like in my apple packing line, I don't run water in it because it's better not to use water, if you don't know you've got good water, right.
Limited personnel	Descriptive	Farmer mentions a limited number of personnel to work on farm.	Well, it's really difficult. I mean it's just me and my husband. Trying to find help is impossible. So, it's just me and my husband, and we have two acres of orchard and two acres of vegetables, five acres of alfalfa, and you know, other acreage with other trees and fruit, and it's just us and we're not young.
Overwhelming record-keeping requirements	Descriptive Process	Farmer indicates difficulty in keeping up with records	The time involved in keeping records. The thing that seems to be the hardest for me, and the time involved in that. I mean, it's like about 50 different sets of records. When you sit there and look at it maybe. I was in the meeting this morning down here. They were talking about digital record-keeping. And it's just overwhelming to me to think about having the briefing written down, and I'm the only person doing it, and I'm the one giving the records and I know that I worked around the clock, and I don't make any money.

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Impractical	Holistic	Farmer mentions the impracticality of regulations	I think it's impossible for a small farm to do it. That is just my take on it.
Lack of infrastructure	Descriptive	Farmer mentions a lack of infrastructure on farm.	Yeah, going straight from the field right to the washing pack because you have like 3 hours before it's too hot to do that. Like, I don't have time to go home and shower. I don't live on the farm, so there's that. I mean, we wash our hands, wash our arms, and that's what you get.
Limited time	Descriptive	Farmer mentions limited time in daily operation to adhere to some regulations.	Yeah, going straight from the field right to the washing pack because you have like 3 hours before it's too hot to do that. Like, I don't have time to go home and shower. I don't live on the farm, so there's that. I mean, we wash our hands, wash our arms, and that's what you get.
Animal or bug controls	Descriptive	Farmer mentions consumers ask questions concerning how animals or bugs are controlled from invading the produce	How are you treating your flea beetles? How are you treating your caterpillars on your kale?
Chemical application	Descriptive	Farmer mentions consumer is concerned about chemical application on produce	Our primary one is, what are you spraying? Or do you spray anything on there?
Sourcing and processing	Descriptive	Consumer wants to know where the produce is sourced and what processing is used	Mostly is where are you getting it from? Where is it at? They ask you how you process sometimes?
No concern	Value	Farmer mentions that consumers are not concerned about safety rules	If your product looks good and nice, and I think that there is not even a thought how it was packed.
More trained personnel	Descriptive	Farmer mentions there should be more personnel, both extension personnel and 'non-extension' personnel (locals who are not extension trained to teach others on regulations).	If money were not an issue, that Purdue could send somebody out to every single place, and say, this is what you must do, this is what you don't have to do. Or to have local trainers that are not necessarily government employees, as in Cooperative Extension staff being the only ones who can do it. If I could teach my neighbor, yeah, that kind of thing, if I could teach my church. That would be helpful.
Regular updates	Descriptive	Farmer mentions regular updates be given	Yeah. And the annually updated list to toggle the scale of production, and then how someone who does small, medium, large, wholesale, to come out, do training, and update that, like I said annually.
More resource tools needed	In Vivo	Farmer indicates a resource that has all information needed or have more resources or point personnel	Use the term flowchart for there's some way you could log into a website, and it would have a few introductory questions like what is the size of your operation, an acre for fruit or crop produced, and your typical annual gross sales. And then from there, which crops are you producing? This then takes you down a trail of things you need to be worried about giving your crop size, location, and other things being ignored because you're not a large operation or you're not growing a particular crop. So I think that would be a way to develop that kind of tool in cooperation with

			the regulatory agencies in the state. So, we're consistent with current state of federal law.
Knowing sources of information	Descriptive	Farmer mentions knowing where to source information	For me, knowing where to go for the information like this, this GAP training you know.
Liability protection	Descriptive	Farmer suggests protection as a way to easily comply to regulations	I mean if you were pulling all the FSMA requirements of that contamination, but you still had contamination outside the requirements, you are still responsible and you will still be held accountable whether you're following FSMA or not right? So if there was some, there'd be more incentive to do FSMA in the regulations if there was some sort of protection rather than just limiting potential, limiting the damage.
Direct market sales	Descriptive	Farmer mentions ability to directly sell to consumers as a benefit of being exempted	We can sell directly to consumers, I mean even though you're limited, you still can do it.
Implement regulations	Descriptive	Farmer mentions being aware of the regulations and implementing some even though they are exempted	As a grower what I'd say, but on the same thing like you said like I think it sounds like most of us though not needing to be certified are aware of the broad strokes of these practices and try to implement as many as are feasible or makes sense. For context, that is not the case for some other growers who either willingly ignore and do things, it's just cheaper.
Learning curve	Descriptive	Farmer indicates the impact of having business grow to a non-exempted FSMA business	That's true because if we want to get any bigger, we have to find other avenues to sell, which means we will probably have to get into wholesale and schools and stuff like that, which means that we have to go back and learn all the certification, all the regulations, you know, if we have to build different buildings and have separate well, and you know, yeah, I mean it would be very cost prohibitive.
Liability issues	Descriptive	Farmer indicates that the farmer is more liable as being exempted	I'm assuming that the people who made the exemptions talk to the insurance companies. I'm sure they didn't talk to the attorneys because nobody does. But that could be a huge liability issue, it could be a major disadvantage. Whereas if you did qualify for those things, and did those things, then most of those would fall back on the customer as opposed to the producer or seller.
Market struggles	Descriptive	Farmer mentions the market will struggle if there were no exemptions	I'm afraid that markets would really struggle I know in Crawfordsville, we struggle to have enough vegetable producers if there were stricter requirements people wouldn't do it.
Less inspections	Descriptive	Farmer mentions fewer inspections on farms as an advantage	They'll still do the on-site safety review of our farm, but they will do it every season, or every so many months, like they do on larger farms that are under that, you know, like I said, we're exempt. So, we don't have all that every so many months that they have to come out.
Personal morals or values	Values Emotions	Farmer expresses their own values on the safety of people	I think, from my perspective, and just hearing, I think food safety is very important.

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			At first blush, it makes me giggle. Because if it's about food safety, then we should all be practicing food safety. Just because I'm small, doesn't mean I should not be safe.
Reduced financial burden	Descriptive	Farmer indicates the reduced financial obligation from being exempted from FSMA	Benefits, you don't have to pay.
Reduced growth	Descriptive	Farmer mentions inability to expand as a business	It limits your growth, your size.
Reduced market reach	Descriptive	Farmer mentions inability to sell to a broader clientele due to FSMA restrictions	Yeah, you're limited. As a family farm, you're limited to direct sales because it's just not. Yeah, and that's what we do. We're not going to try to venture into wholesaler or anything, because that's a whole different ball game.
Reduced profits	Descriptive	When a farmer indicates reduced sales due to food safety regulatory expectations	It's just that we used to before FSMA came into place; we used to wholesale. And since FSMA came into place, even though I'm technically exempt because we're small, we don't have the sales, they won't buy, so we lost a huge customer. My income went 50 like cut in half.
Reduced time commitment	Descriptive	When farmers mention saving time the benefits of being exempted.	The time commitment. You have to spend a huge amount of time going to training sessions, reading materials, taking exams, whatever it might be, then in my business, only 2 or US$3,000 a year, it's not worth it.
No harm	Value	Farmer does not want to harm consumers	My primary risk concern actually is I don't want people getting hurt, because many children, families [eat produce]. One of my biggest expenses is liability insurance. But in terms of the food safety side, we began during the pandemic several years ago, we're sanitizing, we provide buckets to begin with, we put a fresh new plastic bag and liner in every bucket for every customer, which they then take the fruit home in. So that provides a barrier of safety, and they're picking the fruit.
Pesticide application	Descriptive	Chemical food safety risks farmers are concerned about	Well, we do have bees also, so we have to be really careful what we spray, because it can harm them, but also the customers and our own personal consumption. I don't want to be eating chemicals.

Appendix B. Compilation of Codes (Appendix A) into Themes and Subthemes Based on the Theory of Planned Behavior

Theme	Subtheme	Code
Attitude	Personal values	Personal morals or values
Subjective norms	Community	No harm Pesticide application Sourcing and processing
Perceived behavioral control	Labor	Limited personnel
	Utilities and time	Lack of utilities Overwhelming record-keeping requirements Limited time
	Information source	Lack of education Lack of information-sharing channel Knowing sources of information More resource tools needed. Regular updates
	Access to extension personnel	More trained personnel
	Regulation	Inconsistencies in the interpretation of regulations Lack of clarity on regulations Impractical

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Strengthening institutional capacity for fresh food safety governance: Evidence from Indonesia's Regional Food Safety Authorities

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Abstract

Institutional capacity is a critical factor in ensuring safe and sustainable local food systems, particularly for fresh foods that are highly perishable and often traded through traditional markets. As an agrarian country and one of the world's major food producers, Indonesia manages a wide range of fresh, plant-based food commodities that require effective food safety oversight. In this context, strengthening fresh food safety governance supports local producers by promoting safer production standards and practices, while reinforcing traditional markets as trusted channels for fresh food distribution. It also contributes to regional food system resilience by ensuring the availability of fresh foods that are safe in both quantity and

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Disclosures

The authors declare no conflict of interest.

Data Availability Statement

The data used in this study were obtained through an institutional survey conducted among officials of the Regional Food Safety Competent Authority (RFSCA) in Indonesia. All participants provided informed consent to participation, and no personal or confidential information was collected or disclosed. Due to privacy agreements with participating institutions, the whole dataset is not publicly available.

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quality. Within Indonesia's decentralized governance structure, Regional Food Safety Competent Authorities (RFSCA) serve as key institutional actors responsible for safeguarding the safety of fresh foods at the subnational level. As of 2025, a total of 34 provincial food affairs agencies have been formally verified as RFSCA. However, the institutional performance of around 60% of these authorities remains uneven and, in several cases, suboptimal. This study examines the institutional drivers influencing RFSCA performance and develops strategies to strengthen their operational capacity using Interpretive Structural Modelling (ISM) and Best–Worst Method (BWM). Data was collected from 34 provinces through structured surveys and expert assessments. The findings indicate that adequate budget allocation and standardized institutional mandates function as fundamental drivers of institutional performance. Approximately 80% of RFSCA operate with insufficient budgetary support, while core functions such as monitoring, evaluation, and capacity-building activities are largely dependent on these foundational institutional conditions. The proposed framework offers actionable guidance for regional authorities and policymakers to enhance coordination, accountability, and resilience in fresh food safety governance—ultimately supporting safer and more resilient local food systems.

Keywords
Best–Worst Method (BWM), fresh food safety, Indonesia, institutional strengthening, Interpretive Structural Modelling (ISM), regional food governance, system-based analysis

Introduction and Literature Review

Food safety governance plays a critical role in protecting public health and sustaining consumer confidence, particularly in developing countries where institutional capacity constraints continue to hinder effective implementation. In decentralized governance systems, regulatory authority is often distributed across multiple agencies at national and subnational levels, including entities with enforcement and delegated oversight responsibilities. While such arrangements may facilitate coordination and information exchange, they frequently lack clear mechanisms for accountability, performance monitoring, and resource alignment. As a result, fragmented institutional mandates and uneven capacity across regions can weaken food safety control effectiveness (Food and Agriculture Organization of the United Nations [FAO], 2019). Weak institutional capacity can constrain food safety assurance and oversight, increasing consumer exposure to unsafe foods, undermining the reliability of local markets, and weakening regional food system resilience (Cheruiyot et al., 2024). These challenges are particularly evident in decentralized governance systems, where responsibilities are distributed across subnational authorities with differing levels of institutional capacity (Kimanya, 2024). Therefore, strengthening regional food safety institutions should be understood not merely as a regulatory obligation but as a strategic component of food system–based community development (Doustmohammadian et al., 2022). In Indonesia, the decentralization framework established under Law No. 23/2014 delegated substantial authority to provincial governments without distributing substantial resources. Multi-agency and multi-institutional food safety control requires coordination among diverse government entities and stakeholders to ensure coherent regulation, inspection, and enforcement (Al Busaidi et al., 2025). Previous research has emphasized national-level regulatory frameworks, risk communication, and surveillance mechanisms (Geng et al., 2021). Even so, limited attention has been given to the institutional capacity of regional authorities, despite their central role in policy implementation and compliance assurance.

Within Indonesia, responsibility for fresh, plant-based food safety is shared between central and local governments. The National Food Agency sets national regulations and standards and oversees the safety of imported fresh foods, while local governments—through Regional Food Affairs Offices serving as food safety authorities—implement inspection, monitoring, and enforcement for domestically produced fresh foods at the regional level (Hermansyah et al., 2025). This institutional arrangement is grounded in Indonesia Food Law No. 18/2012 along with Presidential Regulation No. 66/2021, which established the National Food

Agency and delineated fresh food safety responsibilities, and Government Regulation No. 86/2019 on Food Safety. Despite formally defined mandates, the current governance structure faces systemic challenges such as overlapping agency functions, inconsistent policy enforcement, limited technical expertise, and weak stakeholder coordination (Liu et al., 2019). These systemic constraints reflect the coordination and enforcement challenges observed in other decentralized systems, undermining the effectiveness of food control, increasing contamination risks in fresh produce, and eroding public confidence in regulatory performance. These challenges underscore the need for targeted institutional strengthening to ensure effective and sustainable food safety system performance (Chen et al., 2021). Without targeted reforms—such as enhancing human resources, improving infrastructure, and ensuring adequate financial and regulatory support—institutions will likely remain fragmented and ineffective (Mayett-Moreno & Oglesby, 2018).

Although existing studies provide valuable insights into food safety governance, they have focused mainly on regulatory design, risk communication, or technical interventions. They offer a limited understanding of how institutional elements interact to influence governance performance at the regional level (Unnevehr, 2022). In this study, institutional elements refer to organizational structures, human resource capacity, operational procedures, infrastructure, and budgeting support that collectively shape regulatory performance at the regional level. Furthermore, most analyses rely on descriptive or qualitative approaches and lack systematic methods to prioritize strategic interventions or model the complex interdependencies among institutional drivers. This creates a significant research gap in identifying which institutional factors exert the greatest influence on food safety governance and how they should be strengthened in a decentralized context. Therefore, this study aims to: (a) identify key institutional drivers influencing the performance of Regional Food Safety Competent Authorities (RFSCA); (b) analyze the structural interrelationships among these drivers using Interpretive Structural Modelling (ISM); and (c) prioritize institutional strengthening strategies through the Best–Worst Method (BWM). ISM structures complex interdependencies among institutional factors, while BWM quantifies expert judgment to prioritize strategic actions. The integration of these methods offers both diagnostic and decision-supporting structural insights for institutional governance while encouraging decision-support capabilities that enable the formulation of actionable strategies to strengthen regional food safety system development. This study addresses these gaps by developing a systems-based analytical framework to examine and strengthen the institutional performance of Regional Food Safety Competent Authorities (RFSCA), while ultimately revealing budget allocation and standardized mandates as foundational enablers of institutional performance.

Food Safety Governance

Food safety governance is increasingly conceptualized as a multi-actor, multi-level process that requires alignment of policy, regulatory institutions, and operational capacities across scales (Shen et al., 2021). Food safety governance encompasses the frameworks and mechanisms through which government agencies coordinate to ensure and monitor food safety. It relies on adequate regulatory support, financial resources, established guidelines, and the professional competence of institutions mandated to manage food safety (L. Wu et al., 2023). However, disparities in institutional capacity across regions frequently compromise the efficacy of governance. Although institutional responsibilities have been formally defined, the current governance structure faces several systemic challenges. These include inconsistent policy enforcement, limited technical capacity, unstandardized procedures and services, and weak stakeholder coordination (Termeer et al., 2018). In decentralized settings, these challenges call for institutional strengthening that enables food safety systems to operate consistently across jurisdictions and over time (Abdollahzadeh, 2021).

Institutional Performance and Capacity in Food Safety

Institutional capacity—including clear mandates, stable financing, human resources, logistics, and

data systems—is widely recognized as a primary determinant of effective food-safety control. Empirical studies report that without reliable funding and standardized duties and functions, investments in technical capacity, inspection coverage, and risk communication are difficult to sustain at the subnational level (Kraak & Niewolny, 2024). Therefore, when assessing food-system governance, it is crucial to analyze the formal institutional structures and the practical capabilities required for effective action and ongoing improvement (Karan et al., 2023). Accordingly, this study focuses on identifying and analyzing the key institutional elements that determine the performance of RFSCA across provinces.

Empirical Applications for Food Safety Institutional Strengthening

Food safety supervisory agencies face several challenges, including limited staff capacity, insufficient facilities, and weak monitoring activities (Shuangshuang et al., 2018). Institutional strengthening is therefore crucial for improving food safety governance. It emphasizes a comprehensive framework, clear institutional responsibilities, adequate supervision, and regular risk monitoring to enhance governance performance (Wang et al., 2025). Systems methods are being increasingly applied to food safety governance problems to map causal relationships and identify leverage points. Empirical applications for strengthening food safety institutions could combine mapping and prioritization tools to translate complex diagnostic findings into actionable strategies. Interpretive Structural Modelling (ISM) is a well-established technique for structuring complex, interdependent factors into hierarchies and revealing driving versus dependent variables in organizational systems (Sreenivasan et al., 2023). The Best–Worst Method (BWM) has gained popularity because it requires fewer pairwise comparisons and often yields higher consistency in expert judgments than older AHP-type approaches (Pamučar et al., 2020).

Applied Research Methods

This study employed a systems-based analytical approach to examine institutional conditions and identify strategic priorities for strengthening regional food safety governance in Indonesia. The methodological framework integrated Interpretive Structural Modeling (ISM) and the Best–Worst Method (BWM), enabling the study to explore structural dependencies while also prioritizing actionable institutional strengthening strategies.

Collecting Data and Respondents

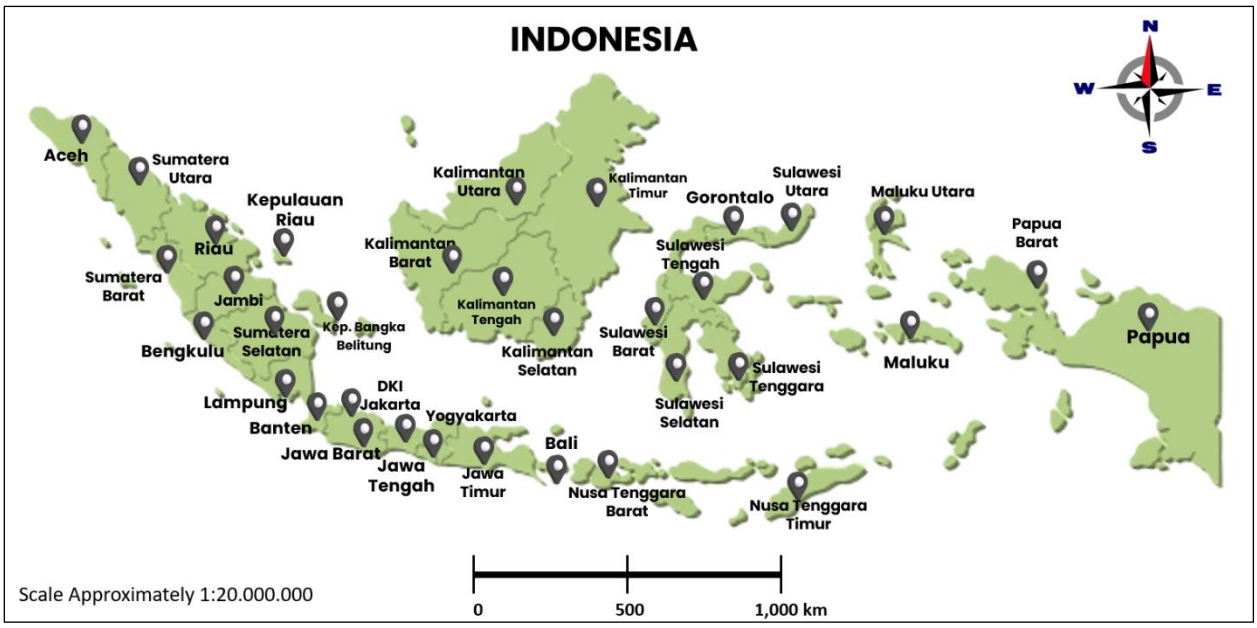
Data for this study was collected from November 2024 to March 2025 through a structured survey of the RFSCAs across all 34 provinces in Indonesia (as shown in Figure 1). Each province was represented by a leader of a competent authority agency or one senior official directly responsible for food safety supervision, purposively selected based on their decision-making role and operational knowledge. The survey aimed to assess the institutional conditions of these authorities through seven key dimensions. These dimensions were identified and based on National Food Agency Regulation No. 12/2023, as crucial for institutional strengthening: organizational structure, human resources, food safety assurance, inspection and supervision, guidance and outreach, supporting facilities, and budget allocation.

Five experts were purposively selected to complement the survey data, provide in-depth insights into the relationships among these dimensions, and help formulate and prioritize institutional strengthening strategies. These experts were selected based on their professional experience and at least five years of direct involvement in food safety agency governance, regulatory policy, or institutional management at the national or regional level. The expert panel comprised two senior representatives from regional authorities, two senior representatives from central authorities, and one academic expert.

Interpretive Structural Modelling (ISM)

The ISM technique was used to explore the interrelationships among the institutional dimensions identified in the survey. This method was chosen because it helps visualize how institutional factors interact hierarchically—from foundational enablers to outcome variables—thereby revealing leverage points for institutional improvement. Once the variables were identified, the relationships among

Figure 1. Location of Regional Food Safety Authorities in Indonesia



Source: Author's compilation based on National Food Agency data (2025).

the variables identified by experts were assessed using a structural self-interaction matrix (SSIM; Nega et al., 2024). In an SSIM, expert judgments about the pairwise relationships are recorded using standard ISM symbols:

- V: if element *i* influences element *j*, but not vice versa
- A: if element *j* influences element *i*, but not vice versa
- X: if elements *i* and *j* influence each other
- O: if there is no relationship between them

For example, experts agreed that budget allocation (E12) directly influences human resource capacity (E2), as funding determines recruitment, training, and retention. The SSIM was then converted into a binary reachability matrix, applying the standard ISM rules and verifying transitivity to ensure logical consistency (Alawamleh et al., 2023). The binary reachability matrix (*RM*) can be mathematically defined as:

$$RM(i,j) = \begin{cases} 1\,, if\ element\ i\ influence\ j \\ 0\,, otherwise \end{cases}$$

Once the initial binary matrix is formed, a transitivity check is performed to ensure that if element *i* leads to *j*, and *j* leads to *k*, then element *i* should also lead to *k*. Mathematically, transitivity implies:

$$\text{If } RM\ (i,j)\ = 1 \text{ and } RM\ (j,k) = 1, \text{then ensure } RM\ (i,k) = 1$$

If any transitive links are missing, they are added to complete the matrix. After transitivity closure, the reachability matrix is used to determine the reachability set and antecedent set for each element. The next step is level partitioning, which involves grouping elements based on their relationships in the reachability matrix. For each element, a reachability set (all elements it can reach), an antecedent set (all elements that can reach it), and their intersection set are identified (Meher & Mishra, 2019). An element is placed at a specific level when its reachability set matches the intersection set. This process is repeated until all elements are assigned a level. After that, a conical matrix is created to examine the system's structure by calculating each element's driving power and dependence power. The final output of the ISM process is a hierarchical model (Ahmad & Qahmash, 2021) that

maps the causal structure of institutional performance in regional food safety governance. All ISM and Cross-Impact Matrix Multiplication Applied to Classification (MICMAC) computations were performed using Microsoft Excel.

Best–Worst Method (BWM)

After identifying the key drivers through ISM, the BWM was applied to determine the priority order of prioritize strategic actions for institutional strengthening. BWM was selected because it allows for consistent expert judgments and requires fewer comparisons than traditional multi-criteria methods, making it more practical for decision-making in a policy context (Wankhede & Vinodh, 2021). It is used to determine the relative weights of several available strategies based on expert judgments by comparing the most and least preferred (best and worst) strategies with the others. The BWM analysis process is conducted through the following steps (Rezaei, 2015):

Step 1: Criteria Identification. The strategies formulated based on the ISM analysis were evaluated in terms of their priority, as weighted by expert respondents.

Step 2: Determination of the Best and Worst Criteria. Each expert was asked to identify one strategy considered the most important (*Best*) and one considered the least important (*Worst*).

Step 3: Best-to-Others Assessment (B → j). Experts were asked to assign preference values indicating how much more important the Best strategy is compared to each of the other strategies, using a scale from 1 to 9. This forms the Best-to-Others preference vector: $A_B = (a_{B1}, a_{B2}, \ldots, a_{Bn})$.

Step 4: Others-to-Worst Assessment (j → W). Experts were also asked to rate the relative importance of each strategy compared to the Worst strategy, using the same 1–9 scale:

$A_W = (a_{1W}, a_{2W}, \ldots, a_{nW})$.

Step 5: Optimal Weight. The optimal weights $w_1, w_2, \ldots w_n$ are obtained by solving a linear optimization problem subject to the following constraints:

$\left|\frac{w_B}{w_j} - a_{Bj}\right| \leq \xi, \left|\frac{w_j}{w_W} - a_{jW}\right| \leq \xi$ subject to:

$\sum_{j=1}^{n} w_j = 1, w_j \geq 0$

Step 6: Consistency Ratio Calculation. To assess the consistency of expert judgments, a consistency ratio (CR) was calculated. The CR is defined as the ratio between the optimal deviation value ξ^* obtained from the optimization model and the maximum allowable deviation $\xi_{\max}$, which is determined based on the scale used for preference values in the assessment (Q. Wu et al., 2024).

This hybrid method (ISM–BWM) integrates structural analysis with quantitative prioritization, enabling both causal mapping of institutional interdependencies and strategic decision support. This approach represents a relevant and novel methodological contribution to food safety governance research in decentralized systems.

Results

The results of this study provide an overview of the institutional conditions of Regional Food Safety Competent Authorities (RFSCAs) across Indonesia and highlight the key factors influencing their performance. The findings are organized into three parts: survey-based institutional condition, structural analysis using ISM, and strategic prioritization using the BWM approach.

Institutional Condition: Survey Findings

Out of the 34 RFSCAs surveyed, the majority operate within a formally established regulatory framework at the provincial level. Specifically, 94% of provinces have formalized the legal status, organizational structure, functions, and work procedures of their RFSCA through decrees issued by regional heads, while the remaining 6% rely on administrative decisions by local food agency leaders. This pattern indicates relatively high levels of formal institutional compliance yet also reveals variation in the degree of institutionalization across provinces, particularly in terms of administrative authority. These findings reflect common challenges in decentralized governance systems in

Indonesia, where policy attention and institutional formalization are closely linked to political commitment and fiscal capacity at the regional level. Most RFSCAs are structured under one or two functional units, typically comprising a food safety division and, in some cases, a technical implementation unit such as a food safety and quality control laboratory.

The adequacy and competence of human resources strongly influence institutional performance. The survey reveals that 71% of RFSCAs fall short of the minimum staffing requirements relative to their operational workload. Nearly 44% employ only five to 10 personnel, 15% have fewer than five, and only 9% report more than 20 staff members. This significant shortage of qualified personnel constrains the effectiveness of food safety control activities. Regarding staff competency, 56% of RFSCAs reported that more than three quarters of their personnel are certified in relevant roles such as food safety inspectors, sample collectors, or auditors. The remaining 44%, however, have yet to meet this competency threshold, indicating uneven regional capacity development.

Operational standardization through standard operating procedures (SOPs) is essential for consistency and accountability in food safety assurance. Survey results show that only 41% of RFSCAs possess complete SOPs, while 56% have partial versions and 3% have none. This gap reflects the limited availability of detailed national technical guidance, combined with uneven regional institutional capacity to translate general regulatory requirements into operational procedures. Even among agencies with established SOPs, only 47% report consistent implementation, with limited understanding, insufficient training, and weak internal commitment cited as key barriers. These findings indicate that institutional weaknesses lie not only in the availability of formal procedures but also in their operationalization, reflecting gaps in national technical guidance, regional capacity for procedural development, and sustained organizational commitment to implementation.

Despite these structural and procedural gaps, 94% of RFSCAs have developed post-market surveillance plans, demonstrating strong awareness of the importance of risk-based monitoring. Execution, however, remains inconsistent: Surveillance data is often collected but rarely used for corrective or preventive actions. Approximately 62% of RFSCAs identified limited budgets, personnel, and infrastructure as barriers to follow-up, while 38% cited the absence of a clearly defined feedback mechanism. These challenges suggest both procedural and institutional weaknesses that may compromise the effectiveness of local food safety surveillance systems (Barinda & Ayuningtyas, 2022).

Adequate facilities and infrastructure are fundamental to effective food safety supervision. While most RFSCAs have access to office space—dedicated or shared within local food agencies—only 47% are equipped with a complete set of inspection tools, including sampling kits and rapid test devices for field assessments. Moreover, just 38% of agencies have access to operational vehicles, which limits mobility for inspection, monitoring, and outreach. These basic equipment and logistics limitations significantly reduce the agencies' ability to perform timely and reliable food safety interventions.

Budgetary constraints remain one of the most significant institutional challenges. Although funding sources include regional and national budgets, only 20% of RFSCAs reported receiving adequate financial support. Alarmingly, three agencies operate with no regional budget allocation, as recorded in the 2023 institutional review by the National Food Agency (Badan Pangan Nasional, 2023). Insufficient budgets limit the scope of essential activities such as routine inspections, laboratory analysis, staff training, and maintenance of facilities, ultimately weakening the sustainability and responsiveness of regional food safety governance (Bi et al., 2025).

These findings highlight the structural, operational, and financial disparities among RFSCAs across Indonesia. Building on the survey findings, several key factors were identified as constraints or enablers that affect institutional performance, as shown in Table 1. To further understand how these institutional factors interact and influence one another, the ISM method was applied as described in the next section.

ISM and MICMAC Analysis: Structural Drivers of Institutional Performance

Based on the survey results and expert consultation, 12 institutional elements were identified for ISM analysis. With 12 institutional elements, there are 66 possible pairwise relationships, and the final reachability matrix contains 48 validated directed relationships (excluding self-loops), representing approximately 36% of all possible interelement linkages. This level of connectivity indicates a moderately structured institutional system, allowing key driving and dependent elements to be identified without excessive model complexity. The final reachability matrix revealed an eight-level hierarchical structure, as shown in Figure 2. Budget allocation (E12) and standardization of tasks and functions (E1) emerged as the strongest foundational drivers. Essential operational supports — including human resources (E2, E3), equipment (E10), and vehicles (E11)—form the foundational capacity required for effective

Figure 2. Hierarchical Structure of Institutional Drivers Derived from Interpretive Structural Modelling (ISM) Analysis

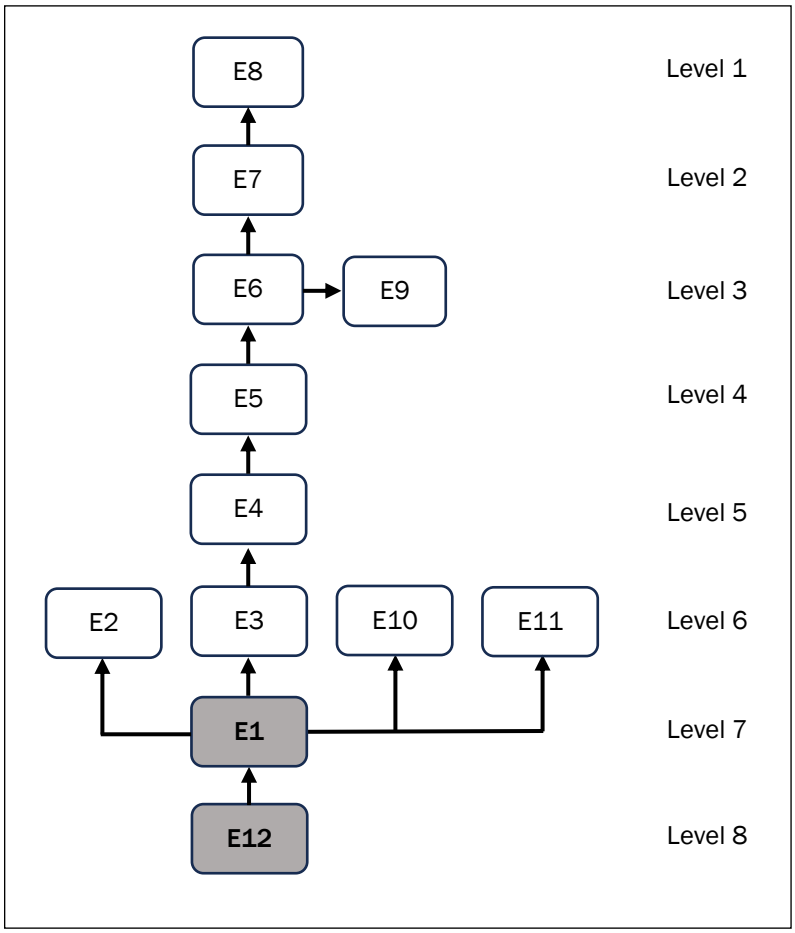


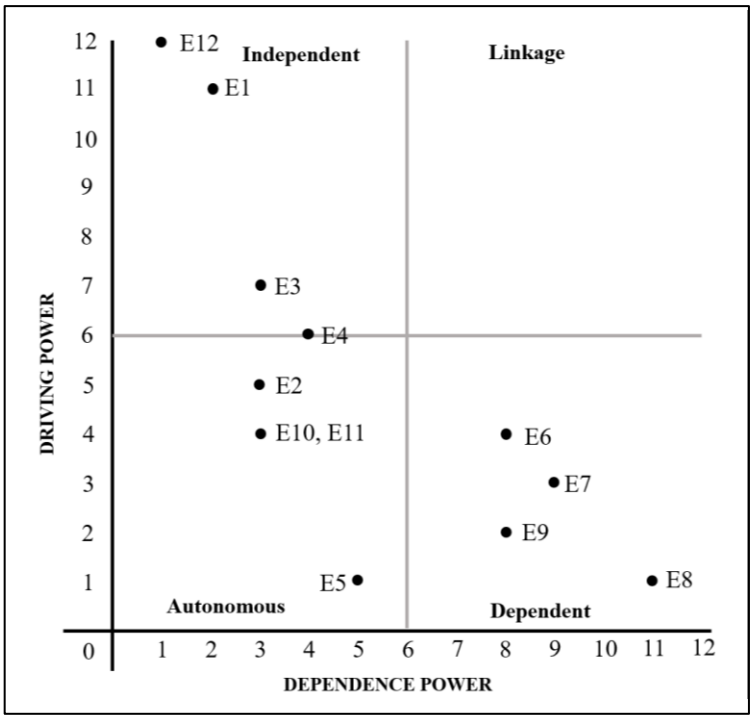
Table 1. Identification of Elements Influencing RFSCA Performance

Aspect	Code	Elements
Institutional	E1	Implementation of standardized duties and functions
Human Resources (HR)	E2	Number of human resources staff
	E3	Human resources competency
Food Safety Assurance Services	E4	Food safety assurance service standards
	E5	Accessibility of food safety information
Food Safety Supervision	E6	Sampling and testing
	E7	Follow-up actions on supervision results
Food Safety Capacity Building	E8	Food safety capacity-building activities
	E9	Evaluation of capacity-building activity effectiveness
Supporting Facilities	E10	Availability of food safety supervision equipment
	E11	Operational vehicles for food safety
Budget Support	E12	Amount of budget for food safety programs

implementation. Service quality (E4) is directly shaped by staff competency (E3), underscoring the critical role of human resources in determining operational standards. Information management (E5) facilitates transparency and informed decision-making. The interaction of sampling and testing (E6) influences the effectiveness of food safety coaching programs (E9). Level 2 is represented by follow-up actions based on supervision results (E7), emphasizing responsiveness within the system. At the highest level, sustained capacity-building activities such as training and coaching (E8) reflect the cumulative output of the institutional system. This finding suggests that operational factors depend heavily on institutional and budgetary readiness, confirming hierarchical interdependence within Indonesia's decentralized food safety governance system.

The MICMAC analysis (Figure 3) identifies budget allocation (E12) and standardized institutional mandate (E1) as dominant driving elements with high driving power and low dependence. This finding aligns with prior studies on food safety governance in decentralized systems, which emphasize fiscal capacity and legal clarity as foundational enablers of regulatory performance (Martins et al., 2024; Nayak & Jespersen, 2022). Strengthening these base-level drivers would have a cascading effect on human resource development, operational consistency, and ultimately, food safety assurance. Elements classified as dependent variables—such as E6, E7, E9, and E8—exhibit limited driving power but high dependence, indicating that they are outcomes of broader institutional arrangements. In the autonomous quadrant, there are four elements—namely number of human resources staff (E2), accessibility of food safety information (E5), availability of food safety monitoring equipment (E10), and food safety operational vehicles (E11). These elements have low driving and dependence values, indicating that they have little influence on the system as a whole and are also not significantly influenced by other elements. Nevertheless, the existence of autonomous elements is still necessary to support the operationalization of the system, and strengthening them should be a low priority. Interestingly, no elements were found to be in the linkage quadrant, which describes elements that have both high driving and dependence values. This indicates that the institutional system structure is relatively stable and there are no elements that are in a vulnerable (leverage-sensitive) position.

Figure 3. Summary of Driving and Dependence Power for Institutional Factors (Cross-Impact Matrix Multiplication Applied to Classification—MICMAC) Classification



Formulation of Institutional Strengthening Strategies

Based on the results of the ISM hierarchy diagram and MICMAC diagram mapping, the formulation of institutional strengthening strategies was carried out through a functional structural approach. An ISM hierarchy diagram provides an overview of the causal and hierarchical structure of the system elements. At the same time, MICMAC can be used to identify the strength of influence and interdependence between elements (P. Wu et al., 2023). The

combination of these two analyses enables the identification of key elements that function as primary drivers, operational supporters, and system output elements. These elements can then be grouped based on institutional functions, as shown in Table 2.

Based on the clustering and interrelationships of these elements, the institutional strengthening strategy was then formulated in a series of steps to represent clusters of interrelated institutional functions. These strategies represent actionable responses to the main driving elements identified in the model, particularly related to budget allocation, mandate standardization, and institutional coordination. The strategies are as follows:

1. Increasing budget allocation and regulations
2. Consolidating resources and infrastructure
3. Standardizating food safety assurance and monitoring services
4. Optimizing technical and evaluative functions
5. Building capacity for sustainable food safety

These strategies served as the basis for subsequent prioritization using BWM, determining the strategies' relative importance and urgency. Thus, the following analytical step quantifies the relative importance of these strategies to guide practical implementation priorities.

Strategy Prioritization Using the Best–Worst Method

Following the ISM analysis, the BWM was applied to prioritize strategies for institutional strengthening. The BWM analysis involved five expert respondents drawn from national regulators, including regional food safety authorities, and academic specialists, all of whom met predefined criteria of experience and institutional knowledge. Experts were asked to evaluate the strategies according to five criteria: regulatory and policy support (Zhang et al., 2022), resource availability (Phulkerd et al., 2016), impact on institutional performance (Maiberger & Sunmola, 2022), ease of implementation (Ibrahim & Baqutayan, 2024), and stakeholder involvement (Phulkerd et al., 2016). The resulting consistency ratio (CR) values for all expert judgments were below the acceptable threshold ($CR < 0.1$), indicating a high level of internal consistency in the pairwise comparisons. The results show that the impact on institutional performance and regulatory support received the highest weights, whereas ease of implementation and stakeholder involvement were rated lower. The complete results are shown in Table 3.

Building on the criteria weighting results, the five institutional strengthening strategies were evaluated against these criteria to identify their relative priority. As shown in Table 4, among the strategies evaluated, standardizing food safety assurance and monitoring services ranked as the top priority, followed by enhancement of budget allocation and regulatory, and sustainable food safety capacity-building programs. This demonstrates the role of standardization as a key factor that is aligned with regulatory support and has a direct impact on institutional performance. This strategy provides an essential foundation for ensuring the consistency, credibility, and effectiveness of food safety governance across the region. The consistency ratio ($CR < 0.1$) indicated reliable expert judgments. These findings suggest that institutional performance improvement relies on regulatory coherence and structured resource management.

Table 2. Clustering of Functions Based on Hierarchy and Cross-Impact Matrix Multiplication Applied to Classification (MICMAC) Analysis

Cluster	Function	Element
Structural	Main drivers of the system	E12, E1
Operational capacity	Operational enablers	E2, E3, E10, E11
Service process	System connectors	E4, E5
Technical and control	Control/evaluation mechanisms	E6, E7, E9
Outcome	System end goals	E8

Discussion

The findings reveal that institutional performance of RFSCA is shaped not only by resource availability but also by how governance functions are organized, standardized, and implemented across provinces. The discussion focuses on interpreting the structural relationships identified through the ISM and BWM analyses, particularly the roles of budget support, regulatory clarity, and service standardization in strengthening regional food safety governance in Indonesia's decentralized system.

Practical Implications of Institutional Drivers

Although the ISM–MICMAC results identified budget allocation and standardization of duties and functions as the most influential structural drivers, the BWM analysis prioritized the standardization of food safety assurance and supervision services as the top strategic action. This study emphasized that budget enhancement and regulatory reform, although crucial, require long-term political commitment and fiscal negotiations often beyond the direct authority of regional food safety agencies. In contrast, service standardization offers a practical and immediate pathway for improving institutional performance. Previous studies on food safety governance indicate that standardized inspection and supervision procedures help reduce implementation gaps across regions by improving consistency, accountability, and coordination, particularly in decentralized systems with uneven institutional capacity (Oñederra-Aramendi et al., 2023).

Through standardized inspection procedures, reporting templates, and risk-based supervision protocols, RFSCAs can transform existing resources—however limited—into more consistent and accountable operations. Standardization effectively converts structural readiness into functional performance by creating a shared operational language across provinces and facilitates better coordination on the national level.

This approach also enhances efficiency in resource use and strengthens the evidence base for future policy and budget advocacy. In this sense, service standardization is a systemic catalyst, bridging the gap between foundational drivers (funding and mandates) and operational outcomes (inspection, monitoring, and assurance). Empirical studies in decentralized contexts have highlighted that inconsistent implementation and standards undermine effectiveness and accountability, underscoring the value of service standardization as an actiona-

Table 3. Criteria Weights Based on Expert Judgments Using Best–Worst Method (BWM)

	Weight					
Criteria	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Average
1. Regulatory and policy support	0.26	0.34	0.48	0.44	0.15	**0.33**
2. Availability/capacity of resources	0.18	0.22	0.11	0.13	0.12	0.15
3. Impact on institutional performance	0.43	0.22	0.29	0.27	0.56	**0.35**
4. Ease of implementation	0.05	0.08	0.08	0.05	0.11	0.07
5. Stakeholder involvement and collaboration	0.07	0.15	0.04	0,11	0.05	0.08
Consistency Ratio (CR)	0.03	0.06	0.02	0.03	0.05	0.04

Table 4. Ranking of Institutional Strengthening Strategies Based on Best–Worst Method (BWM) Results

	Criteria Number					
Strategy	1	2	3	4	5	Total
1. Standardization of food safety assurance and monitoring services	2.67	0.77	2.90	0.46	0.34	7.14
2. Enhancement of budget allocation and regulatory	2.40	0.65	2.90	0.21	0.27	6.43
3. Sustainable food safety capacity-building programs	2.13	0.74	2.34	0.43	0.60	6.23
4. Optimizing technical and evaluative functions	2.26	0.80	2.20	0.47	0.32	6.06
5. Consolidating resources and infrastructure	1.99	0.65	2.41	0.31	0.29	5.65

ble mechanism to enhance institutional performance (Kang et al., 2022). By prioritizing standardization, regional agencies can deliver measurable governance outcomes for food safety while progressively building the institutional momentum needed for deeper regulatory and financial reforms.

Beyond their institutional implications, the identified structural drivers also carry significant community-level consequences. Weak budget support and unstandardized mandates not only limit the operational capacity of regional food safety authorities but also undermine the reliability of public food safety services on which local producers, traditional markets, and consumers depend. Conversely, strengthening these foundational elements can enhance the legitimacy of local institutions, improve trust in food safety oversight, and support more inclusive and resilient fresh food systems, particularly for small-scale actors and vulnerable communities that rely heavily on locally distributed fresh foods.

Practice Implementation of Strategies

Translating institutional strengthening strategies into practice requires a stepwise approach that aligns with the diverse capacities of regional food safety authorities. While the ISM–BWM analysis provides a structured understanding of strategic priorities, successful implementation depends on how these strategies are applied in daily practice.

The five priority strategies analyzed in this study do require a practical implementation roadmap that translates strategic intent into operational action. The implementation actions outlined in Table 5 were selected based on their practical feasibility, scalability across provinces, and potential to strengthen accountability within Indonesia's decentralized food safety governance system. The framework prioritizes measures that can be operationalized by regional food safety authorities using existing institutional arrangements, while also enabling coordination with

Table 5. Practical Implementation Framework for Institutional Strengthening Strategies

Strategy	Implementation Actions
Standardizing food safety assurance and monitoring services	• Develop and adopt template inspection SOPs and checklists across all provinces. • Establish a national reference guideline for risk-based inspection and sample collection. • Conduct inter-provincial peer reviews to ensure consistent interpretation of standards.
Enhancing budget allocation and regulations	• Define minimum budget thresholds for food safety programs in provincial planning documents. • Strengthen coordination with the National Food Agency for joint funding schemes. • Promote financial transparency through annual public reporting.
Building capacity for sustainable food safety programs	• Develop a structured training roadmap for inspectors, laboratory analysts, and educators. • Collaborate with universities, vocational institutions, and professional associations to deliver specialized modules. • Institutionalize mentoring and peer-learning initiatives between well-performing and developing regions.
Optimizing technical and evaluative functions	• Strengthen laboratory testing networks and ensure minimum testing capacity in every region. • Develop standardized inspection checklists and evaluation criteria for post-market surveillance. • Improve data management systems to enable evidence-based corrective and preventive measures.
Consolidating resources and infrastructure	• Develop shared-use laboratory facilities and mobile testing units for interregional access. • Optimize logistics, transportation, and communication equipment to support on-site inspections. • Encourage cross-sectoral resource sharing among food, agriculture, and health agencies.

national agencies and providing a clear basis for performance monitoring and evaluation.

In addition, these implementation actions are expected to improve the consistency, effectiveness, and accountability of food safety governance at the regional level. Standardized service procedures will enhance operational coherence across provinces, while strengthened budgetary coordination and capacity-building programs will support sustained institutional performance. Collectively, these measures will help translate foundational institutional drivers—such as mandates and funding—and can develop measurable governance outcomes, including more reliable inspections, improved monitoring, and stronger food safety assurance within a decentralized system. By adopting these steps, regional authorities can enhance accountability and resource efficiency in service delivery, risk management, and public trust. Building on these governance implications, the following section synthesizes the study's key conclusions and highlights its contributions to institutional food safety governance.

Conclusions

The analysis revealed that budget allocation (E12), regulatory mandate and standardization of duties and functions (E1), and institutional capacity–related elements constitute the fundamental structural drivers shaping the performance of regional food safety governance. Through a systems-based analytical approach integrating ISM and the BWM, this research identified five interrelated strategies that can be utilized to strengthen institutional performance. Among these, the standardization of food safety assurance and monitoring services was ranked as the highest priority, reflecting its role as an operational lever that enables regional authorities to translate formal mandates and limited resources into more consistent and risk-based supervision. In decentralized governance settings, service standardization provides an actionable mechanism to reduce implementation variability across jurisdictions, strengthen coordination between national and regional institutions, and enhance accountability—an observation consistent with findings from comparable food safety governance studies (Al Busaidi et al., 2025). Overall, this study offers a practical and transferable framework to inform policy design and institutional reform aimed at strengthening coherent, equitable, and resilient food safety governance in decentralized systems.

From a global perspective, strengthening institutional capacity for fresh food safety governance contributes directly to the achievement of Sustainable Development Goals, particularly SDG 2 (Zero Hunger) through safer food systems and SDG 3 (Good Health and Well-Being) by reducing foodborne risks (Department of Economic and Social Affairs, 2016). The Indonesian case offers transferable insights for other developing countries seeking to operationalize decentralized food safety governance while maintaining coherence, accountability, and system resilience.

This study places food safety governance within the broader functioning of local food systems, showing how institutional capacity shapes interactions among producers, markets, and public authorities. The findings help policymakers and food system actors align food safety strengthening efforts more closely with community-level priorities, including reliable fresh food distribution, trust in local markets, and locally grounded public service delivery. From this perspective, food safety governance operates as an enabling element of inclusive and resilient community food systems, rather than a stand-alone regulatory intervention.

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Farmers market manager networks for sustainability, support, and innovation

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Abstract

In most states, farmers markets function independently of each other and subsist on modest budgets. The groups and programs that bring independent farmers market managers together for education, collaboration, and sharing are often funded through government programs and grants. With increasing uncertainty of grant funding and government programs, alternative low-cost ways to sustain markets, mentor managers, and foster innovation in local food systems are needed. Business networks and clusters have been successful in other industries. To evaluate the potential of this type of network in mentoring, knowledge sharing, and facilitating collective fund development among farmers market managers, a study was conducted in three regions of Wisconsin. The study included the creation of regional network groups that collaborated on a market promotion project for the benefit of all network markets, utilizing a decision-making tool, the Purpose, Assessment, Tactics, Implementation (PATI) Framework. Overall, these networks were successful. Managers valued belonging to the network, successfully collaborated on regional projects, and intended to continue with the network once the study concluded.

Keywords

networks, clusters, farmers market, PATI Framework, organizational capacity

Introduction and Literature Review

Farmers markets are an important part of many U.S. communities, providing access to fresh local food, opportunities for small business start-ups, and community connections. In many urban and

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rural areas, people have limited access to grocery stores (Rhone, 2025) and limited economic/entrepreneurial opportunities (McGranahan & Beale, 2002). Farmers markets can provide both. However, many communities have limited economic resources to devote to developing and maintaining farmers markets. Where they exist, most operate with little or no budget for staff or infrastructure.

The threat to farmers market sustainability comes from multiple sources. Communities have more limited local tax bases, state-funded resources are being reduced, and federal funding has been sharply curtailed (Kirwan, 2025; Metz & Scherer, 2022; Sullivan, 2025). Reductions in federal funding of programs that support farmers markets include the elimination of nutrition education through the Supplemental Nutrition Assistance Program (SNAP), reduced funding levels for programs that support the purchase of local produce (SNAP, Farmers Market Senior Vouchers, and Farmers Market Women and Infant Children (WIC) vouchers), and the uncertainties involving federal grants that fund farmers market education, nutrition incentives, and rural development. Because farmers markets function as sources of healthy food, drivers of local economies, and community gathering spaces, alternative ways to sustain this valuable resource are urgently needed.

To help farmers markets survive, this study examined whether the formation of networks is a strategy that can help sustain markets while addressing manager needs. Because farmers market managers often have limited resources beyond their time and expertise, we chose to initiate regional networks designed to facilitate idea sharing, problem solving, and collaboration that would continue beyond the grant period without the need for external funding. This study served to bring market managers otherwise likely to continue working independently together into regional networks. Three regional farmers market manager networks were created to study the ability of regional networks to fulfill the goals of collaboration, sharing, and problem solving for farmers markets and market managers.

The network/cluster model was chosen for the initiative because its utility is well documented for businesses and other organizations. Its benefits include "opportunities for collaboration, knowledge, and resource sharing" (Beckie et al., 2012, p. 334). Networks speed up the diffusion of knowledge, including practices that are widely known, by providing information on costs and benefits of adoption at a greater level of detail and persuasiveness than other information sources (Brass et al., 2004). Network members share their firsthand experiences with project budgets, public engagement, preferred contractors, and potential challenges with each other, giving this information more significance and relevance than information gained from non-managers or those not familiar with the region.

Networks serve as more than a place for sharing ideas and practices. They also provide a vehicle for creating relationships and trust, connections that help managers feel more like a team and less like competitors. As well as being proximally located, knowledge diffusion is amplified by their similarity of social, organizational, and strategic characteristics. These similarities generally "ease communication, increase the predictability of behavior, and foster trust and reciprocity" (Brass et al., 2004, p. 796). It is through this process of "coordination and cooperation for mutual benefit" that organizations create trust and in turn social capital (Putnam, 1995, p. 67). As trust and social capital grow, so too does the willingness of members to exchange valuable knowledge grow (Tsai & Ghoshal, 1998). Social interactions and trust form the social infrastructure needed for knowledge exchange to take place and are the essential glue that holds clusters together (Porter, 1998); "only by being in the same local environment, and meeting repeatedly in person, can and will such more subtle forms of information be exchanged" (Bathelt et al., 2004, p. 32).

Creating an effective network is not simple. "Communities are fluid—always changing, adapting, growing; they are ready for different things at wholly different times" (Edwards et al., 2000, p. 293). Qualitative evidence suggests initiative implementation is influenced by several organizational and community readiness factors, including norms and beliefs, capacity, social capital, logistic factors, and sustainability issues (Freedman et al.,

2012). Although farmers markets may appear to be similar in mission, location, size, and products available, "each community may be at a different level of readiness and capacity to initiate community-based interventions" (Edwards et al., 2000, p. 293). Organizational and individual capacity are crucial factors in the success of a network. "Efforts by local people are likely to have the greatest and most sustainable impact on local programs and the setting of local norms. When community resources are tapped, efforts are more likely to be based on concepts and ideas that are ethnically and socially appropriate for that unique community" (Edwards et al., 2000, p. 292). Although the representatives of farmers markets are inherently local, network involvement from market leadership may come from a variety of roles and organization types, from the farmer acting as the market manager to the president of the local downtown business association. "Leaders are the core component of a community's capacity. They facilitate and give direction to the work of community organizations" (Chaskin et al., 2001, p. 27). Each network member brings a unique perspective.

The capacity of markets and the individuals that run them are also affected by external conditions. "Changes taking place at the industry level have repercussions at the organizational, work unit, and individual level and vice versa" (Brass et al. 2004, p. 808). Entities can affect the success of an initiative through whom takes part and their level of participation. Participation "can entail different levels of engagement, ranging from being informed, to being consulted, or even empowered to suggest solutions or choose among alternatives, with each level corresponding to the extent of the citizen's power in determining the end product" (Arnstein, 1969, p. 217). It has been found that "while often the program has been successful in getting funding to provide the intervention, if the community was not invested or accepting of the intervention, even good ideas were failures" (Edwards et al., 2000) p. 296). Sometimes leadership can help move a group toward readiness. "Competent leadership drives initiative success in achieving the desired vision. If community practitioners are to be effective at their work, becoming a capable leader and influencing others to do so is the most important intervention in increasing the likelihood that the local initiative will accomplish its goals" (Lempa et al., 2008, p. 314).

In this study, we look at the process of creating farmers market manager networks, their facilitation, member participation, and their value in developing relationships and skills for members of each network to evaluate their potential value for building individual and market capacity.

Research Setting

The state of Wisconsin was divided into four regions for this study (Figure 1). The northwestern part of the state did not participate in this project. The regions were delineated based on farmers market density, yielding a similar number of markets in each geographical area.

Unpublished data from a statewide survey (N = 174) in 2022 by University of Wisconsin-Madison Extension in cooperation with the Wisconsin Farmers Market Association (WFMA) provides an overview of the more than 300 farmers markets in the state. Half (50%) of the markets are run independently without external financial or administrative support. The remaining markets fall into four categories: 36% economic development associations (downtown business associations, chambers of commerce, or business improvement districts); 27% municipalities; 13% not-for-profits (external to the market); and 10% for-profit businesses. The remaining markets (14%) were not clearly categorized. Over half of the farmers markets have 35 or fewer vendors and charge less than US$100 to each vendor per market season.

Farmers markets in Wisconsin have struggled with high rates of manager turnover. Based on statewide farmers market surveys conducted by Extension in 2003 and 2018, the average market manager in Wisconsin has three to five years of experience. Few receive mentoring or legacy documents before taking on the role, and the majority are unpaid or poorly compensated. Most market managers are unpaid (59%) and of those who are paid, most receive US$15–25 per hour. In the transition, many markets are left to start from scratch and struggle with the expectations of vendors and customers for things to be the same as under the previous manager. Creating regional farmers mar-

ket networks, to allow for mentoring, support, and collaboration, may help to increase manager longevity and market sustainability.

Methods

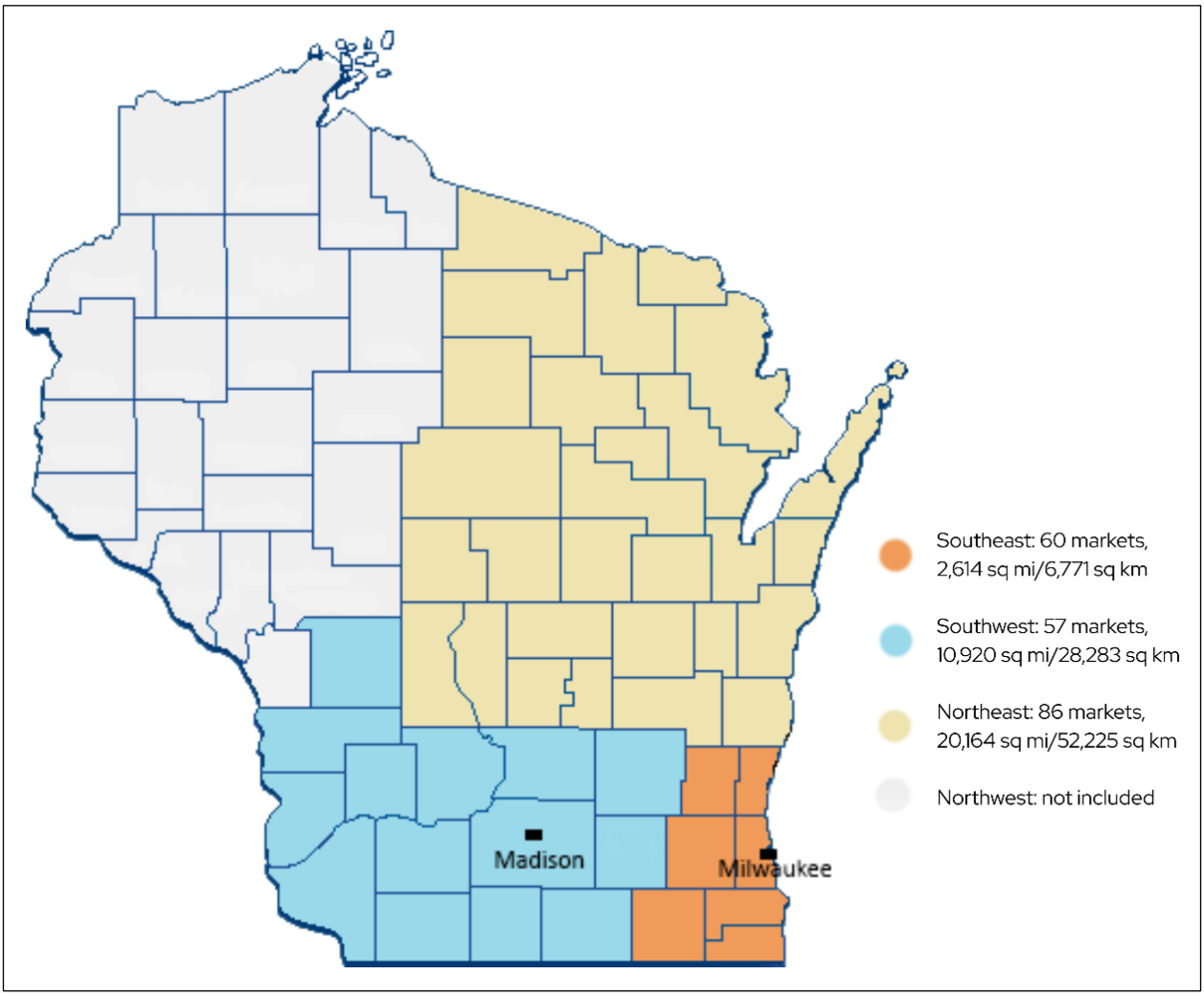
The Process of Creating Networks

Three farmers market manager coordinators were hired by Extension, using grant funding, and charged with updating the state's farmers market listings, conducting surveys, and facilitating regional farmers market networks. Each coordinator lived in the area being coordinated and had earlier experience with farmers markets, as a vendor, manager, or both.

To build the regional networks, coordinators were initially tasked with finding all farmers markets in their respective regions. The initial list provided by the WFMA included information for over 300 markets. Attempts were made to contact all farmers markets listed by phone, email, or in person. Additional markets were added to the list, and those not currently in operation were removed. During the update, each coordinator introduced themselves to the market manager, explained their role, and provided basic information about the creation of regional farmers market manager networks, the upcoming project, and its goals.

During the winter of 2022–2023, each farmers market coordinator hosted an in-person educational workshop for market managers in their region. These workshops included a presentation

Figure 1. Regional Boundaries for the Four Farmers Market Manager Networks



on the grant project and a discussion of the goals, expectations, and benefits of taking part in a regional network. A written synopsis and verbal explanation of the project were given to the market managers who expressed interest in learning more, and staff were available to answer questions. Coordinators also reached out to the managers in their region who did not attend the workshop.

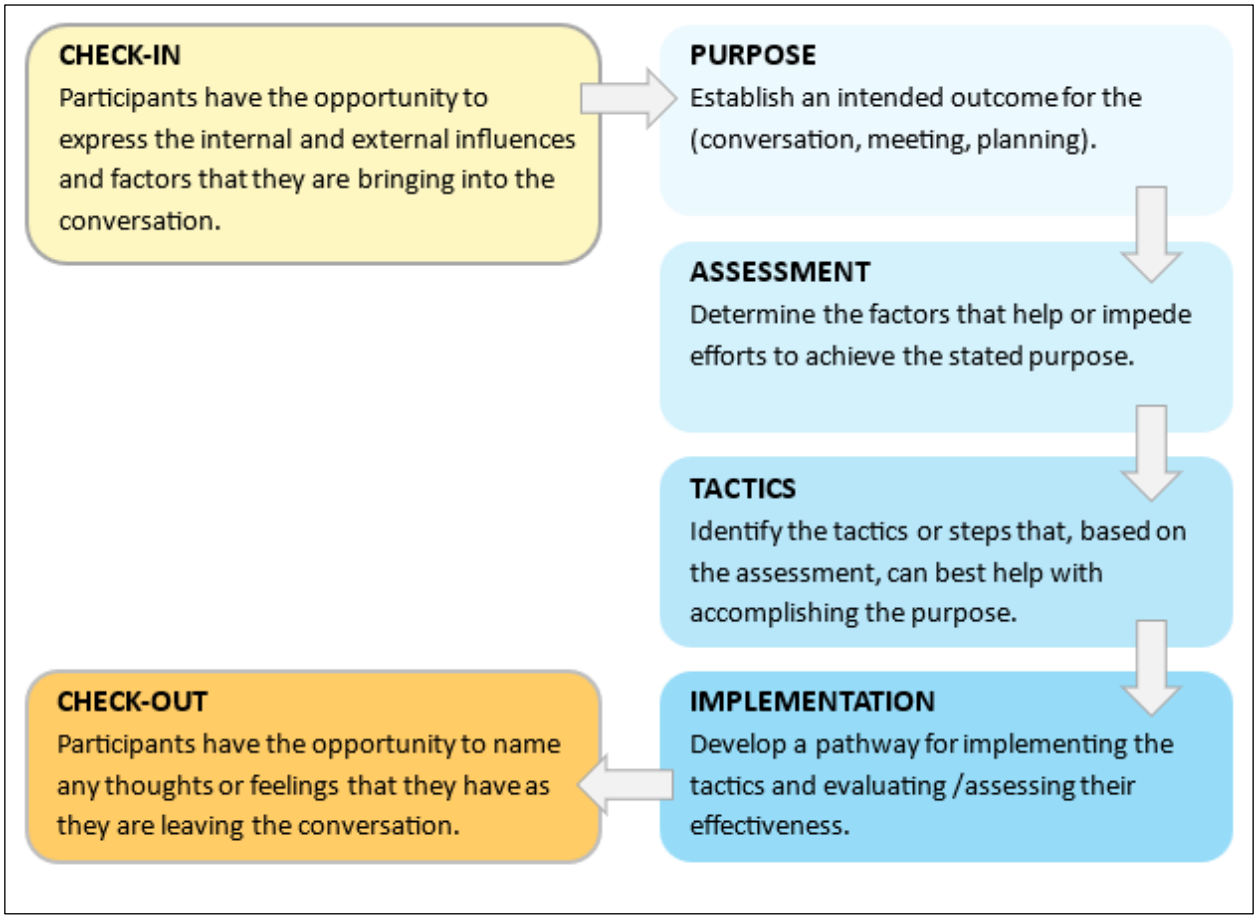
Farmers markets taking part in the study were required to collect data to fulfill the obligations of the grant funding. At a minimum, markets needed to identify the number and types of agricultural vendors at their markets, collect sales data for the agricultural producers (including value added) taking part in the market, and provide a minimum of two customer attendance counts per market season. Participating markets were required to collect this data for three years.

Once market networks were formed, coordinators met with manager groups to establish connections among the participants. The first phase of the project was helping managers with baseline data collection and entry. Then a group-needs assessment was conducted to help market managers find a common project on which managers in the network would collaborate with the goal of increasing vendor sales and customer counts at participating markets.

The Regional Network Project Process

The PATI (Purpose, Assessment, Tactics, Implementation) Framework (Figure 2), an organizational tool created by Dr. Annie Jones, University of Wisconsin Extension Organizational Developments and Tribal Nations Specialist (2020), was used by networks in deciding each group's project.

Figure 2. Steps of the PATI Framework (Created by Dr. Annie Jones, University of Wisconsin Division of Extension, 2020)



The PATI Framework was adapted from the Medicine Wheel logic model, which combines the traditional teachings of Indigenous communities with the planning and evaluation of the logic model, which is used to create a visual display of the relationships among resources, the activities you plan, and the changes or results you hope to achieve. This tool combines strengths from both of these models to provide a broad and comprehensive view of a program's components and endeavors to include input from all group participants. The simplicity, efficiency, and transparency of the tool make it easy for participants to follow.

Regional coordinators were trained in the facilitation of this tool and were provided with weekly troubleshooting check-in meetings to talk through individual network approaches and challenges. They were also provided with the support of a local Extension community development educator experienced in using the PATI Framework. The support educator attended the network meetings and helped with facilitation as requested by the coordinator. In addition to facilitating, coordinators taught network members the framework for use in future projects.

Using the PATI Framework, each network identified a collaborative project and was allocated up to US$12,000, with the potential of additional dollars being available in year two (pending actual grant expenditures). No funding could be used to pay market staff for routine or ongoing market efforts. To help market managers develop their grant-writing and budgeting skills, each market network developed a project description and two-year budget with the guidance of the regional coordinator. Each of the three networks chose a different project aimed at increasing visitor counts and vendor sales. The Southwest network chose a branded grassroots marketing campaign including recipe cards, social media marketing, and market-specific video development. The Southeast group developed a "Taste It Tent" at which each market encouraged healthy eating, promoted vendor products, and hosted cooking demonstrations. The Northeast network used a regional promotion strategy that used Saturday morning local television spots and print ads in regional publications to promote their network. Projects were reviewed for alignment with grant rules and feasibility. Once approved, networks were able to move forward with their projects.

Process Evaluation

One follow-up survey using Qualtrics was conducted for all participating markets in the three network regions during year two of the project. The farmers market manager or the person from the organization most engaged in the project was surveyed. (Not all respondents were engaged in the entire project.) The questions focused on the markets' experience with the PATI Framework process, their level of engagement, and the impact of their participation. Managers were not required to complete any individual question in the survey. The percentages listed are based on the number of managers that completed each question.

Results

Southwest Regional Network

The Southwest region included 57 farmers markets over 10,044 square miles (16,164 sq. km), of which nine joined the regional network, two in smaller urban areas and seven in areas classified as rural. Participating markets were widely distributed, their distance from each other ranging from 12–119 miles (19–192 km). All markets had a market manager who was paid as part of a more comprehensive position or was otherwise compensated for managing the market. There was an existing coalition of five farmers markets, all of which chose to take part in the study, in this region prior to the initiation of the grant. With the involvement of the coordinator, additional markets were recruited to be a part of the network.

Southeast Regional Network

The Southeast area of the state is overall more urban than the rest of the state. It includes the greater Milwaukee area, including extensive suburbs, and the Milwaukee-to-Chicago corridor, which is more densely populated than other areas of the state. It includes 60 farmers markets over 2,614 square miles (4,207 sq. km). Although this area has the greatest density of farmers markets, the network was composed of only four geograph-

ically clustered urban markets ranging in distance from one another by 6–32 mi (10–51 km). Initially, six markets had committed to participating; however, after the original coordinator left the position at the end of the first year, four of these markets decided not to take part. When the position was rehired, two new markets were recruited, bringing the network to four markets. Three of the four market managers were paid positions, and one was a volunteer.

Northeast Regional Network

The Northeast region of the state encompasses the largest geographical area, 21,040 square miles (33,861 sq. km). Markets were more geographically dispersed, with distances between markets ranging from 1–169 mi (1–272 km). This network was also the largest with 10 markets taking part, three in smaller urban areas and seven in rural areas. All managers in this network were paid. One of the locations hosts both a Sunday and a Wednesday farmers market; data was treated separately for these events.

The PATI Framework

Southwest Regional Network: Due to the distance between markets and the demands of different managers' obligations, they were unable to find time to meet in person. Therefore, this group of markets took part in the PATI Framework virtually. The group met three times to work toward a project consensus. Market managers in this group focused primarily on how their individual markets would benefit from the project and spent less time discussing ideas that would help all network markets. Multiple markets wanted the mini-grant funding (US$12,000 per network) to be divided up among the network markets to manage individually. One market manager expressed this perspective so strongly that it was difficult for all the managers' voices to be heard and considered. The regional coordinator continually brought the group back to the purpose of the network and the affiliated funding. After using various techniques to create a space where all managers' voices could be heard and they could focus on eligible projects, the process was shifted to an online survey in Qualtrics. Although this approach differed from the other groups, it was consistent with the PATI Framework. Valuable input was gathered in the survey from managers who had not voiced their ideas at earlier meetings. Once the survey results were collected and analyzed, the group was provided with the results, and another virtual meeting was held to discuss the results and decide the group project. The process resulted in a project that was quasi-collaborative, with managers creating common goals for their network marketing project that included the development of videos and shared promotional resources like recipe cards, but that used the resources independently in ways that suited each individual market best.

Southeast Regional Network: The proximity of the markets and the managers allowed for their PATI Framework process to be conducted in person. Although the group was made up of four individuals with strong initiative and leadership skills, the conversation was well balanced, with space for all managers to speak. The group arrived at a tentative consensus by the end of the first meeting with little help from the PATI facilitator or the regional coordinator. Once the group agreed to their network project, the creation of a "Taste It Tent" at each market, the members quickly moved on from their own individual ideas. They reconvened soon after to complete the plan and discuss responsibilities and options for individual market customization. Network members were able to tweak the project, with the input and consent of other network members, to meet the unique needs of their markets without drifting from the initial proposal concept. This group needed the least amount of guidance during the process and moved through the steps of the framework with little direction. They were able to voluntarily assume tasks related to the project in a balanced way that allowed the members to use their strengths (gathering information, writing, budgeting, organization) in preparing the grant proposal. Group members brought their contributions back to the group to review and submit. All group members remained engaged for all three years of the project and were involved in unified branding as the Southeast WI Farmers Market Collaborative.

Northeast Regional Network: The members of

this network met both in-person and virtually. Their first meeting (in-person) included introductions and an overview of the project. Network members had a chance to meet the other managers and engage in conversation in advance of introducing the PATI Framework. Managers were asked to consider possible project ideas before the next meeting. At the next meeting, held virtually, the framework was explained and the process started. The farmers market coordinator and the educator supporting the facilitation of the PATI Framework both played a significant part in the process. This group met three times to identify their project, once in person and twice virtually, with not all members able to attend every meeting. Ultimately, this group decided to pursue a regional marketing campaign to increase vendor sales and the number of market attendees. Network markets were featured on Saturday morning newscasts for the area and print advertisements in regional local food-focused publications.

Follow-Up Evaluation Survey

Of the 23 farmers markets that took part in the three networks, 17 returned the survey, which included 11 questions (Table 1). Of the six farmers markets that did not return the survey, four were under new management that no longer wished to be involved in the project, and two failed to return any communication via email or by phone during the final months of project funding. The number of respondents for each question ranges from 15–17. The categories of *strongly agree* and *somewhat agree* were considered positive responses for the analysis and *somewhat disagree* and *strongly disagree* were considered negative responses.

Overall, market managers believed the PATI Framework was useful in helping the managers determine the group projects (88%) and that the process (86%) and the decisions made (88%) as a result of the process were both manager-led. The perceived value of the Extension facilitator ranged widely, with 62% of managers agreeing that the person's involvement was helpful, 19% neither agreed or disagreed, and 19% didn't know. The facilitator's role varied substantially from one regional group to another. The Southeast group requested minor support from their facilitator, and the Southwest and Northeast facilitators were substantially involved in the decision-making process. Some managers surveyed, however, were not present for one or more meetings where the PATI Framework was used.

Comments on the process included:

Table 1. Model Effectiveness and Facilitation Manager Survey Results

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	I Don't Know
The PATI Framework was useful in helping to determine our group's project.	8 (50%)	6 (38%)	1 (6%)	0 (0%)	0 (0%)	1 (6%)
I had the opportunity to share my ideas with the group during these planning sessions.	11 (69%)	4 (25%)	0 (0%)	0 (0%)	0 (0%)	1 (6%)
The farmers market managers led the direction of the discussion.	11 (73%)	2 (13%)	0 (0%)	1 (7%)	0 (0%)	1 (7%)
My Outreach Coordinator was effective in facilitating these discussions.	13 (76%)	3 (18%)	0 (0%)	0 (0%)	0 (0%)	1 (6%)
The person assisting facilitation was helpful in the process.	5 (31%)	5 (31%)	3 (19%)	0 (0%)	0 (0%)	3 (19%)
At the time it was selected, I felt the project would be valuable to my market.	10 (63%)	5 (31%)	0 (0%)	0 (0%)	0 (0%)	1 (6%)
There was a group consensus among managers when the final mini grant project was chosen.	12 (75%)	2 (13%)	1 (6%)	0 (0%)	0 (0%)	1 (6%)

> It was great to meet other community representatives and work together. While we were in different locations, with different needs, we were able to have consensus.
>
> The facilitator really struggled with our group. We were too different in market needs and geography. We had one manager that just spoke over everyone, and the group seemed to go around and around.

Another metric measured was engagement (Table 2). Three questions were asked about the market manager's participation in writing the proposal. Most managers took part in one or more aspects of the process (69% proposal writing, 88% gathering information for the proposal, and 75% engaging in budget creating).

Because the managers were not paid by the grant for their time, questions were asked to evaluate how they valued their time spent taking part in the project (Table 3). Most managers responded that the process and project were a good use of their time (65% strongly agree, 25% somewhat agree). The survey also asked if the project was valuable to their market, vendors, and customers. Most managers responded that they strongly agreed (69% market, 69% vendors, and 69% customers).

The likelihood of managers because of this experience engaging in the future with other managers or organizations without assured funding was also measured (Table 4). Managers either strongly or somewhat agreed that they are likely to take part in future collaborations with other farmers markets (100%), start a project with other farmers markets (88%), or apply for grant funding for their market or a group of markets (94%). Managers also said that because of their experience with the regional network, they were likely to continue collecting data about their market (94%) and reach out to other market managers for information or advice in the future (94%).

Table 2. Manager Engagement Survey Results

	Helped/contributed to this effort.	Did not participate in this part of the proposal.
How did you help in writing the mini-grant proposal?	11 (69%)	5 (31%)
How did you help gather information?	14 (88%)	2 (12%)
How did you assist in creating the budget for the proposal?	12 (75%)	4 (25%)

Table 3. Perceived Benefits Manager Survey Results

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	I Don't Know
The project coordinator supported my efforts during the project.	15 (94%)	0 (0%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)
The project was beneficial to my market.	11 (69%)	4 (25%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)
The project benefited my market vendors.	11 (69%)	3 (19%)	1 (6%)	0 (0%)	0 (0%)	1 (6%)
The project benefited my market customers.	11 (69%)	2 (13%)	1 (6%)	0 (0%)	0 (0%)	2 (13%)
My participation in the project was a good use of my time.	11 (69%)	4 (25%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)

Discussion

Farmers markets in Wisconsin traditionally have not been well resourced. Most get by using donations, sponsorships, and vendor fees to fund a complex and vital operation that spurs economic development, increases access to healthy food, and builds community. In some areas of the state, markets are supported through local government and not-for-profit agencies. However, as local, state, and federal government budgets shrink and grants become less available, the support structure in place for farmers markets weakens (Kirwan, 2025; Metz & Scherer, 2022; Sullivan, 2025). In lieu of adequate external funding, increased capacity and support must come from within the farmers market, local food, and food access communities.

As an example of developing internal support, this study sought funding to explore the value of creating regional farmers market networks. Research has shown the value of fostering collaborative relationships among managers. Dollahite et al. (2005) found that "prior to the collaboration initiative, stakeholders worked either in isolation or in one-on-one partnerships. As a result, there was little or no capacity-building among partners or within communities. 'Protecting one's turf' sometimes stood in the way of innovative strategies to address barriers to farmers markets and to other community food security issues" (p. 351).

The goal of creating networks was to help markets connect and set up persistent groups of market managers that would serve as a knowledge resource, support group, and collaborative space for managers, as a network "provides a constructive and efficient forum for dialogue" (Porter, 2000, p. 18). New managers could cycle in as others left, creating continuity and consistency for farmers markets, which would be especially valuable in Wisconsin due to the high rate of manager turnover. However, Campbell (2010) found that bringing people to the table is essential, but not quite enough; diverse sets of stakeholders are more likely to get and stay involved if they find a supportive environment that allows them to influence the process from the beginning, by contributing to setting goals and agendas.

With this understanding, the initiative included funding for each network to engage in a joint project that would benefit all markets in the network. The purpose of these endeavors was to help build the skills of the managers in the network to work together to seek funding and create initiatives. The best solution, arguably, is to envisage arrangements that guarantee some immediate impact within a long-term strategy, because the short-term benefits help reassure and motivate participants and increase trust in the process while the long-term approach makes it possible to develop effective (citizen) involvement (Agranoff, 2006). By working together and replicating their work at multiple markets, managers would not have to complete the work alone. They would share skills, allowing managers to use their strengths and lean on other managers to compensate for their deficits. By

Table 4. Expected Future Network Participation Manager Survey

	Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree	I Don't Know
Participate in future projects involving multiple farmers markets.	11 (69%)	5 (31%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Initiate a project with multiple markets.	10 (63%)	4 (25%)	2 (13%)	0 (0%)	0 (0%)	0 (0%)
Apply for grant funding for your market or a group of markets.	9 (56%)	6 (38%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)
Contact other market managers for information or advice.	12 (75%)	3 (19%)	1 (6%)	0 (0%)	0 (0%)	0 (0%)
Adopt or continue collecting data about the market.	12 (71%)	3 (18%)	2 (12%)	0 (0%)	0 (0%)	0 (0%)
Apply the things that I have learned in other areas.	11 (69%)	5 (31%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

learning a process for group decision making and taking part in bringing a project to fruition, managers would experience the value of the network and continue the collaborative work into the future without external prompting or support.

Once farmers markets decided that they had the capacity to fulfill the grant reporting requirements, regional coordinators began building relationships with the managers and between them through virtual and in-person meetings. The value of the initial meetings of introduction was to help participants to see that they "share many common needs, opportunities, constraints, and obstacles to productivity" because the "extent to which participants see themselves benefitting from working collaboratively toward a common goal is crucial to formation and development" (Porter, 2000, p. 32).

Various processes were considered for determining projects. Research has shown that a "structured approach to decision making is essential to facilitate inclusion, thus improving the chances of a more systematic impact" (Ianniello et al., 2019, p. 35) and that the process design is critical for the success of participation, particularly in relation to the choice of implementation tools of dialogue and the dynamics of involvement; confused definitions of engagement mechanisms and little understanding of the advantages and disadvantages of different methods may jeopardize the outcome of the participation initiative (Yang & Pandey, 2011). The PATI Framework was chosen for its simplicity, transparency, and focus on having all voices heard. Having originated within the organization and been used successfully for 15 years meant that Extension had experienced facilitators to support the framework. The process was also an efficient method of reaching group consensus in deciding upon the network project while prioritizing that all manager voices were heard. As farmers market managers have many obligations, it was important that the process was perceived to be a valuable use of their time.

The value of the regional network groups was evaluated at the end of the grants funding period. (With the high turnover rate of managers in Wisconsin, collecting the survey data while the managers that took part in the project remained in their positions was a priority.) In the follow-up survey, market managers responded favorably to the PATI Framework. Although one regional group encountered some difficulties, most managers were supportive of the coordinators and facilitators of the PATI Framework and the determination of the network project. The process allowed for the flexibility of engaging market managers in diverse ways, allowing for the use of an online survey when conversations were ineffective.

It was also important that the market managers felt ownership of the project and its results, because "shared goals represent the degree to which the network members share a common understanding and approach to the achievement of tasks and results" (Inkpen & Tsang, 2005, p. 153). Managers responded that they believed strongly or very strongly that the managers led the discussion, had the opportunity to share their thoughts during the discussions, and that the group had reached a joint decision when choosing the network project.

Once the group projects were identified, the regional coordinator guided the writing and submission of the network's proposal and budget. This step was an informal indication of each market manager's engagement in the project. Morton and Tobias (1997) found that the first impediment to success was that not all stakeholders were interested in taking part, and "having all interested and affected stakeholders involved in a dependable partnership, committed in time and effort, is essential for true collaboration and innovative outcomes" (Dollahite et al., 2005, p. 352). The network survey found that most managers took part in one or more aspects of preparing the proposal, including gathering information, proposal writing, and budgeting. The impact of the network projects was also positive. Market managers felt that their participation was an effective use of time and that there was a positive impact on their market, vendors, and customers.

All managers taking part in the survey indicated that they were likely to remain engaged with the network after the completion of the project. They also gained skills from this process that they plan to use in the future. Although all groups successfully completed their projects, the strength of the network and their future capacity for independence varied. Trust is a vital part of sustaining a

functional network. Multiple studies have highlighted its value: "closed networks, where direct ties are also tied to each other generate trust" (Brass et al., 2004, p. 805) and "trust plays a key role in the willingness of actors in the network to transfer confidential knowledge" (Garcia-Villaverde et al., 2018, p. 536). Trust engenders the sharing of knowledge, which makes membership in a network valuable.

Trust was built to a different extent within each group. The smallest, the Southeast Regional Network, was the most successful. Some of their success in creating an effective network and project is because of the trusting relationships that were created. Hermans et al. (2017) argues that "through social interactions, individuals exchange information, communicate with each other over network channels, and create new knowledge that can culminate into innovation" (p. 4). The four markets in the Southeast regional network were urban, geographically close, and interacted with each other regularly with ease, including occasional social gatherings. Network diffusion is amplified by the similarity of social, organizational, or strategic characteristics of organizations because the managers in adopting organizations see similar organizations as more relevant and easier to learn from (Ahuja & Katila, 2001). They were also able to reach a higher level of mutuality, consistent with the finding that "when compared to the group exhibiting coordination (the lowest degree of collaboration) [a] group exhibited more confidence, reported increased confidence, reported trust among partners, seemed energized by each success, and clearly aspired to greater achievement" (Dollahite et al., 2005, p. 351).

Less cohesiveness and comradery were seen in the other regional groups, perhaps due to network size and geography. The Northeast and Southwest groups were further apart and met as a group primarily through virtual meetings. The ability of these groups to form a trust-based "closed network" was not helped by using virtual and individual manager meetings to the same extent that the Southeast group relied on small in-person group meetings. As networks persist, more manager-to-manager connections may form and increase trust to build a more sustainable and functional network.

The extent to which each group was coached, rather than supported or led, by their regional coordinator also varied. This position was developed to connect network managers for mutual support and to facilitate manager skills and confidence in seeking, applying for, and managing outside funding. Regional coordinators from Southwest Regional Network and Northeast regional network met more often individually with market managers to provide individual coaching and troubleshooting for customer counts, sales data collection, and entry. The development of this relationship, rather than relationships with other network members, positioned the coordinator as a resource person instead of a coach. This limited the transfer of knowledge within the group and the building of skills to foster independence. Instead of making the need for a coordinator obsolete, it created dependency. Upon completion of the grant, the network was expected to continue to function for the good of the members without externally funded staff. However, the type of support provided by the coordinators for these two regions motivated desire by the coordinator and the network members to find continued funding for these positions, consistent with the finding that "if community practitioners are to be effective in their work, becoming a capable leader and influencing others to do so is the most important intervention to increase the likelihood that the local initiative will accomplish its goals" (Lempa et al., 2008, p. 314). However, "underperforming clusters have a chronic need for support" (Giuliani et al., 2019, p. 152).

Overall, the use of farmers market manager networks shows potential to create a level of regional farmers market self-sufficiency. Most managers engaged in this project, including those who are volunteers, thought that even with many other job responsibilities, their time was well spent. Managers were able to build their skills and their confidence in working collaboratively with other markets and see the value of continuing to work with the network in the future. They also found value in the connections made and viewed other managers as resources that they could continue to utilize. The initial creation and mentoring of these networks has been a key part of their empower-

ment. Without help, it is unlikely that manager networks will come together on their own to fulfill this role. Allocating funding and mentoring the initial formation of manager networks has up-front costs but may reduce some of the dependence on long-term external funding.

The ability of the Southwest regional network and Northeast regional network groups to persist without coordinator support is yet unknown. Managers in both groups indicated that they intended to continue but no future meetings are currently scheduled. However, the Southeast regional network continues to thrive, having added members and embarked on a new regional initiative to increase farmers market sales with private business-funded gift certificates. Additional follow-up with network members will be done to evaluate the persistence and evolution of these groups one year after the original survey, when the value of other surveys will be assessed.

To optimize the potential and value of regional networks, more research is needed. For Wisconsin, the mentoring of managers and relationships that takes place in networks is an important focus. Will the support of a community of managers help to increase manager tenure? Additionally, assessing the value of in-person versus virtual meetings in creating trust and facilitating resource sharing among farmers markets is needed. This work would include assessing the proportion of in-person/virtual meetings recommended to optimize network functioning. Further investigating the value of grouping markets into networks by size, market structure or funding model (e.g., municipal or stand-alone) may also help find ways to increase network effectiveness. Ultimately, the goal is to improve the sustainability of support, capacity and success of farmers market managers to better aid farmers markets and local agriculture, and the communities they serve.



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Agri-food entrepreneurs' perceptions of the infrastructure to support their business: A West of Ireland analysis

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Abstract

Supporting the growth of rural agri-food entrepreneurs requires a clear understanding of the specific supports they need to succeed. The purpose of this study was to gain insight into the infrastructure supporting agri-food entrepreneurs situated rurally in the West of Ireland, and their perception of this infrastructure. Twenty-nine participants (n = 18 women; n = 11 males) took part in five separate focus group discussions. The discussions were guided by a semi-structured interview framework, and the resulting transcripts underwent thematic analysis. Three main themes were identified: (1) Financial Supports: (a) government funding and (b) insufficient and inaccessible funds; (2) Supportive Resources: (a) networking, mentoring, and training, and (b) isolating work environment; and (3) Social Supports: (a) online support groups and (b) perceptions from peers. The findings provide an understanding of the factors influencing entrepreneurial activity and will assist policymakers in the development and adaptation of the necessary supports.

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The authors declare that there are no conflicts of interest.

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Keywords
entrepreneurship, agri-food, infrastructure, resources, rural living, perceptions, rural entrepreneurship

Introduction and Literature Review

Although research into entrepreneurship has increased in recent decades, the existing body of literature is heavily oriented towards urban entrepreneurship and often overlooks those situated in rural areas (Masoomi et al., 2024). Across European Union (EU) countries, rural regions, such as the West of Ireland, account for approximately 83% of total EU territory and 30% of the total EU population (Council of the European Union, 2023; European Commission, 2024). Entrepreneurial activity supports rural economic development and creates a more sustainable livelihood for communities, particularly in developing areas (Pan et al., 2024). The success of such endeavours is heavily reliant on factors such as surrounding infrastructure, institutional frameworks, and governance bodies (Gyimah & Lussier, 2021; Hou et al., 2023).

Rural agri-food entrepreneurship plays a central role in sustaining local food systems, strengthening rural economies, and supporting community resilience in the West of Ireland. The region is characterized by dispersed settlements, reliance on small-scale food producers, and a strong cultural identity tied to local food traditions. These enterprises often operate with limited access to physical infrastructure, digital connectivity, specialist training, and financial support. Understanding the specific infrastructural needs of agri-food entrepreneurs is therefore essential, as their success directly affects local employment, food availability, and the vibrancy of rural communities. In this study, the term "infrastructure" refers to the constellation of supports surrounding entrepreneurs, including financial instruments, digital and informational resources, mentoring and training opportunities, and broader institutional and social environments. While built and logistical infrastructure (e.g., transport, storage, processing facilities) is recognized as important for agri-food systems, the focus for this study is on the social, institutional, and digital supports most described by participants.

According to Hoogendoorn et al. (2019), a perceived lack of financial support as well as a high degree of complexity in associated administrative procedures hamper entrepreneurial activity. In an investigation comparing the perceived barriers to entrepreneurship in Eastern versus Western European countries, Iakovleva et al. (2014) noted that the view of the lack of access to adequate finances was consistently one of the most influential barriers affecting entrepreneurial activity regardless of location. Further supporting this, previous research has shown that having a financially supportive economy is positively correlated to an active entrepreneurial ecosystem (Sharma et al., 2023).

Throughout Europe, a lack of relevant skills has also been cited as one of the most influential barriers hindering entrepreneurial activity (Iakovleva et al., 2014). Working toward overcoming this issue, mentorship programs provide entrepreneurs with the skills and information both to physically develop their business and psychologically improve their entrepreneurial resistance (St-Jean, 2021). Though evidence shows that entrepreneurial education and training have an overall positive effect on entrepreneurial activity, some research suggests that partaking in these programs may negatively influence such activity, possibly due to its highlighting of common setbacks experienced throughout the entrepreneurial processes (Bhatt 2021; Gómez-Araujo & Bayón, 2017). Integrating entrepreneurial role models, particularly women, into these programs has been recommended as a method to inspire and motivate individuals at the early stages of their endeavour while simultaneously combating the gender stereotype associated with entrepreneurship (GEM, 2023). Conversely, previous research suggests that the absence of entrepreneurial role models may act as an institutional barrier to rural entrepreneurship (Lafuente et al., 2012).

Location can have a significant impact on entrepreneurial activity due to the relative difference in availability of supportive resources and infrastructure between urban and rurally located entrepreneurs. For example, the average distance necessary to access essential services is 3.5km (2.2 miles) for urban individuals compared to 21.5km (13.4 miles) for those in rural areas (European Commission, 2024). Also hindering rural entrepre-

neurship is limited access to fast and reliable broadband connections (>30Mbps), with only 60% of rural areas having such access compared to 86% of the entire EU population (Augère-Graniar & McEldowney, 2021). Proposed by the European Commission in 2018, the post-2020 Common Agricultural Policy (CAP) "Next Generation EU" recovery plan commits to repairing a post-COVID economy and supporting the development of a more resilient EU. Included in this legislative proposal is increased rural development support with a shift from a one-size-fits-all to a tailor-made approach. This aims to promote and support the growth of rural employment, the development of rural areas, and to attract young people to farming. In 2021, the European Commission released a consultation factual summary that defined the most urgent issues in relation to the infrastructure of rural areas. These include public transport, access to public services, availability of quality education, access to vocational training opportunities, and addressing demographic challenges such as depopulation and gender inequality (European Commission, 2021). In Ireland, entrepreneurs can access support at both national and regional levels, with Irish regions split into counties. These counties have their own councils composed of elected individuals who are involved in policymaking procedures and developing services within their allocated boundaries (Department of Rural and Community Development, 2024). Three of the leading entrepreneurial support programs across Ireland are New Frontiers, Empower, and Accelerating the Creation of Rural Nascent Start-ups (ACORNS). New Frontiers is aimed at first-time founders and offers support such as mentoring, training, and funding across 18 locations in the Republic of Ireland (Enterprise Ireland, n.d.). Funded by the Department of Children, Equality, Disability, Integration and Youth alongside the European Social Fund Agency, Empower is a free entrepreneurial program for women aimed at supporting individuals in Irish-speaking regions and is funded by two Irish universities (Empowerprogramme.ie, n.d.). Similarly, the ACORNS program looks to support early-stage women entrepreneurs living in rural Ireland and gives participants the opportunity to partake in round table discussions facilitated by successful women entrepreneurs in rural Ireland (ACORNS, n.d.).

The relationships surrounding entrepreneurs and the degree of support or discouragement perceived within these interactions can influence entrepreneurial activity both positively and negatively, particularly during the early developmental stages of a venture (Bohlayer & Gielnik, 2023). Such relationships can impact entrepreneurs' self-efficacy, defined as the belief in one's capacity to initiate and successfully execute entrepreneurial actions (Bandura, 1977). This self-efficacy, in turn, influences thought, affects motivation and action (Bandura, 1991). Understanding the dual role of supportive and unsupportive relationships is essential for interpreting how entrepreneurs navigate challenges within their wider ecosystem. Bohlayer and Gielnik (2023), in their investigation of how training programs shape self-efficacy, emphasised the need for a more granular approach to fully capture the potential negative consequences associated with participating in such training.

Despite increasing attention to entrepreneurship in rural regions, limited qualitative research has examined how agri-food entrepreneurs perceive the infrastructure surrounding their work. To address this gap, the aim of this study was to examine the ways in which agri-food entrepreneurs located in the West of Ireland perceive, interpret, and engage with the various supports available to them. Specifically, the study explored how agri-food entrepreneurs perceive financial, resource-related, and social infrastructure, and how these perceptions influence their entrepreneurial activity.

Applied Research Methods

A qualitative research methodology was adopted to examine how rural agri-food entrepreneurs perceive and experience the infrastructural supports available to them in the West of Ireland. The study utilized semi-structured focus group discussions to generate rich, experience-based data, which were subsequently analysed using reflexive thematic analysis.

Study Design

Five separate, semi-structured focus group discussions were conducted with agri-food entrepreneurs

located in rural areas of the West of Ireland. The purpose of these discussions was to elicit participants' perceptions of the infrastructural supports shaping their entrepreneurial activity. The focus groups followed a discussion protocol designed to explore experiences with financial supports, access to training and mentoring, infrastructural and operational challenges, and social or community support. The focus groups were held in person, lasted for approximately one hour, were audio-recorded, and anonymised to protect participant identities.

Participants

A total of 29 entrepreneurs participated across the five focus groups (n = 18 women; n = 11 men). Recruitment was conducted through targeted invitations to entrepreneurs involved in the Empower and New Frontiers programs. A participant information sheet outlining the objectives of the study and eligibility criteria was circulated in advance. Participants were eligible to partake in the study if they were (1) currently operating an agri-food business; (2) were in the early stages of their venture (0–5 years); and (3) were located in a rural area in the West of Ireland. The sample represented a diverse range of agri-food activities, including small-scale food producers, artisanal food manufacturers, primary producers with value-added products, and food tourism enterprises. Following confirmation of eligibility, participants received additional information on the study, confidentiality, and data management strategies, and informed consent was obtained before data collection. Ethical approval for this study was granted by the Research Sub-Committee of the Academic Council of the Atlantic Technological University (ATURSC_AC_23062020).

Data Analysis

Data weas collected through semi-structured discussions from each of the five focus groups. The data was transcribed and analyzed using reflexive thematic analysis as outlined by Braun and Clarke (2022; also Clarke et al., 2015). A pre-specified framework of analysis was used in this research, with semantic coding prioritized over latent coding. First, transcripts were produced, and the research team familiarized themselves with the data. Second, recurring ideas, experiences, and patterns were identified. Third, segments of text capturing core meanings were coded, and these codes informed preliminary sub-themes, which were discussed and agreed upon within the research team. In the fourth phase, related codes were organized into coherent themes that reflected meaningful patterns in relation to the research questions. Fifth, the themes were reviewed and refined to strengthen conceptual clarity and interpretive depth. Finally, in the sixth phase, the research team developed a conceptual model capturing the relationships between themes and sub-themes, providing an integrative representation of participants' perceptions of the infrastructural supports available to them (Table 1).

Results

Twenty-nine participants (n = 11 male; n = 18 women) took part in the focus group discussions. All participants were in the early stages of their business venture (within 0–5 years). Participants represented a diverse range of agri-food activities, including bakeries, farm-based value-added production, locally focused food services, and food tourism initiatives. This diversity reflects the multifaceted nature of rural agri-food enterprise in the region. The central themes identified (financial supports, supportive resources, and social supports) included both positive and negative opinions regarding the current infrastructure and supports available to the agri-food entrepreneurs in the West of Ireland. These main themes were further subdivided into sub-themes (Table 1).

Theme 1: Financial Support

The first identified theme, financial supports, provides an insight into the financial aid agri-food entrepreneurs situated in the West of Ireland are aware of and their perception of such support.

Government Funding

Participants spoke positively about some of the financial supports available, including a tax-free allowance of up to €15,000 offered by New Frontiers, Ireland's national entrepreneur development program. They considered the allowance as an incentive, enabling individuals to take advantage of

the host of benefits it offers, such as training modules and networking opportunities.

Participants also spoke positively about accessing funding specifically for their rural location. This may be available through Enterprise Ireland (a government agency) or, in some cases, from the local (County) Council. Participants were pleased to see the Irish government supporting their rural economies through funding to create and support a diverse employment opportunities in small communities. However, they felt a need for "more government funding available for those areas to create jobs and so on" (P14). Issues in their areas, such as poor broadband quality, were considered costly for entrepreneurs. Participants felt that the new funding available was an active response to the government's recognition of these location-specific challenges.

Insufficient and Inaccessible Funds

It was clear that, although entrepreneurs appreciated the financial support they received, they felt that overall, the degree of this support was insufficient and oftentimes difficult to access. Multiple entrepreneurs described their struggles in finding information on the financial support available to them and expressed their desire for a central repository that collates such information in an easily accessible and time-efficient manner. With regards to the funding that the entrepreneurs are aware of, they expressed that the amount of time spent completing such applications greatly outweighs the resulting financial assistance they may potentially receive if their application is successful: "the rate you'd want to be paying yourself at to do the application negates the value of the funding you get at the end of it" (P22).

Many agreed that they would be "better off" working for their business and generating the profit from something that is "more sustainable" than trawling through the application processes for the majority of financial supports available. In addition, entrepreneurs felt that the eligibility criteria were frequently overly specific, leaving applicants continuously required to adapt their business plans to ensure eligibility.

Financial supports were also viewed as disproportionately directed toward businesses with high

Table 1. Developed Themes, Sub-Themes, Orientation, Description, and Representation

Theme	Sub-theme	Orientation	Description	Representativeness*
Financial Supports	Government Funding	Positive	Government and regional supports (e.g., rural grants, enterprise programmes) were viewed as helpful in enabling early-stage development.	Prevalent theme; raised across most focus groups.
	Insufficient and Inaccessible Funds	Negative	Funding processes were perceived as burdensome, difficult to navigate, and often oriented toward export-focused businesses rather than local agri-food producers.	Prevalent theme; widely discussed across the dataset.
Supportive Resources	Networking Opportunities	Positive	Training, enterprise programmes, and mentoring initiatives offered valuable opportunities for learning, confidence-building, and connections with peers.	Recurrent theme; raised across several focus groups.
	Isolating Work Environment	Negative	Entrepreneurs described isolation, limited rural supports, and emotional strain, including gender-specific challenges for women balancing multiple roles.	Prevalent theme; raised across most focus groups.
Social Supports	Online Support Groups	Positive	Online communities and social media networks provided encouragement, practical advice, and opportunities to expand customer reach.	Recurrent theme; raised across several focus groups.
	Perceptions from Peers	Mixed	Peer interactions varied: some participants experienced encouragement, while others received discouraging or conflicting advice that undermined confidence.	Peripheral theme; raised occasionally but meaningfully.

* Representativeness reflects breadth across the five focus groups, consistent with reflexive thematic analysis.

export potential, which participants felt disadvantaged locally oriented food producers, whose products are inherently tied to place-based markets, short supply chains, or perishability. Several entrepreneurs emphasised that this bias undermines the development of community-focused agri-food enterprises that contribute to local food systems and rural resilience. Participants felt a sense of hopelessness, stating that they would not "get much support" unless they are "export ready." Also looking on an international scale, rural entrepreneurs explained that they would like to see Ireland seek more funding at a European level, which could be used to support businesses situated in rural areas; according to one participant, "I don't think Ireland punches its weight in terms of drawing down enough EU funding to support infrastructure projects and everything else in rural areas" (P11).

Entrepreneurs expressed that additional funding could be used to create some sort of salary for those who are self-employed, offering some financial security. On multiple occasions, women described the pressure they felt to return to work immediately after their pregnancy or, unfortunately, their miscarriages, as they were financially unable to take any personal time off and could not locate financial support for these situations.

> I suffered lots of miscarriages through the years, and there are no supports if you are self-employed, you have to get right back into it. There is nothing for any women suffering any emotional loss, or anything like that—they just have to get back up on the horse, and it's not dealt with. (P20)

Theme 2: Supportive Resources

Beyond financial support, participants discussed the various resources that they had previously availed themselves of.

Networking, Mentoring, and Training

Networking and networking opportunities were highlighted as positive, supportive drivers of business development. Two examples of programs available in the West of Ireland that were referred to include the EMPOWER (EU funded mentoring program for women) and the Accelerating the Creation Of Rural Nascent Start-ups (ACORNS) programs, as well as various courses that offer training and advice to improve entrepreneurial skills, with one participant stating that without such programs they "would not be doing what I am today." Some participants felt there had been vast improvements in the support of entrepreneurs.

> It's never been a better time to be an entrepreneur in rural Ireland, actually. I think it's been amazing, Empower, I've done the Empower program and the ACORNS program, and I think there are so many supports out there if you want to go and embrace them and make use of them, that barrier is completely gone. (P27)

Multiple participants had experience partaking in mentorship programs offered by different organizations; as one noted, they "did a series of mentoring with 'The Design and Arts Council of Ireland,' and we had an excellent mentor, and he had exactly the right experience" (P22), whereby they were assigned an individual with ample entrepreneurial experience in a similar field. The role of the mentor is to provide guidance and feedback to mentees as their business develops and to help them overcome any obstacles that may arise.

While skills workshops and training for entrepreneurs are useful, participants noted a lack of resources and courses that could improve entrepreneurs' confidence and self-belief. Though many participants recognized that supportive online groups were available, there was a shared belief that these are "severely under-advertised" and require more publicizing. Similarly, participants voiced their confusion regarding course eligibility, expressing their uncertainty regarding whether a course's content is building on other programs or had prerequisites, or if all courses "are targeting complete beginners."

Isolating Work Environment

While the participants in this study did express their appreciation for the variety of programs and courses available to them, they described considerable frustration with the application processes.

Entrepreneurs explained that the "demand is so high you can't get on to them" and felt that the number of programs and courses specifically for entrepreneurs required improvement, either by increasing their quantity or increasing the number of places available to participants. Additionally, the quality of these events was heavily dependent on the skills of the facilitators organizing them, with some participants regarding their experience in these events as "quite poor." Similarly, the feedback on mentoring was extremely varied, sometimes considered too broad and not tailored enough to the specific business involved. The participants also felt that entrepreneurship was "lonely," and one could feel "isolated" due to the nature of their work and lack of colleagues or shared workspaces to promote and support socializing. Recommendations to overcome this issue included an increase in affordable shared workspaces throughout the country, and for the location of networking events to regularly change rather than having the vast majority held in Dublin (on the east coast of Ireland). At the moment, Dublin is the central hub for entrepreneurial training and networking events, which is costly for those situated rurally/West of Ireland without subsidized transport. Rotating the locations of these events or offering subsidized transport to entrepreneurs for business-related travel were both mentioned as desirable changes to support this cohort.

An additional emotional strain for women specifically is that of experiencing pregnancy, childbirth, or miscarriage. One participating women entrepreneur highlighted this as an area that she feels has been completely overlooked and requires significant attention.

For all of the aforementioned barriers, participants shared the struggles of sourcing information. They felt that, as with financial support, supportive resources are also somewhat hidden from them. One entrepreneur in particular described that it took until the eleventh year of business for them to come across supports which they were entitled to apply for: "I'm 11 years in my business, you know it's 11 years old and it's only last year that I, you know, realized that there's supports there for us" (P19). As with the financial supports, entrepreneurs expressed their desire for a central repository or service where they could efficiently and easily establish the helpful resources they were entitled to apply for.

Theme 3: Social Support

Participants also discussed the importance of social and emotional support throughout their entrepreneurial journey.

Online Support Groups

Social media groups were viewed as a positive support system, offering individuals an easily accessible platform to reach out to and communicate with like-minded people. The remoteness of this communication style is of particular importance to those in rural areas such as the West of Ireland, as traveling is often a barrier to individuals socializing. Entrepreneurs felt that these platforms enabled them to receive nonjudgmental feedback on their business-related struggles from people who have experienced and have overcome similar struggles. In addition, participants who reported positive mentoring experiences indicated that mentors provided guidance not only on practical aspects of business development but also offered psychological support in addressing emerging challenges, which in turn had a positive effect on their self-efficacy:

> When you are in these groups of like-minded people, you get to trash it all out, realize you are completely normal because everyone else thinks and feels the same. … They are like your tribe, and when you are with your tribe, it's just like constant encouragement, and motivation. (P12)

Perceptions from Peers

Participants described feeling a lack of support from their peers and the wider community. An influx of feedback from those without entrepreneurial experience was "confusing and misleading and often disheartening." Much of the feedback received from peers was described as negative and unsupportive, with individuals commencing their entrepreneurship journey often being told that they "shouldn't quit" their previous employment and "shouldn't do that." Regarding pursuing entrepre-

neurship, they noted that "Input is essential from experienced businesspeople, but it can get to the point where it is confusing and misleading and often disheartening" (P4).

Discussion

Throughout this research, participants voiced both the supportive and constraining elements of the infrastructural landscape in which they operate. This study captured participants' insights through the lens of financial, resource-based, and social supports.

The landscape of financial sourcing for entrepreneurship has significantly evolved in recent decades. The economic impact of the coronavirus pandemic has been devastating and felt on a global scale (Howarth & Quaglia 2021). More recently, the Russian war against Ukraine has affected European product inflation levels and a myriad of costs associated with entrepreneurship (Kraemer-Eis et al., 2024). Entrepreneurs are combining traditional financial supports, such as loans from friends, family members, and banks, with newer sources such as online funding pages (Block et al., 2018; Bruton et al., 2015). Entrepreneurial intentions, actions, progress, and success are heavily dependent on a region's economic development and its institutional environment (Van der Zwan et al., 2013). A significant portion of this environment includes entrepreneurs' perceived lack of financial support and the complexity of its accompanying administrative procedures (Hoogendoorn et al., 2019). The results of this research conform with previous findings and highlight a lack of financial support perceived by entrepreneurs in rural Ireland as well as an off-putting perception of administrative procedures, often viewed as overly complex and time-consuming. Grilo and Thurik (2005), using 2004 survey data from 15 old EU member states and the U.S., highlighted that the majority of the involved population identified a perceived lack of financial support as a key obstacle to entrepreneurship. Investigating two data sets resulting from the Flash Eurobarometer survey on entrepreneurship across 33 countries, Grilo and Thurik (2008) then noted that in addition to a perceived lack of financial support, a perception of administrative complexities negatively impacted entrepreneurial engagement levels. Futhermore, using the same data set, Hoogendoorn et al. (2019) found that this perceived barrier existed regardless of entrepreneur type. Focusing specifically on the agri-food sector, Zalewski et al. (2022) outline that due to both external (increasing demands) and internal (increasing labor and resource costs) influences, European Union farms would greatly benefit from increased investments. Participants in this research explained feeling as though they were looked at by funding bodies as inferior if they were not export-oriented. This may be potentially due to the positive effect of export-orientation on early-stage entrepreneurship in higher-income countries that has previously been recorded (Hessels & van Stel, 2011). Entrepreneurs of this research expressed that additional funding could be used to create some sort of salary for those who are self-employed, offering some financial security. This implication of entrepreneurship as being accompanied by financial insecurity, low wages, and a lack of benefits is already a common viewpoint across society (Nyström, 2021).

Digitalization is increasingly gaining importance in modern society for entrepreneurial activity, and this is particularly true for those situated rurally. However, only approximately 60% of rural areas have sufficient access to high-speed internet connections compared to over 80% of the entire EU population (Augère-Granier & McEldowney, 2021). This limits rural communities' access to information and communication technologies, creating a sense of a rural-urban divide accompanied by economic and social obstacles. On a global scale, approximately 20% of rural businesses generate a minimum of 80% of their revenue through their online sales (Score, 2019). In analyzing the trends of rural hubs development, European-wide funds, and regional funding initiatives, Dyba et al. (2020) highlighted the potential of digital hubs and diversified financial support to drive rural development and economic growth and support rural entrepreneurial success. However, participants in this study did not explicitly mention such initiatives, which may reflect limited availability or awareness in the region.

European policies have increasingly focused on supporting entrepreneurship in recent decades, with a specific focus on promoting and supporting

innovation in small- and medium-sized enterprises. In Ireland, although multiple supportive programs are available to entrepreneurs, participants in this research felt that more could be done to support their endeavours. While these initiatives have had a positive impact, further dissemination of such support is needed to reach those most rurally located. Additionally, the application procedures and requirements to receive theis support are seen as cumbersome, numerous, and complex. Oftentimes, they require specialist consultants, thus increasing the financial burden felt by these business owners (Zarbà et al., 2014, 2022). Recognizing how crowdfunding digital platforms are quickly flourishing, the European Crowdfunding Service Provider Regulation was developed with the aim of providing a framework for regulating crowdfunding activities within the EU. Through requirements such as ensuring that crowdfunding services are licensed and various investor protection measures are in place, this regulation hopes to increase individuals' confidence and sense of security in crowdfunding and thus support the overall growth of its industry. However, this regulation has its challenges. Strict legal requirements and excessive disclosure requirements may burden and limit crowdfunding services and make this method of finance sourcing less attractive to entrepreneurs (Sasso, 2024).

Similar to previous research, entrepreneurs in this study described problems that are location-specific and present major issues in rural areas. These include, in comparison to urban entrepreneurs, an increase in transportation costs and subsequent financial struggles, and a lack of access to facilities (European Commission, 2023). The term "Transport Desert" has been used to describe rural areas with insufficient public transport services and the resulting limitations on citizens (The Countryside Charity [CPRE], 2020). In Ireland, the Department of Transport has connected over 190 towns and villages to public transport networks since mid-2022 and reduced fare cost by an average of 20% (National Transport Authority, 2022). While this is a step in the right direction, the frequency of these services and their practical implications for rural environments, and more specifically, rural entrepreneurs, have yet to be investigated.

Participants in this study expressed the high value they place on receiving feedback via mentoring programs and training. This has been shown as a heavily influential factor to entrepreneurs' activity, with huge variations in experiences documented (Domurath et al., 2019; Grimes, 2017). Entrepreneurs in rural Ireland expressed a desire for more long-term mentorships to be made available, as the vast majority of those currently offered are short-term and consist of a limited number of encounters. Though one-off interactions do enable entrepreneurs to gain feedback, the literature regarding mentoring emphasizes the benefits of a longer-term relationship, as feedback is more positively received from someone the entrepreneur trusts (Allen et al., 2017; Strike & Rerup, 2016). Humberd and Rouse (2015) suggest that feedback should only be given as part of an already established mentorship, with feedback from a long-term relationship offering benefits that a one-off discussion cannot (Fisher et al., 2017). Investigating this relational dimension of feedback interactions, Van Werven et al. (2023) further supports the notion that changes in epistemic stance are influenced by affiliation and cooperation between entrepreneurs and feedback providers. In their study, they highlight the lack of research investigating early feedback interactions and note that the majority of existing work focuses on one-off interactions. Of the programs and training courses available to entrepreneurs in Ireland, participants of this study expressed frustration with the limited spaces that these programs offer. Additionally, of the participants who attended and completed such programs, feedback on the quality of its contents varied greatly.

Phelan and Sharpley (2011) investigated the agritourism sector in the United Kingdom and found that while farmers' skills and competencies are increasing, there remains a lack of some of the fundamental skills required for developing a successful business. Similar to this research, their study highlights the need for skills training, various support systems, and rural development policies to improve the quality of life and level of success of rural entrepreneurs. Although no research exists evaluating entrepreneurial training courses specifically and solely in Ireland, it is clear from the participants involved in this research that an increased

intake of skills training workshops, as well as a general increase in the quantity of workshops available and method through which they are offered (e.g., in person, online, hybrid) is a shared desire among these agri-food entrepreneurs.

Entrepreneurs involved in this study spoke positively of their experiences with supportive social media groups, noting that they are easily accessible platforms for contacting like-minded people without the additional hassle of traveling. With the advancement of digital technology, such online communities provide entrepreneurs with diverse learning opportunities for discussing ideas, developing their skills, and voicing the struggles they experience in relation to their profession (Autio et al., 2013; Leonardi, 2018; Nambisan, 2017). Gathering data from a Reddit group with over 380,000 users, Schou et al. (2022) investigated how entrepreneurs learn as part of online communities. Their findings highlighted that entrepreneurs do not only learn through passive observation but also through active discussions, which they termed "entrepreneurial learning conversations." There was a shared desire from participants of this research for an increase in resources and courses not only for furthering entrepreneurial skills, but also for promoting confidence and self-belief. Oftentimes, entrepreneurs felt low in confidence due to receiving an abundance of negative feedback from peers. This is in line with previous suggestions, which recommend programs for confidence-building as a possible method to tackle the lack of social support felt by entrepreneurs (Roper & Scott, 2009).

Entrepreneurs involved in this research expressed feeling unsupported by their peers, family members, and the wider community. An emotionally supportive environment can have a significant impact on entrepreneurial activity. Edelman et al. (2016) highlighted that for young adults, such support from family members is of particular importance, noting that familial cohesiveness positively impacted start-up activities. Entrepreneurship is rooted in society, with emotional support playing a critical role throughout the early stages of entrepreneurial endeavours (Downing, 2005; Klyver et al., 2018). Such studies have shown that a family environment that is supportive and encouraging is superior in comparison to one that is distant (Cogan et al., 2022). Throughout this research, similar negative emotions were described in relation to perceived support from peers. An individual's belief in their own capability to perform and complete tasks relating to entrepreneurial outcomes, termed entrepreneurial self-efficacy, plays a vital role in the likelihood of individuals pursuing entrepreneurship and their activity levels throughout (Chen et al., 1998). Neneh (2022), in studying a sample of 300 women, found that the support of peers plays a buffering role in entrepreneurs' lives by significantly lessening the emotional exhaustion experienced as a result of entrepreneur-related stressors. Similarly, training courses, while offering practical advice to nascent entrepreneurs, are also an effective moderator of stress reduction. However, this is more relevant for women, as the interactions during training programs help to reduce entrepreneurial stress and act as a method to break feelings of isolation. Conversely, for males, such interactions can increase this stress (St-Jean et al., 2022). While research indicates an overall positive effect of entrepreneurial education and training, the theoretical understanding behind how and why such training improves entrepreneurial competence remains undefined (Bhatt, 2021; Martin et al., 2013).

In describing the stark differences between rural and urban entrepreneurship, Fortunato (2014) suggests that rural entrepreneurship be treated as a distinct, separate area, as it presents unique opportunities and support in comparison to other areas of entrepreneurship. The findings of this research further support that suggestion as they highlight issues that are location-specific, such as increased travel costs for networking and training events. Furthering this, in their review of rural entrepreneurship, Tabares et al. (2022) suggest that research in this area should give increased attention to entrepreneurship in relation to women in rural areas. With the diversity of financial aid, supportive resources, and a range of environmental factors such as cultural norms varying across different regions and countries, such research will require recruiting specific cohorts and investigating the support available to them based on their place of residence. For example, in Ireland, the *Our Rural*

Future Rural Development Policy 2021-2025 is considered to be the government's action plan for recovering from the COVID-19 pandemic. With a vision of transforming the opportunities and quality of life for those living in rural areas, this policy and its actions align with the current United Nations Sustainable Development Goals. Its measures include but are not limited to supporting the expansion of high quality broadband connections, which will enable more individuals to work remotely and conduct their business online; provide grants to businesses situated in rural towns and villages; develop training to improve the digital skills of the population; and further develop unique Irish locations and experiences (the Wild Atlantic Way, Ireland's Hidden Heartlands, the Gaeltacht regions). Not only will the actions of this policy focus on adults in rural areas, but it will also look to obtain opinions and viewpoints from young people in these areas through consultation events and workshops (Department of Rural and Community Development, 2021). While participants discussed transportation challenges and long travel distances, other forms of logistical or built environment infrastructure, such as processing facilities or storage capacity, were not raised as prominent barriers during the focus groups. This absence is noteworthy and suggests either limited exposure to such facilities or that other issues (financial, social, informational) were more salient at this early stage of business development.

Research Limitations

This research reflects a point in time and therefore may not be an accurate reflection of existing or ongoing needs. This research is also specific to a relatively small region. Currently, there is a scarcity of research that explores the perceptions of entrepreneurs regarding their support, particularly in the agri-food sector. Much of the entrepreneurship research is quantitative in nature and fails to recognize the substantial role that qualitative investigation can play in understanding factors that influence entrepreneurial activity.

Practical Implications

This study possesses several practical implications. As encountering stressors is an integral aspect of entrepreneurial endeavours and without a supportive environment, it can negatively impact entrepreneurial activity, it is essential that the effectors of such stress are well understood. A thorough understanding of the perceived supportive infrastructure for entrepreneurs in rural areas will enable policymakers, governing bodies, and nongovernmental organizations to develop an environment in which entrepreneurial activities may flourish. Increasing the availability and promotion of relevant peer support groups, available both online and in-person, will offer entrepreneurs an easily accessible, low-cost tool through which they can connect with like-minded individuals, engage in active learning, and receive constructive criticism from experienced people regardless of their differing locations. On an economic scale, developing an environment that supports entrepreneurs' physical and emotional needs will in turn positively impact the global gross domestic product. This research offers a more thorough understanding of the drivers of entrepreneurial behavior, critical for policymakers and educators to develop effective educational programs and public policies.

Future Research

Future research could examine infrastructural needs across different rural regions to identify whether the patterns observed here extend beyond the West of Ireland. Longitudinal studies would help determine how infrastructural needs evolve as entrepreneurs progress beyond the early start-up phase. Additionally, targeted research into the experiences of women entrepreneurs and the effectiveness of mentoring or peer support programs would provide valuable insights for designing more equitable and context-appropriate supports.

Conclusions

This study examined the infrastructural landscape surrounding agri-food entrepreneurs operating in rural areas of the West of Ireland and explored how these entrepreneurs perceive and engage with the support available to them. The findings provide nuanced insight into both the enabling and constraining features of their operating environment, illustrating the complex interplay of financial, resource-based, and social support that shape

entrepreneurial activity. Although the results align with international research, direct comparisons remain challenging due to regional variations in the availability, accessibility, and relevance of entrepreneurial support. Nevertheless, the study offers policymakers, government agencies, and nongovernmental organizations a clearer understanding of the specific needs and priorities of agri-food entrepreneurs in this region. Such understanding is essential for the design and adaptation of policies and programs that can more effectively foster rural entrepreneurial development.

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Real-time image sharing system: Urban farm stand management facilitated by information resources and market orientation

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Abstract

Direct sales of agricultural products account for a significant portion of sales in urban areas; therefore, efficient management contributes to the sustainability of urban farming. Recent innovations in real-time image sharing (RTIS) have emerged as tools for urban farmers to improve their direct sales efforts, allowing both farmers and customers to view real-time images of their farm stands. However, how farmers manage information for direct sales within their business models remains poorly understood. In particular, little is known about how RTIS implementation improves farm stand management and how farmers' information resources and market orientation influence this process. To investigate this, we conducted qualitative longitudinal data collection using a case study approach, interviewing nine farmers in Tokyo who used RTIS for direct-sales marketing. We assessed their information resources, market orientation, and firm performance before and after adopting RTIS. Our findings indicate that RTIS usage helps farmers gather information resources

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and subsequently adopt a market-oriented approach. Farmers can improve their shipping efficiency after accumulating information resources and enhancing market orientation, especially if they initially have limited information resources but a certain degree of market orientation at the time of RTIS implementation. Farmers also develop process innovation as a strategy integrated with their information resources and market-oriented approach. Additionally, farmers who optimize their shipping systems can improve their farm stand sales, particularly if they adopt process innovation after RTIS implementation. We conclude by discussing the academic and practical implications of our study, along with agricultural policies that support effective RTIS use, considering regional characteristics.

Keywords
real-time image sharing, direct marketing, farm stands, information resource, market orientation, shipping optimization, process innovation

Introduction and Literature Review

Recently, various information technology (IT) innovations have been developed for farm management, with information management technology playing a crucial role in sales of agricultural products. These include point-of-sale (POS) systems that help gather and utilize sales data (Steckel et al., 2004), e-commerce sites for online sales (Lin et al., 2020; Zheng et al., 2019), and social network services (SNS) for communication with customers (Lin et al., 2020; Zheng et al., 2019). These technologies function as real-time information-sharing systems (Ghouri & Mani, 2019), facilitating the flow of information among shipping organizations, farmers, and customers.

Farmers are increasingly using these technologies to sell directly to customers and reduce transaction and logistics costs by shortening distribution channels. This approach enhances the freshness of farm products (Letelier Araya et al., 2025), fosters community connections, and promotes customer health (Sonnino & Marsden, 2006). Additionally, addressing information asymmetries between farmers and customers (Chae et al., 2018) helps improve sales of products that meet customer needs (Kurnia et al., 2015). However, effective marketing and distribution of agricultural products through direct sales requires comprehensive management of the value chain to meet customer demand and ensure quality and safety (Lee et al., 2012).

In this context, a new direct-sales management system called "Mie-Vege" was developed in 2021 by the Tokyo Metropolitan Government and coordinating manufacturers. This system automatically posts images captured by webcams installed in stores onto a website, allowing sellers and buyers to monitor the current status of the sales floor while guaranteeing customer privacy (Wolfert et al., 2017). What sets it apart is the use of images for information sharing between buyers and sellers, referred to as a type of real-time image sharing (RTIS; Wu et al., 2009).

Farm stands are an important channel for the direct sale of agricultural products in urban areas (Yoshida, 2020). For example, 33% of farmers in Tokyo and 18% of farmers in Kanagawa sell their products to neighbors in farm stands where they operate individually (Ministry of Agriculture, Forestry and Fisheries, 2020). This is because Japanese urban areas, where urban sprawl surrounds farmlands with residential and commercial development (Sorensen, 2001), have a substantial customer base for agricultural products. As shown in Figure 1, many urban farmers establish farm stands in their own work sheds or huts to sell horticultural products directly to customers, reducing distribution costs. This approach also lessens the impact of market price fluctuations for agricultural products (Aguiar et al., 2018) and allows the distribution of affordable food and the acquisition of social capital (Colson-Fearon & Versey, 2022). Some farm stands are staffed by farmers, whereas others are unattended. In unattended stands, farmers see their customers only when visiting to set up displays and clean them, and customers purchase items from displays or vending machines.

Two key factors enable farmers to maintain a competitive advantage through farm stand management: the acquisition of information resources and the implementation of market orientation.

First, as farmers accumulate marketing-related management resources, they succeed in business diversification, including sales from farm stands

Figure 1. Farm Stands and Their Sales Floors in a Japanese Urban Area (left is attended, and right is unattended)

The areas enclosed by white lines in the figures represent the sales floors where the products are displayed.



(Ilbery, 1991). Both the tangible and intangible resources held by diversified farmers significantly influence their financial performance (Walley et al., 2011). Accumulating information resources also supports vertical integration in farm management (Yagi & Howitt, 2013) by utilizing insights from customer service experiences and relationships (Holloway et al., 2007). Farmers operating farm stands can also gain, integrate, and utilize information resources to establish a competitive advantage quickly.

Second, market orientation is a vital factor for sustaining competitive advantage among firms that engage in direct sales (Abbu & Gopalakrishna, 2021). Narver and Slater (1990) defined market orientation as "an organizational culture that most effectively and efficiently creates the necessary behaviors for the creation of superior value for buyers and, thus, continuously superior performance for the business." To enhance farm stand sales in urban farming, farmers must understand customer demands and clearly communicate their products' value. Market orientation is especially important in farm stands, where farmers must proactively engage with customers and share information. Previous studies have indicated that profitability and customer service improves in direct marketing firms when market orientation is paired with a foundation of information sharing (Abbu & Gopalakrishna, 2021).

However, until now, farmers' process of improving direct sales management using information systems has remained unclear. Farm stands are primary direct-sales channels for urban agriculture, where each farmer's resources and management orientation directly influence consumer satisfaction and customer relationship management, and therefore RTIS usage is likely to have a significant impact. Nevertheless, the process by which RTIS contributes to firm performance is not well understood, nor is the role of information resources and market orientation. Understanding this process is important for proposing policies that support RTIS use.

Therefore, this research aims to clarify how farmers improve firm performance through direct-sales information management using RTIS and to identify the characteristics of those who do so effectively. To achieve these objectives, we interviewed urban farmers engaged in farmstand management and assessed the effectiveness of information management in direct-sales marketing and related support systems.

Literature Review

This literature review explores significant research on IT utilization toward accumulation of information resources in agricultural product sales, improvement of market orientation, and the subsequent sales performance in order to construct hypotheses regarding the process of farm stand management improvement through RTIS.

RTIS relies on image data, providing a real-time visual representation of the sales floor on a smartphone screen, and enables viewers to understand the situation of the sales floor more easily than the text data used by most existing systems. Smartphones are more convenient than PCs for retrieving real-time information resources (Hearn & Bange, 2002; Kitchen, 2008), especially for farmers who spend much of their time in the field. Farmers can use the Internet via smartphones to improve firms' access to information on market prices and production and consumption trends, facilitate information sharing among employees in a cloud environment, and help maintain customer relationships (Anderson & Rainie, 2010; Mishra et al., 2009; Pitichat, 2013). However, because IT is adopted more by younger farmers (Giua et al., 2021), older farmers may find it difficult to share images of farm stands.

Information resources are defined as "information collection requests containing a data profile for each request" (Trauth, 1989). They are crucial for firms seeking competitive advantage, fostering a flexible culture, and developing strategic plans (Powell & Dent-Micallef, 1997), and are built through effective information management. In retail industry, inventory management by POS or monitoring camera systems can provide insights into customer behavior and inventory changes in real time (Andarwati et al., 2020; Frontoni et al., 2014; Steckel et al., 2004), while also facilitating internal information sharing (Andarwati et al., 2020). However, data on customer behavior and inventory changes are only useful in agricultural marketing if users can trace their continuous changes (Steckel et al., 2004). In this regard, the RTIS can support decision-making more effectively than POS information.

Market orientation has been established as a key antecedent to sustained competitive advantage and organizational performance (Kirca et al., 2005; Kumar et al., 2011). Narver and Slater (1990) described market orientation as composed of three behavioral components: customer orientation, competitor orientation, and interfunctional coordination.[1]

The introduction of IT, especially an interfunctional information coordination system, improves market orientation (Borges et al. 2009). Furthermore, the continuous accumulation of information resources through IT facilitates the implementation of market orientation (Narver et al., 1998). Market orientation within firms is also considered to facilitate the adoption of IT and enhance information management by accelerating information acquisition. Micheels and Gow (2015) found that organizational learning with IT mediates the relationship between market orientation and organizational performance in farm management. This suggests that when a market-oriented business becomes aware of new IT innovations, it deepens its information management and accumulates information resources, which in turn enhances its market orientation.

A strong relationship between market orientation and firm performance is particularly evident in the manufacturing sector, which typically features a low concentration of authority and a risk-averse culture (Kirca et al., 2005). Market orientation has also been measured in farm management and has been shown to improve financial performance (Ho et al., 2018; Micheels & Gow, 2008, 2015; Mirzaei et al., 2016), contributing to the success of direct marketing. This study proposes that farmers implement their market orientation through the use of RTIS, measuring it using the three behavioral components defined by Narver and Slater (1990).

Direct sales performance in farm management is evaluated from three viewpoints: shipping optimization, process innovation, and sales improvement. Previous studies have shown that the real-time inventory status and customer behavior data obtained through POS systems are vital for optimizing shipping systems (Steckel et al., 2004). Additionally, firms operating E-commerce services gain a better understanding of supply and demand

[1] According to Narver and Slater (1990), customer orientation is the sufficient understanding of one's target buyers to be able to create superior value for them continuously. Competitor orientation means that a seller understands the short-term strengths and weaknesses and long-term capabilities and strategies of both the current and potential key competitor. Interfunctional coordination is the coordinated utilization of company resources in creating superior value for target customers.

dynamics (Kurnia et al., 2015) and reduce information asymmetries with their customers (Chae et al., 2018), outcomes we also anticipate from the use of RTIS in this study. Therefore, we consider shipping optimization in farmstand management as the first performance indicator.

Innovation is a key success factor in IT-based businesses and is driven by market orientation (Borges et al., 2009). Implementing a market orientation is the first step toward improving organizational performance (Slater & Narver, 1995), and its impact is often mediated by innovation (Baker & Sinkula, 2002; Han et al., 1998). Innovation is defined as "the adoption of an idea or behavior pertaining to a product, service, device, system, policy, or program that is new to the adopting organization" (Damanpour & Gopalakrishnan, 2001). It can be broadly categorized into product innovation and process innovation, the latter of which is defined as the implementation of a new or significantly improved production or delivery method (Damanpour & Gopalakrishnan, 2001; OECD & Eurostat, 2018), which may include the introduction of new business management practices enabled by IT. Process innovation is viewed as a vital resource for achieving long-term competitive advantage (Frishammar et al., 2012). Firms with strong IT capabilities are more likely to create product innovations, while process innovation development is often supported by external IT partnerships (Yu et al., 2016). In agricultural enterprises, IT adoption frequently involves collaboration with suppliers, enabling not only the use of external products but also access to technical and managerial support through data sharing and product improvement recommendations. Disseminating farmstand information is assumed to encourage farmers to adapt their product promotion, pricing, and business practices, thereby developing process innovation. In this study, we propose process innovation as the second performance indicator, clarifying how farmers' initial levels of information resource accumulation and market orientation affect this process.

Furthermore, the accumulation of information resources enhances organizational performance. For example, the use of POS systems has been shown to increase sales by encouraging customer purchasing behavior (Steckel et al., 2004). E-commerce implementation promotes purchasing behavior (Wang & Herrando, 2019), leads to higher sales (Cosgun & Dogerlioglu, 2012), reduces transaction costs (Damanpour & Damanpour, 2001; Kurnia et al., 2015), and expands trade areas (Damanpour & Damanpour, 2001). The use of SNS by small- and medium-sized businesses also promotes purchasing behavior (Guha et al., 2018), and family farmers have reported increased sales through internet use (Khanal & Mishra, 2016). Therefore, we consider the increase in sales at farm stands as the third performance factor, resulting from shipping optimization and process innovation in farm stand management.

Materials and Methods

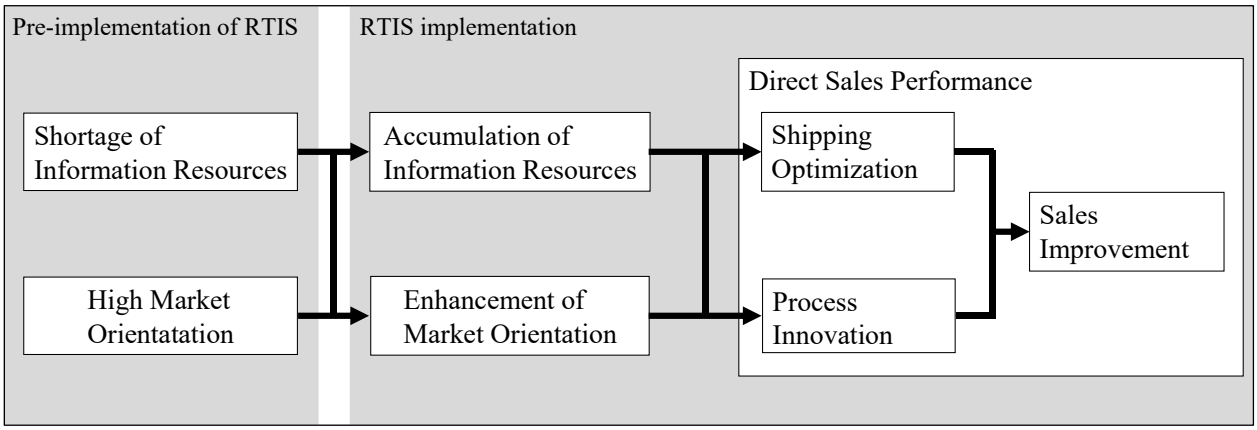
Based on the above literature review, this qualitative study assessed the impact of urban farmers' use of RTIS on their farm stands' operation. We hypothesized that farmers with limited information resources but high market orientation before using RTIS use it to accumulate information resources and further enhance their market orientation, as shown in Figure 2. Another hypothesis was that RTIS supports the accumulation of information resources, while high market orientation motivates farmers to improve their direct-sales performance by optimizing the product replenishment shipping system, implementing process innovation, and thereby increasing farm stand sales.

This study employed a case study methodology with longitudinal approaches used for data collection. We categorized farms based on their information resources and market orientation and compared the direct sales performance across these groups. Data were gathered via semi-structured interviews over three periods with nine farmers: at the time of RTIS implementation, three months later, and one year later.

Study Site

This study focused on urban farmers who sell their products at farm stands in Tokyo Prefecture, one of the most densely populated and sprawling cities in the world. In Tokyo, farmlands are often surrounded by urban residential and commercial developments (Sorensen, 2001). Tokyo has the

Figure 2. Hypothesized Process of Farm Stand Management Improvement Through RTIS Implementation



highest proportion of farmers in Japan selling products at farm stands (Ministry of Agriculture, Forestry and Fisheries, 2020). Many cities feature farm stands located within them on their official maps or websites, making it easy for residents to purchase agricultural products. Furthermore, it also has the second highest proportion of farmers implementing data-driven agriculture (Ministry of Agriculture, Forestry and Fisheries, 2020). Farmers in Tokyo tend to adopt new IT to improve farm management, making it an appropriate site for conducting this study.

RTIS in Farm Stand Management

This study focuses on the particular system "Mie-Vege" (see Figure 3) to clarify the impact of using RTIS for a certain period on farmers' operation of their farm stands. Mie-Vege includes a webcam that captures images of the farmstand sales area and a website that displays these images. Once the webcam is installed, it automatically takes photos and uploads them to a cloud server via a built-in SIM communication module or a Wi-Fi connection. The website then displays real-time images, allowing farmers operating the farm stands to view not only their own stand but also real-time images of other farm stands. Addition, farmers share the corresponding URLs with their customers, allowing them to view the images remotely. Mie-Vege is appropriate for this study because it guarantees the privacy of visitors[2] and is the only packaged system with image delivery functionality for farm stands,[3] enabling farmers to continue using the RTIS throughout the research period.

Semi-Structured Interviews

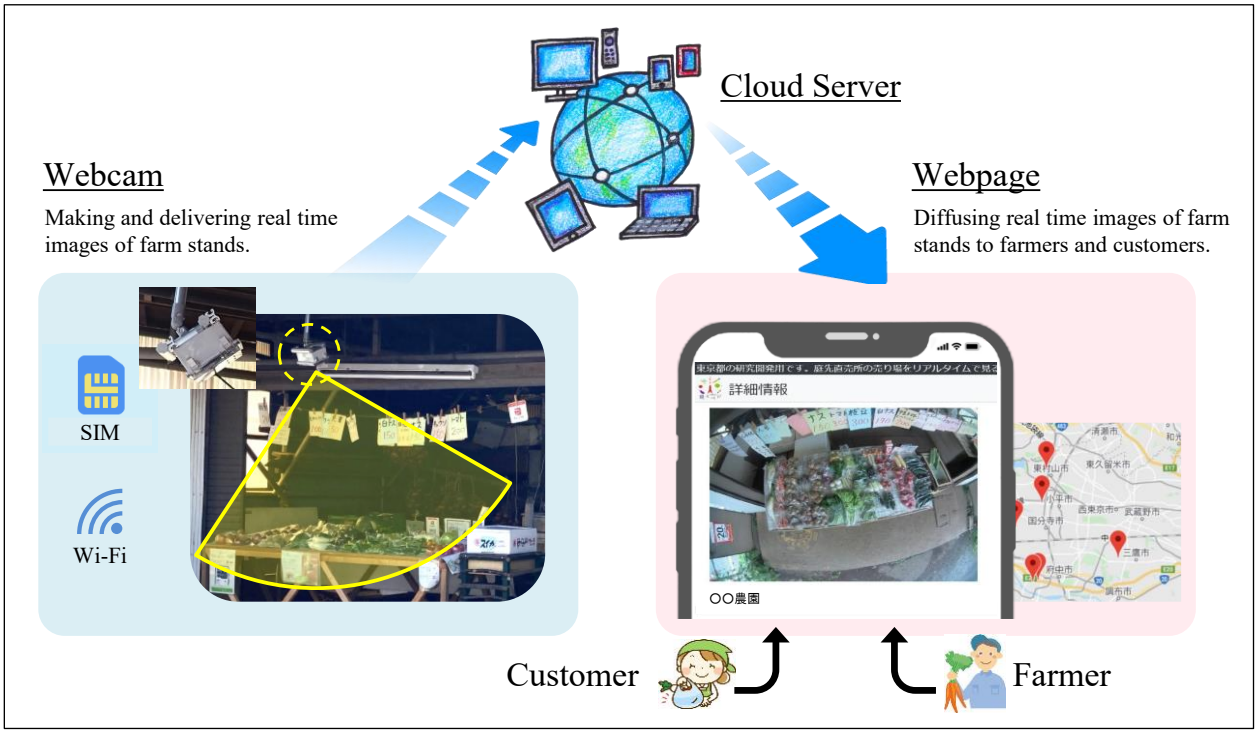
We conducted three interviews with farmers to clarify the process and antecedents of improving firm performance through the use of RTIS.

This study was exploratory in nature, conducted prior to RTIS diffusion, and targeted farmers who could utilize RTIS to disseminate information about farm stands. Therefore, the case study involved nine farm households in Tokyo engaged in farm stand management. We established two criteria for selecting participants: 1) They must operate a farm stand for at least two-thirds of the year, and 2) the manager or successor should be under 50 years old at the start of the research and show a strong intention to continue managing the farm stand. Participants were selected based on information from the Tokyo

[2] The webcam features motion detection and only captures images after confirming no movement for ten seconds. Because it focuses only on the sales floor of the farm stand, stationary cars or people on the nearby street do not appear in the images. Image data are constantly updated, and past versions are not displayed online. The farm stand visitors are informed via signage that RTIS is implemented there.

[3] When comparing the impacts across multiple farms, differing system functionalities could introduce bias. Furthermore, packaged systems enable faster recovery from issues, minimizing disruption to the study period.

Figure 3. Real-Time Image Sharing Infrastructure at Farm Stands in this Study
The webcam automatically captures still images of the sales area and uploads them to a cloud server via a built-in SIM module or a nearby Wi-Fi connection. Both customers and farmers can view real-time images of farmstands through webpages.



Metropolitan Agricultural and Forestry Research Center, supporting successors of urban family farming.[4]

This study was conducted over one year, from 2021 to 2022, to investigate information management and its effects on farm stand operations. We interviewed each farmer for 60 to 90 minutes on the three occasions: at the time of RTIS implementation, three months later, and one year later. To enhance the reliability of our findings, we also collected image data uploaded to the system and statements made by each farmer on SNS.

Interview at RTIS Implementation

The first interview was conducted to assess farmers' farm stand management practices, information resources, and market orientation. The information resources examined in this study included internal information from farmers, such as information about customer relationships (Anderson & Rainie, 2010; Pitichat, 2013; Tan et al., 2002; Wajcman et al., 2008). The information also included real-time inventory status of their farm stands and customer perspective[5] (Andarwati et al., 2020; Frontoni et al., 2014; Steckel et al., 2004; Zhang et al., 2020) and market information on prices, products, and displays (Mishra et al., 2009). Regarding market orientation, we assessed each of the three behavioral components identified by Narver and Slater (1990)—customer orientation, competitor orientation, and interfunctional coordination—by counting the number of specific actions each farmer

[4] This method was selected as obtaining information on farmers and farm stand management from published sources is difficult. Despite difficulty in obtaining a sufficient size for statistical analysis, this method helps illustrate the dynamic changes in farm stand management resulting from system usage.

[5] In this study, customer perspective indicates the information customers can obtain when viewing the RTIS: whether they can identify the types and prices of products, where they are displayed, and which products they want to buy. Farmers are able to gain this insight through continuously monitoring the RTIS and conversations with customers using it.

undertook. In line with their behavioral perspective, market orientation was operationalized as a set of observable organizational behaviors, rather than attitudinal orientations.[6]

Interviews After RTIS Implementation

We examined changes in farmers' information resources, market orientation, and firm performance related to farm stand management at three months and one year after implementing the system. In addition to the information resources identified at RTIS implementation, farmers' recognition of customer evaluations of the RTIS system (Tsekouropoulos et al., 2013) as an information resource was assessed. We focused on three aspects of firm performance. First, we measured each farmer's shipping optimization by counting the individuals who replenished products after recognizing the inventory at their farm stands and meet any of the following criteria: checking the inventory by viewing the RTIS, receiving replenishment instructions via phone from another member who views the RTIS, or directly observing the inventory at the farm stand. Second, to examine farmers' behavior regarding process innovation development, we confirmed whether they undertook any of the following activities after RTIS usage: implementation of new market strategies, employee awareness initiatives, or improved sales floor displays. Third, as organizational performance, we compared farm stand sales before RTIS implementation with the average sales over the two years following implementation.

Overview and Classification of Case Study Farmers

This study categorized farmers based on their information resources and market orientation to compare the impacts of RTIS usage. Table 1 presents the information resources and market orien-

Table 1. Farmers' Information Resources and Market Orientation Related to Farm Stands at RTIS Implementation

	Information resource [a]			Market orientation [b]			
ID	Customer relationship	Real-time product inventory in own stand	Total	Customer orientation [c]	Competitive orientation [d]	Interfunctional coordination [e]	Total
A1	2	0	2	8	3	5	16
A2	1	0	1	10	5	2	17
A3	2	0	2	9	3	5	17
B1	3	1	4	5	3	1	9
B2	3	1	4	3	3	1	7
C1	0	0	0	2	2	2	6
C2	1	0	1	2	2	1	5
D1	0	0	0	0	0	0	0
D2	0	0	0	0	2	0	2

[a] A codebook of information resources is provided in Supplementary Table A.1. This notation is consistent in the following tables.
[b] The number of specific behaviors that represent market orientation is based on the index developed by Narver and Slater (1990). Further details on market orientation are provided in Supplementary Table A.2. This notation is consistent in the following tables.
[c] Count of specific actions regarding customer satisfaction objectives, customer commitment, creating customer value, measuring customer satisfaction, after-sales services, understanding customer needs.
[d] Count of specific actions regarding salespeople sharing competitor information, responding rapidly to competitors' actions, top management discussing competitors' strategies, target opportunities for competitive advantages.
[e] Count of specific actions for interfunctional customer calls, information sharing among functions, all functions contributing to customer value, functional integration in strategy.

[6] The specific actions used to construct each component are summarized in Table 1.

tation of each farmer at the time of RTIS implementation. Some farmers gain customer relationships through direct interactions at farmers markets or usage of social media. Regarding real-time inventory management, farmers B1 and B2 were consistently aware of their current stock levels before implementing RTIS because some family members were always present in the stands during opening hours and called others when necessary. Differences among farmers were apparent in market orientation, particularly customer orientation, which is stronger than competitor orientation and interfunctional coordination.

Based on these results, we classified farmers into four categories according to their level of information resources and market orientation. We then analyzed each group's firm performance relative to their characteristics. Group A has limited information resources but high market orientation, Group B has abundant information resources and moderate market orientation, Group C has limited information resources and medium market orientation, and Group D has limited information resources and low market orientation.

Table 2 provides an overview of the farmers involved in the case study. All farmers used multiple sales channels, with the proportion of farm-stand sales ranging from 10% to 85%, as shown in Figure 4. They sold products through diverse channels, such as farmers markets, supermarkets, and school lunch programs, in addition to farm stands, as pointed out in prior research (Yoshida, 2020). Farmers B1 and B2 had two family members working at their stands, while the others sold their products without staffing the stands. Each farm had at least one person responsible for product shipments. Some farmers also created websites or SNS accounts to share information.

Results

This section presents the key findings from the study, drawing on qualitative research data across nine farmers in Tokyo. The results are organized thematically to highlight the accumulation of infor-

Table 2. Overview of Case Study Farmers (at the Start of the Research)

ID	Organization (number of farm stand clerks; number of the shippers; attended or unattended stand) [a]	Annual farm stand sales (USD) [b]	Sales promotion channels	Average number of sales products [c]
A1	Manager, his spouse, successor couple (0; 4; unattended)	19,983	SNS (2 types), Homepage,	11
A2	Manager, his spouse, successor (0; 2; unattended)	19,983	SNS, Homepage	1
A3	Manager, 4 part-time (0; 2; unattended)	13,032	SNS, Homepage	1
B1	Manager, his spouse, successor, relatives (2; 3; attended)	24,327	SNS	14
B2	Manager, his spouse, successor, relatives (2; 3; attended)	38,228	SNS	17
C1	Manager, his successor (0; 2; unattended)	15,639		9
C2	Manager, his successor, 3 volunteers (0; 3; unattended)	6,950		6
D1	Management couple (0; 2; unattended)	8,688		5
D2	Management couple (0; 2; unattended)	6,082		5

[a] If the clerk number is 0, the farm stand is unattended.
[b] 1 USD = 115 JPY according to the exchange rate on January 1, 2022.
[c] Annual average number of products sold at farm stands per day. All farmers produce and sell vegetables; A2 and A3 only sell tomatoes, while C1 handles kiwifruits in addition to vegetables. Their products are interchangeable and, in fact, are changed in response to weather and demand every year.

mation resources, market orientation improvement, and the process of how urban farmers achieve efficient farm stand management from a multifaceted perspective.

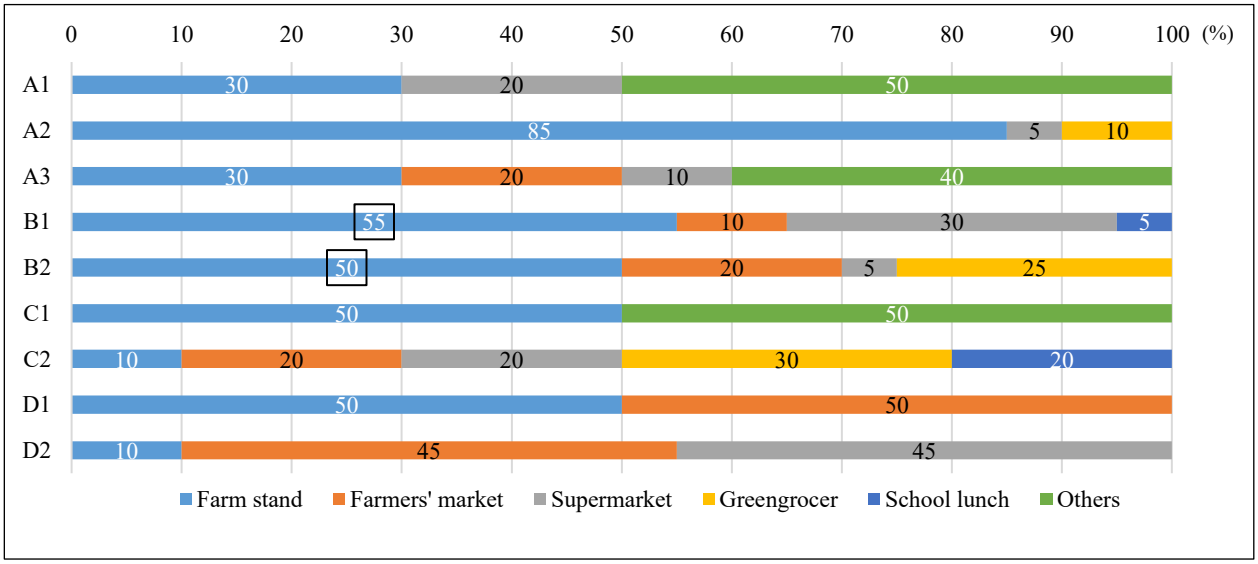
Accumulation of Information Resources Through RTIS Implementation

Table 3 presents changes in information resources related to the farm stands in the case study. Customer relationships remained unchanged for the farmers. However, some farmers gained awareness of real-time product inventory and a customer perspective of their farm stands. Farmers in Groups A and C accessed product inventory information through RTIS, even when away from their stands, such as when working in the field or at home. Farmers in Group B were already aware of their inventory levels before RTIS implementation, and this did not change. Group D farmers began using remote viewing three months after adopting RTIS but discontinued it one year later.

Prior to RTIS implementation, farmers managed their farm stands from the perspective of an operator; none of them were able to view it from the customer's point of view. By repeatedly watching images of the RTIS and talking with their customers, Farmer A1 and all Group B farmers were able to gain a customer perspective on their own stands for the first time, enabling them to adjust product arrangements on the sales floor.

Regarding external information, some farmers accessed data on selling prices, product varieties, and displays at other farm stands as well as customer evaluations of the system. Notably, all farmers learned about other product varieties three months after RTIS implementation. Farmers B2, C1, and D1 also collected information on prices at other farm stands. Additionally, Group B farmers used the system to observe how other stands arranged their sales floors, set up pop-ups, and displayed price tags. Therefore, they learn about competitors' practices to explore practices they could implement in their own farm management. Furthermore, farmers in Groups A, B, and C gathered customer feedback to understand the benefits of using the system.[7]

Figure 4. Each Case Study Farmer's Sales Channel and Its Ratio



Note: B1 and B2 sold products with clerks at their farm stands, while the others sold unattended. Other sales channels included online shops, restaurants, department stores, wholesalers, and delivery sales.

[7] Farmers in Groups A and B introduced RTIS to their customers through SNS and their websites three months after implementation. All farmers facilitated customer access to RTIS by posting multiple times and prominently placing its URL on their homepage. At attended stands, the system was communicated to customers during in-store interactions. At unattended stands, communication occurred through conversations with customers encountered during product replenishment or via SNS.

Implementing Market Orientation via RTIS

Table 4 illustrates the changes in market orientation among the case study farmers resulting from the use of RTIS, focusing on the three behavioral components. Most of these farmers completed accumulating information resources within three months after RTIS implementation, while many of them continued strengthening their market orientation for one year.

Customer orientation was already high for Group A farmers before RTIS implementation but improved for all farmers afterward. Specifically, they incorporated customer feedback on pricing and product assortments. They also identified customers who frequently used RTIS, provided guidance on its use, gained deeper insights into customer satisfaction, and adjusted product displays based on the camera's coverage.

Competitor orientation improved through information gathered by viewing other farm stands via the system. Farmers who accessed data on product variety, pricing, and displays at other

Table 3. Accumulation of Information Resources Related to Farm Stands [a] [b]

	Information inside the farm									Information outside the farm												Total		
	Customer relationship			Real-time product inventory in own stand			Customer perspective			Product prices at other stands			Other farm stand products			Displays of other stands			System evaluation from their customers					
ID	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m
A1	2	2	2	0	1	1	0	1	1	0	0	0	0	1	1	0	0	0	0	1	1	2	6	6
A2	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	4	4
A3	2	2	2	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	2	4	5
B1	3	3	3	1	1	1	0	1	1	0	0	0	0	1	1	0	1	1	0	1	1	4	8	8
B2	3	3	3	1	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	4	9	9
C1	0	0	0	0	1	1	0	0	0	0	1	1	0	1	1	0	0	0	0	0	1	0	3	4
C2	1	1	1	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	1	4	4
D1	0	0	0	0	1	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0	3	2
D2	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	2	1

[a] 0m denotes the data at RTIS implementation. 3m and 12m denote three months and one year after that, respectively. This notation is consistent in the following tables.

[b] Gray cells indicate an increase in information resources compared to the time of RTIS implementation; darker gray cells indicate a greater increase than that observed 3 months after RTIS implementation.

Table 4. Increased Market Orientation Among Case Study Farmers [a] [b]

	Customer orientation			Competitor orientation			Interfunctional coordination			Total		
ID	0m	3m	12m	0m	3m	12m	0m	3m	12m	0m	3m	12m
A1	8	12	15	3	4	4	5	6	7	16	22	26
A2	10	12	13	5	5	5	2	4	4	17	21	22
A3	9	9	12	3	3	3	5	5	6	17	17	21
B1	5	8	10	3	5	5	1	3	3	9	16	18
B2	3	5	7	3	5	6	1	2	4	7	12	17
C1	2	3	4	2	4	4	2	3	3	6	10	11
C2	2	6	6	2	2	2	1	2	3	5	10	11
D1	0	1	1	0	2	2	0	0	0	0	3	3
D2	0	1	1	2	2	3	0	0	0	2	3	4

[a] Further details on market orientation are provided in Supplementary Table A.2.

[b] Gray cells indicate an increase in market orientation compared to the time of RTIS implementation; darker gray cells indicate a greater increase than that observed 3 months after RTIS implementation.

stands began considering strategies for managing their own farm stands. These strategies included differentiation, motivation, and better understanding of market prices.

Regarding interfunctional coordination, some farmers enhanced functional integration over the course of the year by monitoring their farm stands via RTIS. They familiarized successors and family members with the system's functions and its applications for family management. Additional efforts included sharing posting techniques on SNS in the family, centralizing information by placing the URL on Google Maps and other advertising media. and consolidating information for pop-up events.

Impact on Farm Stand Management

Table 5 presents firm performance related to farm stand management before and after RTIS implementation, including shipping optimization, process innovations, and year-on-year sales comparisons. The following sections provide detailed explanations of these changes.

Shipping Optimization

Farmers in Groups A and C increased the number of family members capable of remotely monitoring and replenishing product inventories. Before implementing RTIS, they risked losing sales opportunities at their unattended farm stands because they could not check product inventory. RTIS improved the shipping process by allowing replenishment decisions even when farmers are absent. Two scenarios emerged: In one, all members responsible for replenishment used RTIS (A2, C1); in the other, some members viewed the system and instructed others to replenish (A1, A3, C2).

In both cases, farmers could verify product levels before replenishing or instructing others, minimizing unnecessary work and maximizing sales opportunities. In contrast, Group B farmers experienced minimal changes to their shipping systems, as many were consistently present at their farm stands. For example, B1's production manager only used RTIS in July, the peak season, to assess replenishment needs. Meanwhile, Group D farmers began accumulating product inventory information three months after implementation but discontinued this after one year, resulting in no improvements to their shipping system.

Process Innovation

Group A farmers, who were already highly market

Table 5. Changes in Firm Performance Related to Farm Stand Management [a] [b]

	Shipping optimization [c]			Process innovation [d]			Year-on-year sales ratios (%) [e]		
ID	0m	3m	12m	0m	3m	12m	1 yr after	2 yrs after	Average
A1	0	2	2 (2)		x	x	147	113	130
A2	0	2	2			x	114	165	140
A3	0	1 (1)	1 (1)			x	110	151	131
B1	2 (1)	3	3		x	x	100	99	100
B2	2 (1)	2 (1)	2 (1)		x	x	73	69	71
C1	0	2	2				129	132	131
C2	0	1 (1)	1 (1)				121	113	117
D1	0	1	0				73	65	69
D2	0	1 (1)	0				75	48	62

[a] Further details on shipping optimization changes and process innovation are provided in Supplementary Table A.3.
[b] Gray cells indicate more efficient farm stand management compared to management at the time of RTIS implementation.
[c] Number of members who replenish products based on the inventory at their farm stand (numbers in parentheses indicate members who replenish under the instruction of the information-holders).
[d] Implementation of new market strategies, employee awareness initiatives, and improved sales floor displays.
[e] The baseline was annual sales from May 2020 to April 2021, compared to the annual sales exactly one or two years later, on average. Weather and market impacts were consistent across all farms, because the distance between farmers' fields was no more than 12 km. The year-on-year variations in vegetable market prices are 100% in 2020 and 2021 and 103% in 2022, showing little significant fluctuation (Ministry of Agriculture, Forestry and Fisheries, 2025).

oriented before implementing RTIS, developed strategies to create new value by sharing information through the system. For instance, Farmer A1 displayed fresh but overstocked products within the camera's view to increase the likelihood of customer purchase. This practice illustrates anchor bias from nudge theory (Thaler & Sunstein, 2009), as it encourages customers to buy fresh items and thereby improves inventory turnover. Farmer A2 regularly monitored sales through RTIS and observed that sales improved when space was available on the sales floor. Based on this insight, they sometimes left the sales floor partially empty during product replenishment to give customers the impression that the farm stand was popular. Farmer A3 informed employees about the system and emphasized sales promotions and customer service. Even before RTIS implementation, Farmer A3 engaged in extensive interfunctional coordination to develop employee skills and revised work manuals based on employee feedback. This high level of market orientation supports process innovations. Group B farmers gained valuable insights by using RTIS to view real-time images of other farm stands and applied these to improve their own displays. The system facilitates product identification on the sales floor, simplifies customer inquiries, and enhances the efficiency of sales activities.

Increased Sales at Farm Stands

From the farm stand sales data, we found that farmers in Groups A and C, who implemented shipping optimization, experienced sales growth. In contrast, sales for farmers in Groups B and D either remained unchanged or decreased. Farmers who experienced sales growth optimized their shipping systems through timely product replenishment. These farmers likely accumulated sufficient information resources and a certain level of market orientation, enabling them to use RTIS effectively to enhance replenishment efficiency and boost sales.

Additionally, farmers who adopted process innovation increased their farm stand sales when they improved product replenishment. For instance, Farmer A1 innovated their sales process for three months after RTIS implementation and recorded the highest sales increase after one year. Farmers A2 and A3 adopted process innovations in their sales after one year and experienced significant sales growth in the second year. On the other hand, although Group B farmers adopted process innovation, their sales did not improve. Shipping optimization is critical for increasing farmstand sales, with process innovation acting as a mediator in this relationship.

Discussion

Based on the results of this study, Figure 5 illustrates the process by which urban farmers use RTIS to improve farm stand management, as well as the relationship between farmers' information resources, market orientation, and performance achieved through RTIS implementation. In the following, we discuss the details of this process, the characteristics of farmers who used RTIS effectively, and policies that support RTIS use.

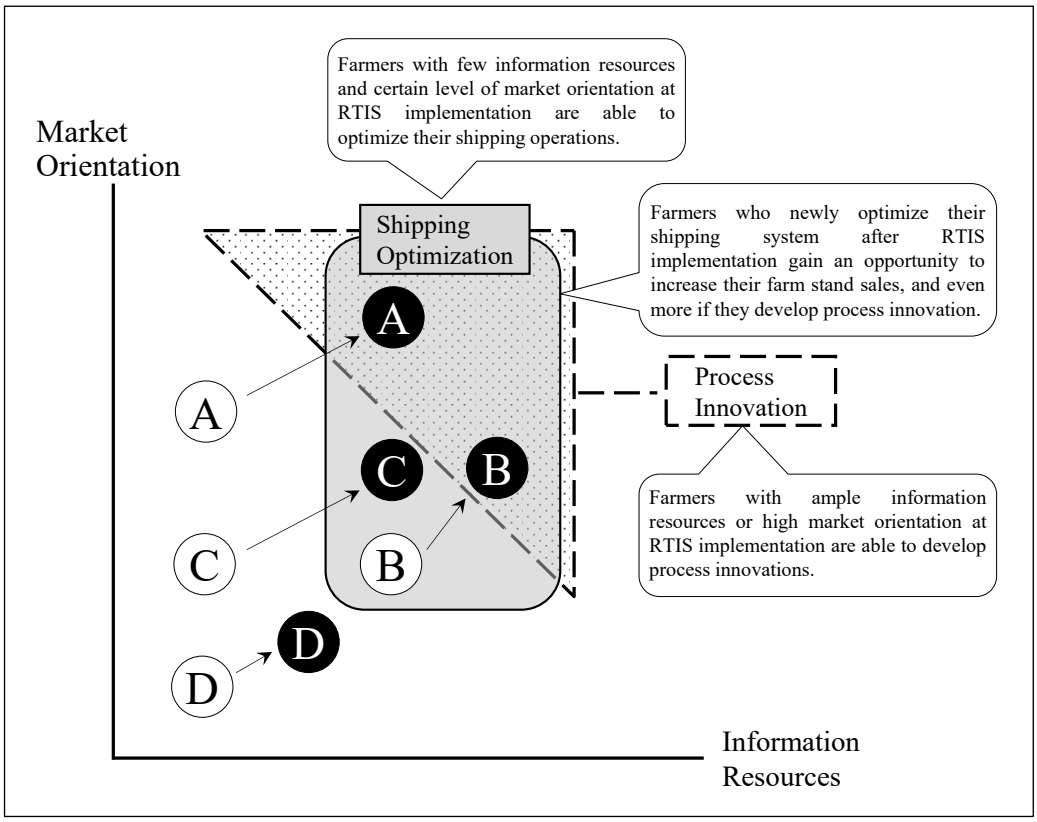
Process of Improving Farm Stand Management Through RTIS Use

First, farmers can accumulate information resources through RTIS. These resources include details about their farm stands, such as product displays, prices, and customer evaluations. Previous studies have shown that customer and inventory trends are communicated to shippers via POS data and information from farmers markets (Andarwati et al., 2020; Steckel et al., 2004; Takeno et al., 2008). This study confirms similar effects for RTIS. It also supports the idea that new production and marketing strategies can be developed by analyzing information on products and prices from other farm stands. The farmers in this study accumulated information resources through frequent interaction with customers, gathering customer opinions on SNS, and using RTIS.

Second, farmers using RTIS can enhance their market orientation. While IT applications in firms' market-oriented strategies for collecting customer information and sharing data across departments are limited, our findings show improvements in all three components of market orientation (Narver & Slater, 1990). Farmers can enhance their market orientation after accumulating information resources, as they need time to interpret the data

Figure 5. Farm Stand Management Performance Achieved by Farmers Using RTIS with Information Resources and Market Orientation

Capital letters indicate the groups of farmers in this study and white dots indicate before RTIS implementation, black dots after the implementation.



obtained through RTIS. In other words, market orientation can be more readily enhanced by linking RTIS data to information accumulated through face-to-face sales with customers or existing market-oriented strategies, as was the case with Group B farmers with sufficient information resources.

Third, the results indicate that farmers' accumulation of information resources and enhanced market orientation through RTIS lead to optimized shipping operations and process innovations. For example, farmers optimized the arrangement of the sales floor, adopted new marketing strategies, and increased employee awareness. Previous research has linked firm performance to information resource accumulation and the implementation of market orientation (Ho et al., 2018; Micheels & Gow, 2008, 2015; Mirzaei et al., 2016), and this study aligns with those findings. Moreover, farmers with ample information resources or high market orientation were able to develop process innovations after implementing RTIS. This innovation results from sharing real-time images of the sales floor with customers, a capability not available through existing POS, SNS, or e-commercie systems. The process innovations identified here are consistent with earlier research on market-oriented outcomes: employee team spirit (Kohli & Jaworski, 1990), customer satisfaction (Kirca et al., 2005), and cost reductions in sales promotions (Han et al., 1998; Yu et al., 2016).[8]

[8] These process innovations can be identified from the actions of groups A and B, described in Supplementary Table A3. Employee team spirit means explaining the importance of creating a customer-focused sales floor and service (A3). Customer satisfaction means recommending fresh products to customers (A1), adjusting placement to enhance visualization value (B1). Cost reductions in sales promotions means advertising that the farm stand is popular (A2) and reducing their inquiries to us (B2).

This study also shows that among farmers who optimized their shipping operations through RTIS implementation, those who developed process innovations gained further opportunities for sales growth. This finding indicates that farmers need time to gain a competitive advantage by integrating valuable information resources with innovative marketing strategies at their farm stands. In contrast, Group B farmers in this study did not immediately increase farm stand sales despite enhancing market orientation and developing process innovations because they had already accumulated information resources before implementing RTIS. While previous research has shown that improving market orientation increases profitability (Narver & Slater, 1990), in the context of farm stand RTIS usage, this effect occurs only when farmers accumulate information resources before enhancing market orientation.

Classification of Farmers' Information Resources and Market Orientation in RTIS Use

This study demonstrates that firm performance in farm stand management varies depending on the level of information resources and market orientation at the time of RTIS introduction. Assessing farmers' levels of information resources and market orientation approximates their performance with the system.

Both Groups A and B adopted process innovation based on information gained through RTIS use. However, Group A, which was more market-oriented, used RTIS to enhance shipping efficiency and sales, while little improvement in shipping or sales was observed in Group B, which had more information resources at the beginning. Comparing Groups A and C, Group A adopted process innovation owing to its higher market orientation, resulting in greater sales growth than Group C. To maximize organizational impact on farm stands and achieve long-term sales growth, Group C needs to adopt process innovation alongside shipping optimization. Group C had a higher market orientation than Group D and achieved shipping optimization and improved sales despite both groups implementing the same RTIS and lacking accumulated sales data on farm stands. In contrast, Group D was less market-oriented and prioritized production management over farm stand management, which limited shipments and prevented accumulation of sales floor information. As a result, Group D did not experience improvements in shipping systems or sales. To use RTIS effectively to increase farm stand sales, Group D should first improve market orientation related to farm stand operations.

Indeed, farmers' use of RTIS could also be influenced by their business models, such as the sales ratio of farmstands. However, this ratio does not necessarily capture farmers' strategic intentions toward farm stand development. A low current ratio may reflect limited past opportunities rather than a lack of interest, whereas a high ratio may result from temporarily favorable local demand. In this context, market orientation provides a more appropriate lens for understanding farmers' engagement with RTIS. Farmers with strong market orientation tend to focus on understanding customer demand and improving responsiveness, leading them to adopt RTIS to optimize shipping operations at their farm stands, regardless of their current sales ratio (e.g., C2). Conversely, farmers with low market orientation may refrain from investing in such practices, even if they have a substantial portion of farm stand sales (e.g. D1). This suggests that RTIS adoption is shaped less by the current sales structure than by how farmers strategically position their farms within their overall business.

Practical Contributions

Mie-Vege was launched by the developer after the study period. As of October 2025, farmers must invest approximately 435 USD per year, while customers are free to browse. Considering the annual sales of urban farm stands, introducing this system is not necessarily beneficial for every farmer; for some, the expenses outweigh the benefits.[9] The insights gained from this study regarding RTIS's impact and the differences between farmer groups are useful for the diffusion of technology and policy support. To support decisions on whether to

[9] In fact, after the study period, farmers in Groups A, B, and C desired to use RTIS even if charged, but those in Group D did not.

accept this expenditure, in the following sections, we clarify the significance of information management using RTIS in farm stands and discuss the factors that enhance its effectiveness.

Shipping Optimization

All farmers who optimized their shipping systems improved interfunctional coordination, a key component of market orientation, and involved family members in restocking farm stands. The collaboration among family members observed in this study was a type of shared management resource that supports diversification strategies in urban farming (Rantamäki-Lahtinen, 2009; Yoshida et al., 2019). This enables flexible management decisions, thereby supporting information sharing in farm stands through the RTIS to achieve shipping optimization.

Process Innovation

The results of this study suggest that implementing market orientation through RTIS influences the development of process innovations, including the adoption of new marketing strategies, improvements in employee awareness, and enhancements in sales floor displays. The nature of these process innovations varies among farmers based on their prior market orientation.

Group A farmers, who were highly market-oriented before RTIS implementation, adopted new marketing strategies: recommending fresh products to customers (A1) and intentionally leaving some slots of their vending machines empty to suggest high demand (A2). Group B farmers, who had existing information resources before RTIS implementation, improved their sales floor displays and communicated to customers that their farm stands were more responsive to customer demand than competing stores. Additionally, they posted social media to convey product information that could not be fully captured by RTIS camera images alone. These process innovations create opportunities to make customers want to buy more products and eliminate overstock at farm stands. Furthermore, the visibility of farm stands is improved, leading to reduction in unnecessary inquiries and enhancement of customer service across the entire farm, as in the case of B2. Following this process, farmers can effectively maintain their farm stands' competitive advantage over other retailers and build long-term social relationships with customers (Cassia et al., 2012).

Support for Effective RTIS Use

RTIS aligns with experimental continuous learning (Narver et al., 1998), influencing market orientation by building experience through experimentation. In terms of normative initial learning, another process to enhance market orientation, create learning opportunities, and select effective management strategies remains essential beyond using RTIS.

This periodic research revealed that some firm performance improvements appeared shortly after RTIS implementation, while others developed over time. For example, farmers received information about sales floor conditions and customer perspective at their farm stands immediately after implementation. However, some farmers understood customer evaluations of the system only after one year. This delay may have resulted from the time needed for farm stand members to communicate with customers about the system and encourage its use as well as limited opportunities for farmers without direct customer relationships to gather feedback. Additionally, the farmers showed enhanced market orientation one year after implementation compared to three months post-implementation. As they strengthened market orientation, they actively communicated their farm stand's advantages, recognized peak sales times, and integrated the system with their SNS, websites, and other promotional tools. Consequently, Group A farmers adopted process innovations, developed new customer services, and implemented marketing management strategies one year after RTIS implementation.

The Tokyo Metropolitan Government started to promote RTIS implementation in 2022 through its "Supportive Service for Challenging Farming in Tokyo." This initiative assists farmers not only with subsidies for RTIS implementation, but also with guidance on creating promotional tools, activating business models, adopting market-oriented practices, and building management resources, including human networks with customers and other farmers (Yoshida & Yagi, 2019). Further-

more, the government's farm extension service offers hardware and software support before RTIS implementation, provides setup guidance, and facilitates collaborative implementation by farmer groups. This approach enables farmers to become more market-oriented and accumulate management resources more quickly, thereby enhancing the system's impact. As of October 2025, RTIS had been implemented in 27 farm stands or farmers markets across the Tokyo Prefecture. Recent stagnation in urban population growth has made labor recruitment for farming and direct marketing more challenging. Given these urban dynamics, farmers are expected to increase implementation of this system in the future.

In addition, RTIS can be utilized not only in urban areas but also in suburban and rural regions. While RTIS implementation is important where the farm stand business model is viable with a certain population density, awareness of real-time product inventory on the sales floor is even necessary with labor shortages in agricultural product sales and retail operations. In fact, in July 2024, Mie-Vege was implemented at a farmers market on Miyakejima, a remote island in Tokyo with a small population and few farm stands, to improve agricultural product sales to tourists. For retailers seeking timely restocking or new customer acquisition, the findings of this study are beneficial regardless of whether they sell agricultural products.

Conclusion

This study demonstrates the process of RTIS utilization in managing farm stands, which represent one of the major sales channels for urban farmers. First, as part of the improvement process for farmstands using RTIS, farmers can accumulate information resources related to farm stand management, followed by an enhancement of market orientation. Subsequently, they can optimize their shipping systems, adopt process innovations, and increase sales opportunities for agricultural products. Second, farmers with limited information resources prior to RTIS implementation can optimize their shipping systems, while highly market-oriented farmers can adopt process innovations. Farmers who adopt only process innovations cannot increase sales. However, those who optimize their shipping systems can improve sales with an opportunity for further growth if process innovation is also adopted. Based on these results, we propose supportive policies aimed at enhancing market orientation during RTIS implementation and accelerating the accumulation of information resources through RTIS use.

The findings suggest that farmers should first assess their existing information resources and market orientation before adopting RTIS and then strengthen market-oriented practices such as family cooperation and early communication with customers. In addition, the accumulation of diverse information resources, including customer feedback and images from other farm stands, can enhance the effectiveness of RTIS-based information management. When these requirements are widely recognized by farmers, extension agencies, and manufacturers, the RTIS can support the development of regional direct marketing business models.

One limitation of this study is that changes in information resources, market orientation, and firm performance may have been influenced by factors other than RTIS usage, such as the emergence of competing retailers or attractive sales channels for farmers. This research was conducted at the pre-dissemination stage of RTIS to quickly identify its impacts and differences among farmers, resulting in a limited sample size. As RTIS diffusion progresses, future studies could conduct quantitative analyses incorporating regional variables and other technology adoption factors.

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Appendices

Table A1. Codebook of Variables of Information Resources

Categories	Variable	Description	Coding rule	Example evidence
Information inside the farm	Customer relationship	How many channels for maintaining customer relationships	Number of individuals	Clerks at their farm stands, local farmers markets or farm experience, usage of social media, such as Facebook, Instagram, LINE, or similar tools for customer contact (0 for unattended farm stand and non-usage of any social media)
	Real-time product inventory in own stand	Check real-time product inventory at their farm stand if necessary	1 = Present, 0 = Absent	Mention of direct observation by clerks or remotely using RTIS
	Customer perspective	Observe the stands from customer's point of view	1 = Present, 0 = Absent	Mention of gaining new perspectives through continuous viewing RTIS images or conversation with customers using RTIS for sales floor improvement
Information outside the farm	Product prices at other stands	Review the selling prices of other farm stands	1 = Present, 0 = Absent	Mention of checking prices of products there
	Other stand products	Examine the variety of products sold at other farm stands	1 = Present, 0 = Absent	Mention of checking products variety there
	Displays of other stands	Observe the displays at other farm stands	1 = Present, 0 = Absent	Mention of checking how to display products and price tags there
	System evaluation from their customers	Confirm system evaluations with farm stand customers	1 = Present, 0 = Absent	Mention of receiving positive feedback regarding its convenience for shopping or improvement requests such as changing the field of view

Table A2. Changes in Market Orientation Among Case Study Farmers

	CUSTOMER ORIENTATION					
	Customer satisfaction objectives			Customer commitment		
ID	0m	3m	12m	0m	3m	12m
A1	○ We started a layaway service based on visitor requests.			○ We placed an information sign for our farm stand in a position visible from the main street so that first-time customers can find it without getting lost.	● We considered the color scheme of the entire store to make customers feel comfortable at our farm stand. ● We placed popular items within the camera's coverage area and clearly indicated that additional items were available outside the area so that customers see value in coming in.	● We introduced RTIS to customers instead of SNS because it allows them to intuitively understand the sales condition. ● We particularly recommend the RTIS to customers who buy multiple items or travel from a distance.
A2	○ In response to customer feedback, we began offering low-sugar tomatoes and tomatoes suitable for gift giving.			○ We announced the scheduled end of sales on SNS to ensure that interested customers had the opportunity to purchase before sales closed. ○ We used unique trade names for our products instead of common variety names to help customers better understand their characteristics. ○ We placed a sign with information about our farm stand on the main street so that first-time customers could find us easily.	● We not only check store conditions using the RTIS but also identify peak sales hours to prevent stock shortages. ● We assure our customers that they can shop with confidence because their images are not leaked through the RTIS.	● We have identified patterns in higher sales periods as well as peak sales hours. For example, customers tend to purchase more items when the sales floor is less crowded with products.
A3				○ We track how many times customers scan the QR codes at our farm stands to measure the effectiveness of our advertising. ○ We sell our products in small, convenient bags to encourage customers to purchase them.		● We introduced the RTIS to customers who travel from far away or are strongly committed to attending our farm's event.

B1	○ We cropped and sold herbs when we had extra land and labor available, responding to our customers' requests.		○ We introduced an electronic payment service at our farm stand to participate in discount promotions.	● We keep our farm stand looking attractive because customers see it regularly via the RTIS system. For example, we change the sheets on the sales floor once a year.	● We installed a vending machine and consistently sell products to increase opportunities for customers to make purchases. ● We also use a municipal information dissemination application to share recommendations for our farm stand.
B2		We opened a LINE account to send information to customers who did not use Instagram, based on their requests.	● We posted the locations of our farm stands on Google Maps to guide customers who do not use SNS.	● We promote items aggressively on Instagram, which has a large audience, and share information about items with smaller quantities on our official LINE account, which is seen by frequent customers.	● We recognized the need to renew our price tags and recipe information and visited other farm stands with the RTIS system to study how to display effective pop-ups.
C1					
C2		We listened to customers' recorded soliloquies from the camera and referred to them when setting prices.	○ We placed an information sign for our farm stand on the main street to help first-time customers find it without getting lost.	○ We placed take-home flyers at our farm stands so customers could view the RTIS information at home.	
D1					
D2				○ We replaced the "open" sign with a larger one to make it visible via the RTIS system.	

Note: 0m denotes data collected at the time of RTIS system installation, while 3m and 12m represent three months and one year afterward, respectively.
○ indicates the market orientation identified before the system was used.
● indicates the market orientation identified after system use.
These notations are consistent throughout the following tables.

Table A2 continued

	CUSTOMER ORIENTATION					
	Create customer value			Measure customer satisfaction		
ID	0m	3m	12m	0m	3m	12m
A1	○ We made a time-lapse video of the sales-floor remodeling process and showed it to our clients to build anticipation. ○ By using our own brand name, we communicate to customers that we produce and sell seasonal vegetables rich in flavor.	● We consistently replenish the sales floor with products and keep the store open on time, ensuring customers see our farm stand through the RTIS system.	● We plan to make the selling price less visible through the RTIS system, considering customers who buy our goods through other sales channels where quality and prices are higher.	○ We select the items we sell based on our customers' preferences and ask them to evaluate the quality after purchase.	● We use the RTIS system to understand what our customers see at our farm stand.	
A2	○ We publicize the expected start of sales through SNS and inserts to generate customer excitement. ○ We adhere to a pricing standard based on sugar content and inform customers that they can shop confidently at our farm stand by displaying sugar content clearly. ○ We use the same product stickers at our farm stand as in other sales channels, linking these prices under the same brand.			○ We assess customer satisfaction with each product through direct conversations at our farm stand.		
A3	○ We display posts at our farm stand highlighting the unique qualities of our products compared to other farmers' to support premium pricing. ○ We publicize the expected start of sales through SNS to build customer anticipation. ○ We use the same packaging and stickers for B-grade products as for A-grade ones to convey the farm's name and quality.		● We developed our production department to better meet the demand generated by the RTIS system and to encourage purchasing.	○ We interview supermarkets and markets to gather information on customer responses, shelf space, store conditions, and customer needs.		

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	○ We continue to use the same tomato varieties to maintain consistent taste.				
B1		● We had willingness to expand our product variety because customers regularly used the RTIS system to browse the sales floor.	○ We request customers' opinions on new items and use their feedback to decide whether to continue selling them.	● We proposed to the system developer that an access counter be installed to measure the impact of RTIS on customer engagement.	
B2			○ We ask customers to compare our items with those from their neighborhood.		
C1	○ Because many customers look forward to the start of kiwifruit sales, we post the scheduled date at our farm stand.				● The RTIS system helped us to understand that our customers often bought unusual items and were satisfied with them.
C2				● We monitor customer satisfaction by capturing their soliloquies through the camera's sound collection feature.	
D1		● We raise awareness to increase the number of items, ensuring the RTIS system effectively disseminates information about our farm stand.			
D2					

Table A2 continued

	CUSTOMER ORIENTATION					
	After-sales services			Understand customer needs		
ID	0m	3m	12m	0m	3m	12m
A1	○ We sell salad sets that are easy to prepare for customers who live alone, making it easier for them to buy our products. ○ We promote unusual items with simple recipes through pop-ups and SNS.			○ We not only listen to our customers' requests but also encourage them to share their cooking success with us, which we then share with other customers through SNS and in person.		
A2	○ We demonstrate how to cook with our products via Instagram.			○ We identified demand for to matoes with low sugar content and tomatoes suitable for gift-giving.		
A3	○ We plan to sell salad sets combined with other items to help customers prepare meals easily.		● We make and sell sweet potatoes at our farm stand in winter to encourage customers to visit and provide them with easy meal options.	○ We gathered customer requests through SNS and at our farm experience events.		
B1				○ We learned cooking methods for vegetables from our customers and recommended these to others. ○ We discovered customer requests during conversations at our farm stand; for example, many asked us to sell herbs.		
B2	○ We recognized that customers needed information about our farm stand beyond Instagram and saw the need for additional information tools. ○ We understand our customers' purchasing behavior before and after visiting the farm stand.					

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C1	○ We post simple cooking instructions for unusual products at the farm stand to inform customers.		● We recognized strong customer demand because we created the RTIS flyer ourselves, and more clients than expected took it home.
C2	○ We provide cooking tips for expensive items, such as peanuts.	● We identified items that customers were unsure how to cook from their camera-recorded soliloquies and provided instructions on how to prepare them.	
D1			
D2			

Table A2 continued

	COMPETITOR ORIENTATION					
	Salespeople share competitor information			Respond rapidly to competitors' actions		
ID	0m	3m	12m	0m	3m	12m
A1				○ We asked our extension advisors how to correctly use sensitive terms such as "pesticide-free" and "organic" used by other farmers, and we applied these terms appropriately on SNS.		
A2	○ We often buy and eat tomatoes produced by competing farmers. ○We examine the fruit tomatoes sold by other farmers on e-commerce platforms to determine appropriate sizes and promotional strategies.			○ We decide the price difference between our products and those of other farmers by comparing sugar content and taste.		
A3	○ We evaluate the quality of our tomatoes by tasting those sold by other farms and comparing their prices.			○ We plan to reduce our sales volume at the cooperative farmers market if other farmers continue to sell at lower prices.		
B1		● We observed other farm stands through the RTIS system and felt motivated by their improvements to their sales floors. ● We considered which products we could and should produce on our own farm by studying other farm stands via the RTIS system.		○ We ship to supermarkets without competition from other farmers during periods when other farmers' products overlap with ours at the cooperative farmers market. ○ We determine our selling price by examining prices at supermarkets and the cooperative farmers market.		
B2		● We closely examine the sales methods of newly discovered farm stands through the RTIS	● We considered introducing a vending machine at our farm stand and used the RTIS system to	○ We mainly ship items that neighboring farmers do not sell at the cooperative farmers market.	● We use the RTIS system to monitor vegetable price quotations in other areas	

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		system.	examine unattended sales areas to identify effective sales practices.		of Tokyo because, although we often sell products to nearby customers, we recognize the need to develop future sales channels.
C1		● We consider which products or varieties we could and should produce on our own farm by observing other farm stands through the RTIS system.		○ We set our selling price considering the prices at other stores frequented by our customers. ○ We choose to grow and sell varieties not produced by neighboring farmers.	● We used the RTIS system to track vegetable price quotations at other farm stands since we only sold our vegetables at our own stand and had limited price reference information.
C2				○ We plant new varieties and crops introduced at workshops and adopt a strategy to differentiate ourselves from neighboring farmers.	
D1		● We browsed B2's farm stands via the RTIS system to check their prices and items for reference in our own cultivation and sales. ● We used the RTIS system to study the management of other farm stands, especially since COVID-19 reduced our opportunities to visit them in person.			
D2	○ We frequently examine vegetables from other producers at communal markets and supermarkets, checking their prices as well.		● We launched an Instagram account and studied how other farmers marketed their products.		

Table A2 continued

	COMPETITOR ORIENTATION		
	Target opportunities for competitive advantages		
ID	0m	3m	12m
A1	○ We choose cultivated products based on our customers' preferences rather than social trends because following trends too closely might drive customers to other farm stands. ○ We do not easily lower the price of our products, as doing so could cause customers seeking high-quality produce to leave.	● We reassure customers during business hours by ensuring enough vegetables are available for purchase, since, according to the RTIS system, some other farm stands do not clearly indicate whether they are open.	
A2	○ We maintain the price of our produce by differentiating our quality from other farmers; for example, we sell tomatoes with higher sugar content than neighboring farmers and offer them at a lower price compared to other high-sugar tomatoes. ○ We implement differentiation strategies such as showcasing our farm's history and emphasizing product freshness—approaches not used by online tomato marketing companies.		
A3	○ We viewed neighboring farmers who grew tomatoes in greenhouses and sold them as competitors and therefore adopted different sales methods.		
B1	○ We were aware of farm stands running cashless payment redemption campaigns and recognized our farm stand's location as more advantageous than others.		
B2	○ We also sell produce purchased from three other farmers at our farm stand, believing that offering a wide variety helps us stand out. ○ We focus on growing and selling cut flowers because many customers want them and competition in the neighborhood is limited.		
C1			
C2	○ We ship much of our produce to school lunches and supermarkets because prices and quality at farmers markets are lower, preventing us from achieving high profits there.		
D1			
D2	○ We differentiate ourselves from other farmers through quality rather than branding strategies.		

Table A2 continued

	INTERFUNCTIONAL COORDINATION					
	All functions contribute to customer value			Functional integration in strategy		
ID	0m	3m	12m	0m	3m	12m
A1	○ We use both Instagram and an official LINE account for social networking: Instagram targets consumers who have never visited our farm stand or who buy our products at other shops, while LINE is reserved for those who have visited the farm stand. ○ We share supportive customer comments received through SNS with the entire family to motivate everyone to work.			○ Our successor has experience in the child-care business and applies this experience to create pop-ups for our products. ○ We use the same pop-up at our farm stand that we have previously used at the market. ○ We display our family crest at the farm stand to convey to customers the significance of our farm's history.	● Our successor taught our manager the functions of the RTIS system and verified the product shipping system using it.	● We posted RTIS information on Instagram and on the price box at our farm stand so all customers can see it.
A2	○ We maintain a clear decision-making process within our farm; for example, female employees decide the design of the product seal based on their opinions.			○ We divided cultivation responsibilities between the manager and his successor but cooperate in shipping to improve operational efficiency.	● Our successor taught our manager how to use the RTIS system for promotional purposes. ● We centralized information on our farm stand so customers can access the RTIS system through our farm's website.	
A3	○ We conduct annual staff surveys to understand their preferred tasks, aiming to enhance their skills and motivation. ○ We involve all staff members in customer experience events, allowing them to hear directly from customers to boost motivation and encourage creativity.			○ We pay allowances to staff members skilled in photography to manage SNS outside of their regular working hours. ○ We revised work manuals based on staff feedback. ○ We use common shipping bags for products across sales channels to accommodate sudden shipment changes.		● Our manager taught all staff the functions of the RTIS system and verified the product shipping system using it.

B1	○ We discuss and decide within the family whether to share information about our farm stand through SNS.	● Our successor taught all family members how to use the RTIS system and shared ways to introduce it to customers at our farm stand. ● Our successor taught the manager's wife how to post on Instagram so she can share information about our farm stand with customers during slower work periods.	
B2	○ We discuss and decide within the family which information to disseminate to customers through SNS.	● Our successor taught all family members how to use the RTIS system and shared how to introduce it to customers at our farm stand.	● We enabled our customers to access the RTIS system through all our SNS channels and Google Maps. ● To create pop-ups for customers using the RTIS system, our successor proposed sharing information between a staff member skilled in cooking vegetables and another skilled in design.
C1	○ Our successor, skilled in PC design, created all posters displayed at our farm stand. ○ We use Google Calendar to share work schedules.	● Our successor taught our manager how to use the RTIS system.	
C2	○ We use a farm management information system to share cultivation and marketing data between the principal and successor, enabling joint decisions on work plans and sales channels.	● Our successor taught our manager the functions of the RTIS system and verified the product shipping system using it.	● When our successor was away from the farm stand and detected an anomaly through the RTIS system, he informed the manager to resolve the issue promptly.
D1			
D2			

Table A3. Effects of Using the Real-Time Image Sharing System among the Case Study Farmers

	Shipping optimization			Process innovation		
ID	0m	3m	12m	0m	3m	12m
A1		● When our successor couple work outside, they check our farm stand via the RTIS system and replenish products if needed. If one of them cannot replenish, he or she asks the other to do so.	● Our successor couple checks our farm stand using the RTIS system, and when neither of them can replenish, they ask our manager couple to do so.			● We guide our customers to check the RTIS system in advance when they ask us to reserve products. We display fresh and well-stocked items in the center of the camera's range, increasing the likelihood that customers will order them.
A2		● Our successor and the proprietor check the farm stand via the RTIS system. Based on the results, they also determine the approximate replenishment time.				● We discovered that customers buy more products when they see that others are buying them. Therefore, we deliberately leave some blank space on the sales floor to signal that it is a popular farm stand rather than filling it completely.
A3		● When our manager works outside, he checks our farm stand and sometimes asks our staff to replenish products.	● Based on changes in product volume seen via the RTIS system, we determine the approximate replenishment time.			● We trained our staff on how to use the RTIS system and emphasize the importance of creating a customer-focused sales floor and service.
B1	○ We have two clerks, and when we need to replenish, the clerks contact the successor in charge of cultivation.	● During the busy season, our successor monitors our farm stand with the RTIS system and replenishes products before the clerks contact him.			● Based on our experience talking with customers, we understood the visibility of each product via the RTIS system and adjusted product placement to enhance the value of visualization.	
B2	○ We have two clerks. When we need to replenish, the clerks contact the staff in charge of cultivation.				● We encourage customers to identify products and prices by looking at pop-ups via the RTIS system, increasing its value and reducing their inquiries to us.	

	Shipping optimization			Process innovation		
ID	0m	3m	12m	0m	3m	12m
C1		● Our successor and manager check our farm stand with the RTIS when working on the farm, going out, or even at home to replenish products efficiently.				
C2		● Our successor checks our farm stand via the RTIS system when working in the field, going outside, or at home. When he is away and notices replenishment is needed, he asks our manager to do so.	● The successor determines the estimated replenishment time based on changes in product volume seen via the RTIS system.			
D1		● Our manager checks our farm stand with the RTIS system while working in the field and decides whether or not to replenish products.	− We were unable to improve shipments owing to reduced labor and inconsistent or decreased production.			
D2		● Our manager checks our farm stand via the RTIS system when he goes outside and sometimes asks his wife to replenish products.	− We had very few products to replenish our farm stand because steady demand existed through our other sales channels.			

Note: ○ indicates effects observed before the system was used, ● indicates effects observed after the system was implemented, and − indicates a loss of effect.

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Advancing wholesale market access: Technical assistance to support Black, Hispanic, and Tribal producers

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Abstract

This pilot study examines the technical assistance (TA) needs of Black, Hispanic, and Tribal agricultural producers seeking to access wholesale markets, and the core competencies required of TA providers working to support these objectives. The study draws upon a literature review, a secondary analysis of TA programs across the U.S., and interviews with 20 TA providers from the Southern, Southeastern, and Midwest/Great Lakes regions. It identifies key challenges that underserved producers face in accessing wholesale markets, factors that determine the adoption of TA resources, and the challenges associated with program delivery by TA providers. To meet these objectives, the study uses reflexive thematic analysis and Latent Dirichlet Allocation. Findings show that regulatory complexity, limited capital, land tenure insecurity, infrastructural deficiencies, and information asymmetry were major barriers for producers in accessing wholesale markets. Skepticism about federal programming, navigating bureaucracy, operational challenges, and cultural factors were reported as

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This article is part of a larger study examining the distinct technical assistance needs of Black Hispanic, and Tribal producers for wholesale market access.

barriers preventing producers from accessing available TA. The overarching theme of structural discrimination and historical distrust of federal agencies further exacerbate these barriers, leading to exclusion from both market opportunities and TA resources. Further, limited capacity, insufficient funding, and cultural barriers affect the TA providers' ability to develop and provide tailored programming to support underserved producers and build long-term relationships. The providers identified cultural competency, technical expertise, and communication skills as critical competencies in working with diverse producers. This research underscores the need for culturally responsive TA models, capacity building of producers, place-based infrastructure and provider investment, greater access to secure land and financial capital, and more inclusive communication channels and grant structures. This study contributes to a growing body of work calling for systemic reforms in agricultural support systems. Future research that is conducted on a larger scale, that includes producer perspectives and examines impacts of policy shifts on TA programming is needed.

Keywords
technical assistance, wholesale markets, capacity building, underserved producers, thematic analysis, topic modeling, agricultural support systems

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Conflict of Interest Disclosure
The authors declare that they have no relevant financial or other interests that could be perceived as influencing the content or interpretation of this paper.

Introduction

Agricultural producers[1] rely on the availability of appropriate technical assistance (TA) and investment in TA to support their operations embedded within complex local, regional, and global agri-food systems (Chesapeake Bay Commission [CBC], 2017; Francke & Briones, 2017; Graziani, 2024; Prokopy et al., 2015). TA providers are trained professionals who play a crucial role in assisting producers with the knowledge, skills, and resources needed for managing production, marketing, and overall operational feasibility. This support can be in the form of training and workshops, grant-writing and loan application assistance, production practices and technology transfer, regulatory compliance assistance, business planning, conservation practices, and networking. These directly contribute to the economic and social well-being of the producers (Dunst et al., 2019; Johnson et al., 2023; Scheyett et al., 2023; Scott et al., 2022, 2024).

The role and importance of TA are further underscored by the growing challenges as well as opportunities in farming and ranching. These include prolonged droughts, flooding, wildfires, animal disease outbreaks, markets, urbanization, or supply chain disruptions (Carney, 2023; Chen et al., 2021; Hayden et al., 2018; Johnson et al., 2023; Oberholtzer et al., 2014; Prokopy et al., 2015; Reynolds, 2011; Wiener et al., 2020). In this study, the providers include those working at federal and state agencies, cooperative extension and land grant universities, and nonprofit organizations.

However, historically, producers from underserved[2] groups have faced inequity and discrimination in receiving financial and technical support from the U.S. Department of Agriculture (USDA). These have been particularly pronounced within institutions that administer credit and other critical farm support programs (Asare-Baah et al., 2018; Russell et al., 2021; SFI, 2024; Tyler & Moore, 2013; USDA Equity Commission, 2024; The White House, 2022). Many testimonies, civil rights investigations, congressional reports, and peer-

[1] The term "agricultural producers" (hereafter "producers") is used to refer to agricultural farmers, ranchers, and private forest landowners and operators.
[2] The 2018 farm bill legislation and the U.S. Department of Agriculture (USDA) identify producers who are "beginning," "socially disadvantaged," "veterans," and "limited resource" as being "historically underserved," in reference to federal policies and programs.

reviewed research document decades of deep-rooted systemic racial discrimination against underserved producers. Such actions have led to the loss of land, businesses, equipment, culture, and identity in these communities (Carpenter, 2012; Elsheikh, 2016; Farrell et al., 2021; Francis et al., 2022; Gilbert et al., 2002; Hinson & Robinson, 2008; Holt-Giménez, 2014; Horst & Marion, 2019; Lahr et al., 2022; Russell et al., 2021). This structural ostracization led to the erosion of trust between TA providers and underserved producers. Over time, this has constructed barriers that have held back these producers from equitable access to TA, among other resources for agricultural growth.

This pilot project takes a qualitative approach to examine the distinct TA needs of Black, Hispanic, and Tribal[3] producers, focusing on the providers' perspectives who deliver these services and programs. Specifically, the objective of this study is to assess the barriers that underserved producers currently face in accessing markets and relevant TA, as perceived by the TA providers. Additionally, this study explores the core competencies of TA providers working with underserved communities.

Support toward initiatives that endorse equity in agri-food systems by federal and state government agencies, as well as civil society organizations and universities, are rather dynamic. At the time of this study, in 2024, federal and state agencies were expanding support for equity (e.g., projects funded through the American Rescue Plan Technical Assistance Investment Program in addition to ongoing funding through the 2501 Program). However, in 2025, following the change in federal administration, several policies and budgetary shifts rolled back some of this targeted support. Many studies argue that when support increases, targeted TA is necessary in navigating the complex bureaucratic systems, overcoming generational disadvantages, mitigating the effect of land loss, and expanding market access (Cornelius & Tai, 2024; Dy & Seybold, 2023; Hernandez, 2025; Reynolds et al., 2025; Tshabalala, 2024; Valley et al., 2020).

This research contributes to the literature by providing evidence-based insights from the perspective of TA providers. Further, it addresses the gap in the literature of understanding of provider experiences and competencies in relation to underserved agricultural communities. This research also contributes methodologically by integrating traditional qualitative analysis with topic modeling.

This pilot study focuses on understanding the TA needs for accessing wholesale markets, recognizing that this constitutes one of many opportunities within the local and regional food systems. Access to wholesale markets can offer significant economic and social benefits to underserved producers (Aminetzah et al., 2021; Crook et al., 2023; SFI, 2024; Wallace Center, 2012). Wholesale markets provide a larger and more consistent demand as well as opportunities to scale operations compared to direct-to-consumer sales (Dumont et al., 2017; Low et al., 2015; McManus et al., 2020; Zare Mehrjerdi & Woods, 2024). They can create opportunities for investing in branding, packaging, and aggregation as well as create opportunities for value-added production (Day-Farnsworth et al., 2009; Schmidt et al., 2011).

Further, producers also have access to institutional buyers that are increasingly incentivized to purchase locally grown foods (Cornelius & Tai, 2024; Crook et al., 2023; Wallace Center, 2012). Wholesale markets can therefore be appropriate for producers who are already producing or plan to produce sufficient volumes or aggregate through collectives to meet the buyer's needs.

However, access to wholesale markets can be challenging due to many barriers that limit the ability of smallholders to compete and scale in a feasible manner. These barriers include quality and volume requirements, compliance with food safety and certification standards, market power and relationships vis-à-vis buyers, high upfront investment in infrastructure, and access to land and credit (Callahan & Daniel, 2022; Collins et al., 2024; McManus et al., 2020; Morrill & King, 2019; Schmidt et al., 2011). Expanding operations would allow smallholders to overcome many of these

[3] USDA employs various terms to refer to Indigenous peoples, including "Tribal," "American Indian," "Alaska Native," and "Native American," depending on the context and program. The term "Tribal" is used in this text.

challenges by achieving economies of scale (Ikerd, 2023).

Studies have shown that TA programming focused on wholesale access have been successful in supporting producers in gaining access to these markets (McManus et al., 2020; Schmidt et al., 2011). However, resource constraints, geographical barriers, and cultural differences can hinder the providers' ability to identify needs and deliver targeted services effectively (Gumirakiza & Matney, 2020; Hartmann & Martin, 2021; Thompson & Gaskin, 2018). Although underserved producers may share many of the same needs and barriers to wholesale market access as other small-scale (predominantly white) producers, substantial differences arise due to the impacts of racism and historic inequities. Yet there is little evidence-based research that examines these challenges and needs specifically for underserved producers (Aminetzah et al., 2021).

Today, socially disadvantaged producers[4] represent about 5% of all producers in the U.S., the remaining 95% identifying as white (USDA National Agricultural Statistics Service [USDA NASS] 2024). They are more likely to specialize in specialty crops, beef cattle, and other livestock, which are not commonly covered by direct government agricultural programs (Todd et al., 2024). For example, in 2022, farms with white producers received 99% of all Commodity Credit Corporation loans and 97.4% of all other federal payments (including loans administered by the Farm Service Agency, disaster payments, and other support) (Fent, 2024).

Figure 1(a) shows the distribution of all farms and ranches as reported in the 2022 Census of Agriculture. Additionally, it shows the states that are included in four Regional Food Business Centers of the USDA: Appalachia, Delta, Great Lakes Midwest, and Southeast, representing the regions that are included in this pilot study. The pilot is part of larger project focusing on equity in wholesale market access for historically underserved producers. Figure 1(b) shows the distribution of Black-operated farms and ranches, largest in the southern and southeastern states, with the highest proportion in Mississippi (13.8%). Figure 1(c) shows the distribution of Hispanic-operated farms and ranches, skewed towards the western and southwestern states, with the highest proportion in New Mexico (36.2%) and a relatively smaller proportion in the southern and southeastern states. Lastly, Figure 1(d) shows the distribution of Tribal-operated farms and ranches, largely concentrated in the southwestern states, with the highest recorded proportion in Arizona (61%).

While producer perspectives are critical in understanding these issues, using only those risks overlooking the institutional and systemic dimensions of TA. Underexplored insights into the issues can be found through focusing on the providers as pivotal change agents in the system and examining their perspectives. These insights will be representative of both the supply side constraints in TA delivery as well as the demand side needs and will be valuable in identifying gaps between policy design and implementation (Dimitri et al., 2025). Thus, gaining insights from TA providers becomes an essential step in program and policy development to address structural challenges within the agricultural support systems. Further, strengthening TA systems will also contribute to broader efforts towards improving resilience and growth of "agriculture of the middle"[5] (Brislen, 2018; Lyson, 2008; Janssen, 2018).

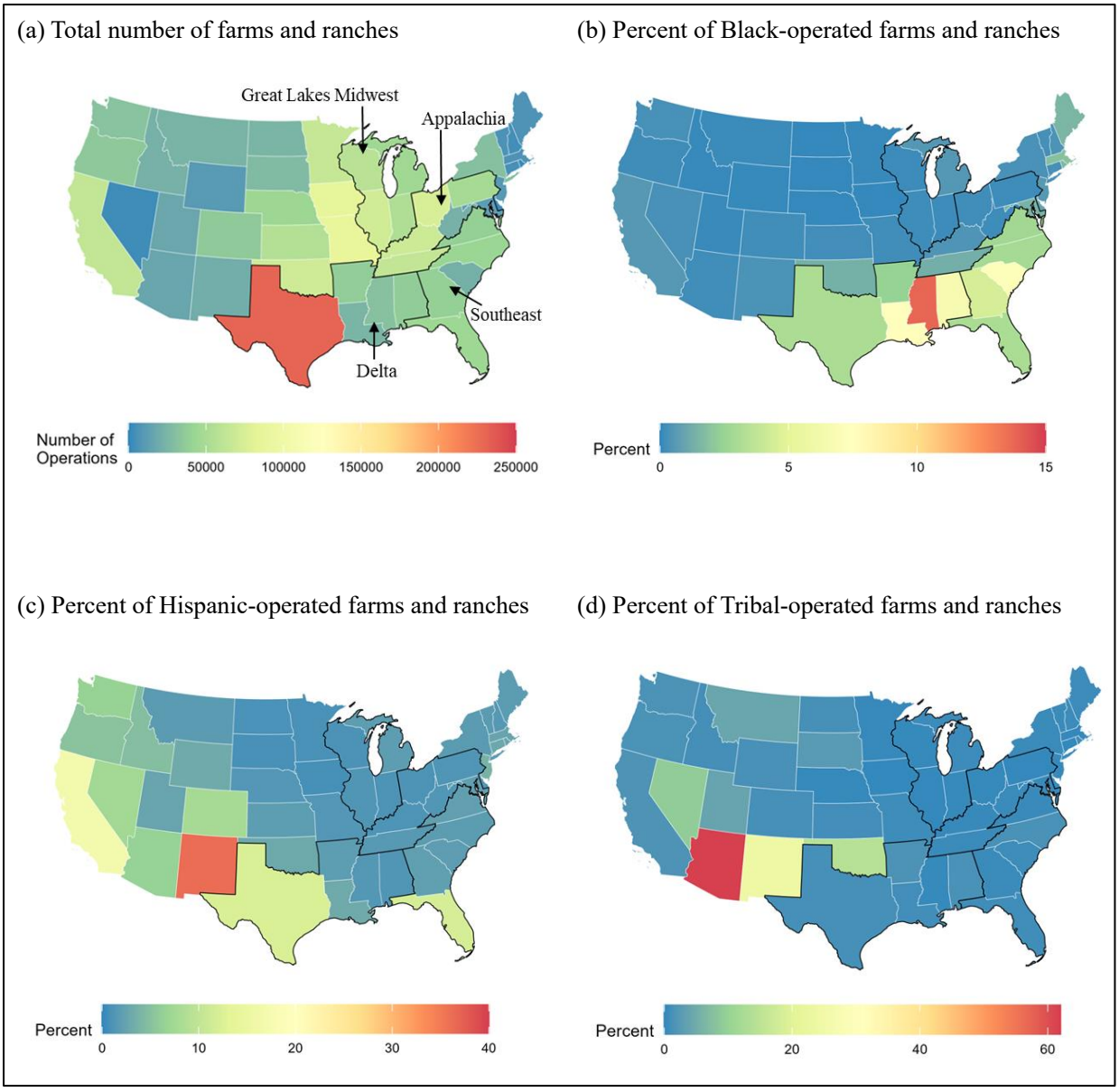
Theoretical Framework

The Agricultural Innovation Systems (AIS) approach conceptualizes innovation in the agricultural and food systems as a complex process that involves interactions among diverse actors and institutions that co-produce technological, social, and institutional innovations within the systems (Annosi et al., 2022; Hall et al., 2006; Herrero et al., 2020; Klerkx & Begemann, 2020; Klerkx et al., 2012).

[4] Socially disadvantaged producers include those who self-identify as Black or African American, American Indian or Alaska Native, Hispanic or Latino, and Asian or Pacific Islander.

[5] Refers to farming operations that are too small to compete with highly integrated corporate markets and distribution systems, yet too large to rely solely on direct marketing techniques (Lyson, 2008).

Figure 1. Distribution of All Farms and Ranches in 2022 and Proportion of Black-, Hispanic-, and Tribal-owned Farms and Ranches



Data source: USDA National Agricultural Statistics Service (2024).

The Mission-Oriented Agricultural Innovation Systems (MAIS) framework builds upon the AIS approach by incorporating a "mission-oriented" perspective to address social and political issues in agri-food systems transformation (Hekkert et al., 2020; Klerkx & Begemann, 2020; Kok & Klerkx, 2023; Pigford et al., 2018). The MAIS framework provides a thorough approach to understanding the technical assistance needs of the wide variety of producers scaling to wholesale markets. Policies guided by the MAIS framework have well-defined, transformative goals with a focus on advocating for public goods like social justice and equity, and demand an active role of the state (Hekkert et al., 2020; Pigford et al., 2018; Timmermann, 2020).

This study applies the MAIS framework to analyze how TA providers operate within interconnected systems of actors, institutions, and policies

that shape underserved producers' access wholesale markets. At the core of MAIS are the producers themselves, who engage with multiple stakeholders, including TA providers, financial institutions, buyers, consumers, and policymakers. TA providers such as USDA agencies, Cooperative Extension, and nonprofits play a critical role in facilitating innovation. These are in the form of accessing new markets, adopting new technologies, or transitioning to new products. The MAIS approach explicitly recognizes the barriers faced by underserved producers in accessing TA as institutional constraints that shape the innovation process (Klerkx & Begemann, 2020; Kok & Klerkx, 2023).

Federal and state-level programs and agencies aimed at supporting underserved producers provide much-needed resources. However, structural and systemic barriers limit their adoption and impact (Aminetzah et al., 2021; Asare-Baah et al, 2018; Russell et al., 2021). Additionally, the MAIS framework highlights the significance of networks and linkages in supporting agricultural innovation. By examining the actors, institutions, and resources within a well-defined framework, the MAIS approach helps us in assessing levers that can effectively support the TA needs of Black, Hispanic, and Tribal producers.

Methods

Alongside guidance from the project advisory group,[6] the study applies the MAIS framework to characterize the policy and programming environment. The study employs a robust approach for triangulating qualitative insights from interviews conducted with TA providers by combining reflexive thematic analysis and Latent Dirichlet Allocation (LDA). This ensures that both inductive thematic development and data-driven topic modeling contribute to a comprehensive understanding of the TA needs.

Data Collection

Data for this study was collected by interviewing TA providers who provided services to Black, Hispanic, and/or Tribal producers. A purposive sampling approach was used to select TA providers with direct experience in providing technical assistance to underserved producers in the Southern, Southeastern, and Midwest/Great Lakes region. Providers who worked exclusively with underserved producers, either by virtue of their location or though targeted programming, and providers who worked with all producers including underserved producers qualified as participants in the study. Since the objective was to identify issues specific to underserved producers, providers who did not work with these producers at all were excluded from the study.

This study was a part of a pilot project with the USDA, which focused on these three regions; therefore, providers from the three regions were included in this study. Emails from the authors' professional networks served as the first medium of contact with participants. The employment of snowball sampling, once interviews began, led to selection of subsequent participants. The interviews were conducted between December 2024 and March 2025. The results and interpretations are not generalized beyond the study context; rather, patterns that emerge consistently across the participants interviewed are examined. The recurrence of themes, therefore, reflects convergence across multiple, independently sourced accounts rather than a result of sampling bias.

Interviews followed a structured protocol that contained a total of 20 open-ended questions (see Appendix). The questions were finalized following a review of literature and input from the project's advisory group. Questions were developed to solicit responses that aligned with the study objectives, addressing topics of wholesale marketing, TA resources and programming, issues related to equity, and needs of the producers and providers.

The interviews were conducted via Zoom or telephone, depending on each participant's preference. They lasted approximately 45-60 minutes. All interviews were audio-recorded with consent and transcribed for analysis by the authors. The

[6] This project's advisory group comprised of four individuals with expertise in farming, extension and education, advocacy, TA programming, grant management, and legal aid. Collectively, this group brought practical farming experience, community perspectives, and TA knowledge, ensuring that this study was grounded in both rigorous research and lived realities.

authors' respective university institutional review boards approved this study as exempt. Prior to participation, all interviewees received information about the study's purpose, confidentiality assurances, and their right to withdraw at any time.

Data Analysis

Reflexive thematic analysis is an inductive approach that allows for identification of themes or patterns in qualitative data following a reflexive and iterative process. This method highlights the researchers' active role in interpretive analysis of the data, the flexibility of the theoretical assumptions being made, and interpretations of themes that emerge (Braun & Clarke, 2019; Braun & Clarke, 2022; Byrne, 2022). In this study, the findings are interpreted in the MAIS framework and the themes identified through manual coding of the data.

By adopting a reflexive approach, the analysis accounts for the contextual complexities of TA provision for underserved producers, while ensuring that the emergent themes are credible and representative of the data collected, as well as informed by the researchers' interactions with the project's advisory group and stakeholders. The approach involved familiarization with the data, coding based on sections within the interview protocol, generating themes, and refining themes to capture the perspectives of TA providers.

To complement the manual coding and to triangulate the findings, LDA was used. A natural language processing technique, LDA is a probabilistic generative model that allows for identifying co-occurring word patterns. This aids in identifying topics that align with the themes identified through reflexive thematic analysis. The process involves preprocessing the textual data to remove punctuation and common words, following which the automated unsupervised learning method identifies patterns in the text. This computational technique adds an additional layer of analytical rigor by revealing patterns that may not be apparent through manual coding alone (Jacobs & Tschötschel 2019; Maier et al., 2021; Nanda et al., 2023).

Results and Discussion

Twenty TA providers were interviewed for this study (Table 1). The interviewed TA providers work at federal and state agencies, cooperative extension, universities, nonprofits, and Tribal organizations. There is not a definitive number of providers in the study region to characterize the universe of providers. While the sample size of this study is 20, it covered a wide range of providers to get a cross-section of perspectives.

Interviewing the TA providers gave a systems-level and institutional perspective within the TA ecosystem that shapes how these resources reach underserved producers. The providers offered a broad and comparative view across multiple producer communities and geographies, allowing the identification of patterns that just a producer-perspective may not fully capture. The rest of this section presents interview results based on the research objectives, which included examining (a) issues in wholesale market access for Black, Hispanic, and Tribal producers; (b) the TA needs of producers to support wholesale market access; (c) the current state of programming and support by the TA providers, and (d) core competencies of the TA providers.

Wholesale Market Readiness and Access

Several themes emerged from the analysis of qualitative interview data that highlight the barriers faced by underserved producers in accessing wholesale markets. The interconnected themes include (a) information asymmetry and regulatory environment, (b) limited capital and capacity, and (c) infrastructure and logistical constraints. An overarching issue discussed in each of the three themes was "structural racism and discrimination" and its impact and persistence in social and economic outcomes today. The LDA model application yielded the following terms within three topics: "grants," "funding," "knowledge"; "land," "capital," "capacity"; and "infrastructure," "scale," "aggregating," "processing," respectively. These reaffirm the validity of the themes from the reflexive analysis.

Information Asymmetry and the Regulatory Environment

One of the main themes that emerged for underserved producers for expanding to wholesale markets is information asymmetry, particularly related to the economics of wholesale markets. Among the TA providers interviewed, 85% emphasized that the underserved producers served were largely unaware of available market data like current market demand, pricing trends, and opportunities. Another common theme is the highly regulated environment, which aligns with the findings of Asare-Baah et al. (2018) and Tyler and Moore (2013). The complexity and technical language as well as the cost of regulations related to food safety and handling, quality inspections, and certifications were significant challenges for the producers.

The majority of the TA providers (65%) noted that the producers' lack of experience in applying for federal grants, the complexity in the grant application process, and the inability to provide the required operations data were major barriers preventing them from applying for grants. More than half of the providers interviewed (60%) spoke about their expectation of their application being rejected as dissuading them from applying for federal grants and loans. They recounted that producers have voiced discomfort in visiting local offices owing to an expectation of racism. They are further discouraged by a lack of transparency in the decision-making process of loan and grant allocations. These issues were also reported by Guynn et al. (2024), Reynolds et al. (2025), and Russell et al. (2021).

Some TA providers (40%) reported that many producers were not accustomed to estimating the costs of production for their operations. They did not have data and records for their inputs, acreage, practices, and output in the form required by federal and certification agencies. This is often a result of not having access to tools like farm management software or the lack of time and labor to meticulously manage all records (Friedman et al., 2024). These providers also reported that many Black and Tribal producers operate on historical knowledge and experience-based decision-making rather than formally collecting data. Together, these led to challenges in applying for loans and grants, meeting the GAP certification requirement, and selling to institutions. In the following excerpt, a TA provider who is also a farmer, working with producers in Southern states, described this issue:

Table 1. Characteristics of Technical Assistance (TA) Providers Interviewed (*N* = 20)

Characteristic	Sample size	Description
Geographic Scope		
Southern and Southeastern regions	10	Includes providers from Kentucky, Georgia, Texas, Virginia, and Mississippi
Midwest/Great Lakes region	7	Includes providers from Illinois, Michigan, and Wisconsin
National organizations	3	Providers working nationally
Organizational Affiliation		
Federal and state agencies	5	Providers at federal and state agencies managing and/or delivering TA programs
Cooperative Extension and land-grant universities	8	Providers affiliated with land grant universities, holding full-time or part-time extension appointments
Nonprofit organizations	5	Providers working at nonprofit organizations focused on outreach, education, and advocacy
Tribal organizations	2	Providers affiliated with Tribal-serving organizations
Providers also producers	4	Producers who are also providing TA by being affiliated through one of the above organizations
Total sample size (*N*)	20	Total providers interviewed

> That's been the biggest one [challenge], getting folks [GAP] certified. … And it was very difficult to scale because a farmer couldn't tell me how much it cost him, for example, to grow a tomato or couldn't give me accurate statistics. On year to year, how much their cost to produce was. So, all of that stuff before you get outside the farm gate, there's still a lot of education that needs to be done in that space.

Limited Capital and Capacity

All interviewed TA providers mentioned land and capital as constraints blocking access to wholesale markets in a few ways. First, access to land is a hindrance, including land that is permanently owned by the producers and land that is feasibly accessible for them to scale operations. Most underserved producers grow on small operations and the availability and cost of land for upscaling operations can be extremely challenging (Callahan & Daniel, 2022; Figueroa & Penniman, 2020). Many producers are running their operations on leased land, and due to land tenure insecurity, they may lack the incentive to invest in infrastructure or sustainable practices as they may have to relocate (Carlisle et al., 2019).

Second, access to working capital, for scaling operations as well as for managing day-to-day operational costs, is a significant barrier. Producers find it difficult to make the decision to scale as it may require them to invest in infrastructure for storage, processing, packaging, and transportation, and these costs can be prohibitive. While the challenge of securing working capital to scale operations may not be unique to underserved producers, barriers in accessing loans and technical assistance add additional layers of complexity (Asare-Baah et al., 2018; Rittner et al., 2025). An auxiliary issue associated with working capital is that many grants require producers to claim reimbursements for expenditures made. In the following excerpt, a TA provider working with Tribal producers described this issue:

> So, the biggest issue I see is, outside of technical jargon, outside of people misunderstanding stuff, is the fact that these grants are written with the idea that people will have established capital to take advantage of these grants. The people I work with when they say like, oh, this is a reimbursement grant and you need [US]$25,000 of your own money up front before you can get reimbursed, that is an insurmountable hurdle for them.

Third, 55% of providers spoke about limited access to human and social capital to support on-farm practices as well as market relationships as a major constraint. They reported that it is common for underserved communities to have fewer providers from organizations and federal agencies available to support them. They also noted the loss of generational farming knowledge as an impediment for new and beginning producers and as a factor that affects their production and marketing decisions.

Infrastructure and Logistical Constraints

Almost every interviewed TA provider (90%) identified significant deficiencies in infrastructure as a major barrier that physically constrains wholesale market access, not just for underserved producers but for any producer in the agriculture-of-the-middle category. Limited availability of processing facilities, for fruits, vegetables, and meat, directly impacts producers' ability to sell to institutions and grocery stores (Brislen, 2018; Carrillo, 2008). These providers emphasized that infrastructure and logistical gaps disproportionately affect underserved producers due to factors like historical disinvestment, lower access to capital, and weaker networks. One TA provider described this issue as a "chicken or egg problem" for the market, referring to who, between the producer and the buyer, takes the first step toward the wholesale relationship. Must the producer first invest in the infrastructure and capacity to be wholesale-ready before approaching the buyer, or can the buyer approach the producer to guarantee a market and share the risk in upscaling to meet the needs of the market?

Access to Technical Assistance

The themes that emerged from the interview responses related to barriers in accessing or utilizing technical assistance are (a) historical distrust and institutional barriers, (b) operational and infra-

structural challenges, and (c) socioeconomic and cultural factors. Topic modeling with three assigned topics provided the terms "trust," "racism," "grant"; "part-time," "capacity," "technology"; and "language," "identity," respectively. These reaffirm the themes that emerged from reflexive thematic analysis.

Historical Distrust and Institutional Barriers

A major theme revolves around the historical distrust between underserved communities and federal institutions, particularly USDA agencies (Russell et al., 2021). Half the TA providers interviewed said that such distrust creates a perception among underserved communities that TA programs are designed for larger and primarily white producers. Further, the providers pointed to skepticism about program continuity and availability of funds, which discourage many producers from engaging with available TA resources.

Forty percent of interviewed TA providers discussed how persistent mistrust has resulted in further alienation from standard communication networks for sharing information about TA resources available. A TA provider working at a nonprofit organization in the Midwest/Great Lakes region shared a statement related to this mistrust:

> We've heard from Latino producers that they've been talked down to or ignored in spaces where other farmers were welcomed. Some of our families don't even open mail from the USDA because they assume it's going to lead to trouble. There's a real fear of being visible in systems that haven't protected you in the past.

Operational and Infrastructural Challenges

Sixty percent of TA providers highlighted that TA by itself may not have much value to a producer, if it is not associated with any financial assistance for infrastructure or operational costs. An example mentioned included TA for setting up high tunnels to grow vegetables. While valuable to the producer, it is irrelevant if there are no financial resources to purchase and install the tunnels.

Technological constraints were noted by 40% of the TA providers interviewed. Limited access to broadband internet, a computer or smartphone, and/or lacking technological proficiency hinder direct access to online resources and make it difficult to participate in virtual programming (Pesci et al., 2023).

Socioeconomic and Cultural Factors

About a third of the providers (30%) noted that many underserved producers prefer working with organizations and TA providers they trust, such as local nonprofits or community-based organizations. But these groups are often underfunded to provide long-term support (USDA Office of the Secretary, 2022). Additionally, the limited representation of leadership and staff in extension and federal agencies makes it harder for underserved producers to trust and relate to the services they offer (Hartmann & Martin, 2021).

TA providers are predominantly white and may not reflect the cultural backgrounds of underserved producers (Hartmann & Martin, 2021; Russell et al., 2021). This results in unintentional biases or unrelatable outreach efforts. Examples include making assumptions about technological proficiency, assuming literacy in technical jargon, and prioritizing commodity crops that are more common among white, large-scale producers (Diaz et al., 2023; Furman et al., 2014). A provider noted that many Tribal and Black farmers may use traditional knowledge systems, and for this they rely on informal community-based knowledge and networks rather than formal TA providers.

Program Delivery by TA Providers

Many factors limit the reach and impact of TA providers when it comes to identifying the needs of underserved producers and developing and delivering appropriate services. The major themes that emerged from interviews with TA providers that focus specifically on unique challenges that directly impact program delivery were (a) limited capacity and mobility of providers, (b) insufficient financial resources, and (c) cultural barriers. The element of trust is deeply intertwined within these themes and continued to be a major structural factor highlighted by all TA providers. Topic modeling provided the terms "capacity," "staff," "distance"; "funding," "grants"; and "language," "barrier,"

"cultural," respectively, and reaffirm the themes identified.

Limited Capacity and Mobility of Providers

Over half of the TA providers interviewed (60%) described having to operate with limited capacity, constrained by insufficient funding, understaffing, and high workloads. This significantly affected their ability to deliver tailored services and conduct outreach to underserved producers. They described that it is common for a single provider based out of a federal agency office, nonprofit, or cooperative extension office to serve a diverse region and community that may be spread across several counties. Thus, finding qualified topic specialists (e.g., specializing in cooperative marketing or food safety certification) to work in remote and rural areas can be difficult (Narine et al., 2016).

These providers highlighted that these capacity constraints vastly limit their ability to focus on "proactive" TA, instead providing "reactive" TA, which limits innovation and creativity in programming and resources. They recognized the need for and value of being present in underserved communities on a regular basis to form relationships and build trust, especially considering the historical mistrust already contributing to fewer interactions.

Insufficient Financial Resources

Half the TA providers interviewed discussed how limited funding might only support a portion of their time, meaning that they are often engaged in multiple projects, thus limiting their focus on any one service. The majority of the providers (60%) highlighted that most federal grants for agricultural support, as well as related issues like disaster support, have limited funding. The resulting oversubscription creates a self-reinforcing cycle of disengagement among underserved producers, as many are repeatedly unable to access support.

They further noted that since these financial resources can be tied closely to the federal and state-level political climates, it can create uncertainty for the TA providers advocating for these resources. They mentioned that despite their best intentions, they have to be cautious about the promises they make about available support because these may suddenly become unavailable. This can drastically affect the relationships, trust, and credibility that the providers built with producers. Reflecting on this uncertainty, a TA provider noted the following:

> You know that if the political climate changes a little bit, to what extent are we going to have the federal government behind us, backing up what we've said. It is a very precarious position to be in, to put yourself out there in a community that already has some reasons to be skeptical and you're telling them that this time it's going to be different.

Cultural Barriers

Some TA providers (40%) acknowledged that cultural barriers are common between producers and providers, and many face challenges in cross-cultural engagement. These challenges may manifest in the form of discomfort and hesitancy in working with underserved producers and an inability to connect or communicate as desired. This can result in providers avoiding underserved communities altogether. The providers also reported that despite their efforts to hire professionals belonging to the underserved communities they work with, they are often unable to do so. This could be due to a limited availability as well as a mismatch between education and occupational requirements, which results in hiring professionals who are white (Elliott-Engel et al., 2021).

Less than half of the providers interviewed (40%) reported hearing directly or indirectly from underserved producers that these professionals "do not speak their language." This is not just referring to the spoken language but also to the cultural, behavioral, and experiential disconnect between providers and producers (Elliott-Engel et al., 2021). This, in different ways, continues to occur in programming. An example is trainings that have a one-size-fits-all approach that is more suited to conventional operations.

Core Competencies of TA Providers

The analysis of responses related to essential qualities and core competencies of TA providers working with underserved producers underscores the importance of both interpersonal skills and appro-

priate technical expertise. The LDA model yielded the following terms: "cultural," "communication," and "relationships."

"Cultural competency and relationship building" emerged as a critical theme emphasized by every provider responding to this question. They discussed the need for providers to establish credibility and develop trustful relationships with producers over time. "Technical expertise and tailored programming" were reported as important factors by 70% of the providers. These would contribute to building trust with producers through the provision of culturally appropriate programming, meeting them where they are, and ensuring equitable access to resources. Most providers (65%) noted "communication and advocacy" as a key theme. They emphasized the importance of active listening and communicating through channels more commonly used by producers. Additionally, they recognized the need for facilitating producers' participation in decision-making spaces and advocating for systems that benefit underserved producers.

Conclusion and Recommendations

Results from this pilot study indicate that effective TA to meet the needs of underserved producers requires approaches that address both structural barriers and technical skills. These correspond to the institutional systems within the MAIS framework that shape innovation processes and equity outcomes. These findings build on prior studies that collect data from producers and also report the lack of communication and transparency in federal programming, along with discrimination, as major barriers (Russell et al., 2021).

The authors recognize that this study is not without limitations. Because the study is part of a pilot with the USDA, it includes interviews with a limited number of TA providers (20), selected across the Southern, Southeastern, and Midwest/ Great Lakes regions. Its findings do not consider issues related to wholesale markets and TA in other U.S. locations. Regional variations in policy, infrastructure, market access, and demographics may limit the broader applicability of the recommendations. The purposive sampling strategy used in this study may introduce a selection bias. The relatively small sample size means that the findings are preliminary in nature and calls for future work with a larger sample to validate them. A larger sample will also allow for making comparisons across regions and provider types. The authors also acknowledge that their positionality[7] may have influenced the presentation of the findings.

Direct input from producers is needed to validate this study's findings, particularly in relation to trust, discrimination, and cultural relevance. It is important to note that these findings represent insights for a particular period, based on current program structures, political climate, and funding availability. As federal and state policies evolve, the relevance of challenges and opportunities identified in this study may shift.[8]

This research becomes especially important in the current political climate, following the change in U.S. federal administration in 2025 when the USDA ended or cut a wide range of equity initiatives in agriculture, totaling at least US$148.6 million.[9] Socially disadvantaged producers represent about 5% of all producers in the U.S. today, with the remaining 95% identifying as white (USDA NASS, 2024). Removing funding available specifically for underserved producers will be regressive in nature. This is because it shifts resources away from those producers with the least historical access to federal support, thereby disproportionately reducing resources available to them.

[7] The authors include both men and women; white, Black, and South Asian; and native-born and immigrants. These positionalities likely affected how they understood and interpreted the experience of the providers and producers. While such diversity can enrich the analysis, it can also influence the significance placed on different themes and therefore the overall findings.

[8] While this research was conducted prior to the change in U.S. administration in 2025, the authors recognize that changes in the associated funding and political landscape directly and indirectly affect the discussion and recommendations of this study. The USDA will also no longer use the term "socially disadvantaged" (USDA, 2025), which included producers who identified as Black, Hispanic, and/ or Tribal. This is likely to have an impact on programs that had funding earmarked for these communities.

[9] Refer to USDA press release: https://www.usda.gov/about-usda/news/press-releases/2025/06/17/secretary-rollins-takes-bold-action-put-american-farmers-first-cuts-millions-woke-dei-funding

The themes that emerge from the analysis point towards a lack of "readiness" both for producers seeking to scale operations and for TA providers working with underserved producers. As emphasized by the TA providers interviewed, the success of these programs depends on their ability to be relational and not transactional in nature. The barriers and recommendations from the findings are summarized in Figure 2. The arrows from the "interventions" point at the direction to address the "barriers" identified. The arrow from "access to technical assistance" underscores its emphasis on supporting wholesale market access for underserved producers.

Wholesale Market Readiness

The findings underscore the need for tailored capacity-building for underserved producers in the regions covered by the study. This is particularly important regarding specific entry points to wholesale markets, data collection and management, regulatory compliance, and certification requirements (McManus et al., 2020; Schmidt et al., 2011). These support producers with applications for grants and loans, and in obtaining necessary certifications (e.g., the USDA's Good Agricultural Practices Program). While online resources, programming, and federal grant programs[10] are available to help assess and support wholesale readiness, there is still a large gap in TA required to meet the specific needs of underserved producers (Asare-Baah et al., 2018). Further, there is a need to facilitate the development of long-term relationships between producers and buyers. This will keep producers more informed about current market opportunities and create incentives for buyers to invest in aggregation and logistics systems (e.g., packaging and storage facilities, transportation, and institutional orders) (Crook et al., 2023; Day-Farnsworth et al., 2009; Schmidt et al., 2011).

Technical Assistance Delivery and Provider Support

Institutions providing TA must consider including members from underserved communities in their staff. This recommendation aligns with literature on community development as foundational ways to increase trust and engagement from communities who may otherwise distrust formal institutions (Ellis & Muyita, 2025; Hartmann & Martin, 2021; Oliver & Strager, 2021). Hartmann and Martin (2021) refer to this as "insider collaboration." An increased capacity among TA providers to deliver long-term programming that is backed by guaranteed funding will be critical in establishing trust with underserved communities (Furman et al., 2014).

Some ways of building relationships and trust, as also supported by other studies, could be to partner with established community-based organizations and models of cooperative learning (Dy & Seybold, 2023; Furman et al., 2014). Further, with an increase in engagement, it will be important to incorporate traditional farming knowledge systems into TA programs (Francke & Briones, 2017; Hartmann & Martin, 2021). Strategies to address operational challenges of participation include greater engagement in appropriate communication networks, delivering culturally appropriate services, and creating accessible programming (Diaz et al., 2023; Elliott-Engel et al., 2021; Lahr et al., 2022).

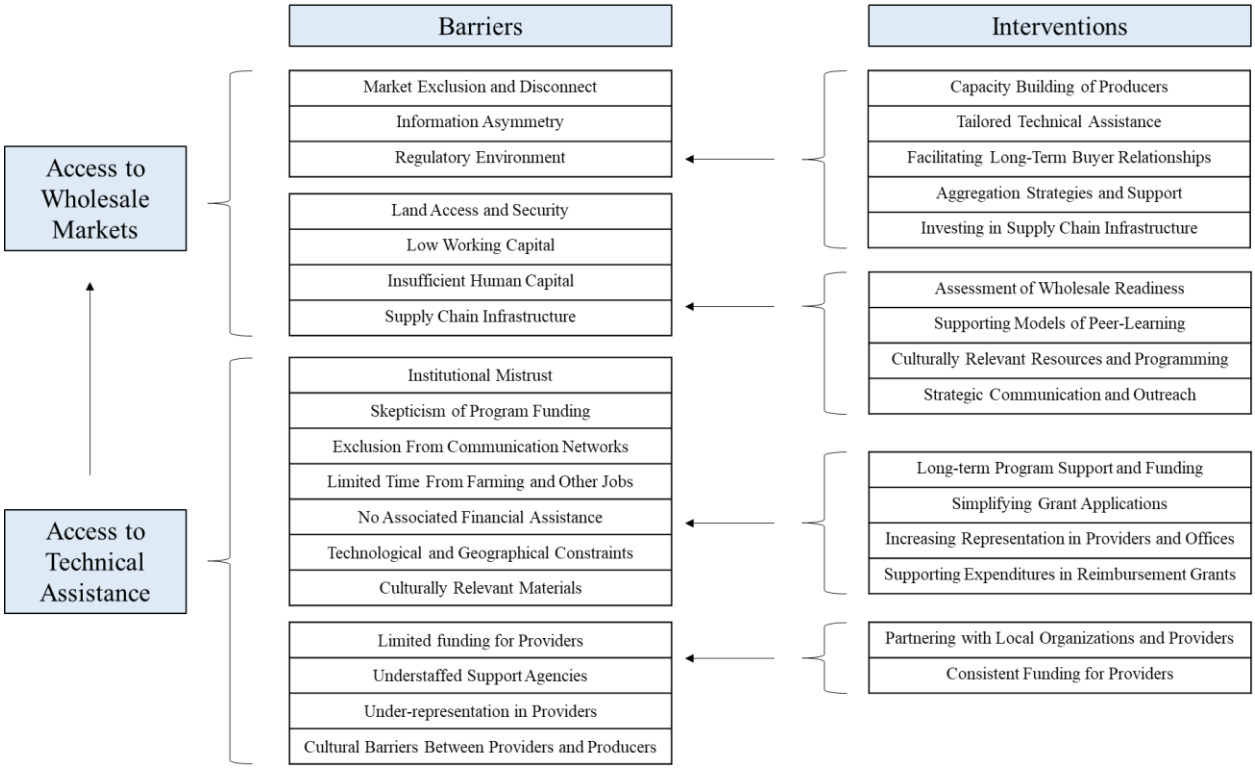
Federal Program Design and Administration

The USDA established Regional Food Business Centers[11] across the country with the objective of supporting market access and TA for producers, emphasizing their planned efforts to rebuild trust with underserved producers. However, the program timeline of five years has been criticized as not being sufficient to establish trust and build last-

[10] Some examples of resources, programming, and support available include the Baskets to Pallets project at Cornell University, the Small Farm Outreach Program at Virginia State University, the wholesale readiness training curriculum at the Minnesota Institute for Sustainable Agriculture, published guides by Sustainable Agriculture Research and Education, as well as support offered by many local nonprofit organizations and civil society groups. Some notable federal grant programs include the Outreach and Assistance to Socially Disadvantaged and Veteran Farmers and Ranchers Program (2501 Program) and the American Rescue Plan Technical Assistance Investment Program (ARPTAI).

[11] Notably, federal funding to support the USDA Regional Food Business Centers was withdrawn following the change in federal administration in 2025, directly affecting the TA communication, coordination, and support being extended through these groups.

Figure 2. Barriers Identified in Wholesale Market Access and Access to Technical Assistance, and the Associated Proposed Interventions



ing relationships (Van Sandt et al., 2024). Findings from the study emphasize the need for engaging with peer networks, producer organizations, and the communication networks that underserved producers use (e.g., Facebook groups as opposed to emails) to improve outreach among those who have been excluded from conventional communication networks.

There is a need to address the bureaucratic challenges that underserved producers face, particularly in accessing federal assistance. This could be done by simplifying application and evaluation requirements for underserved producers and further assisting those who have not applied for federal grants and loans before (Reynolds et al., 2025). One way of addressing this challenge, as suggested by a TA provider interviewed and recommended by Dy & Seybold (2023), is establishing panels of underserved producers who also weigh in on funding decisions for grants. Providers also noted a need for reducing upfront capital requirements for reimbursement-based grants or supporting producers in making these expenditures through low-cost credit. Further, equitable funding for the 1890 institutions[12] would also support the creation of tailored research and knowledge as well as human resources to address these issues (Asare-Baah et al., 2018; Furman et al., 2014).

As federal agricultural support institutions seek to rebuild trust with underserved communities, it will be particularly important to implement transparent decision-making processes for loan and grant allocation (Dy & Seybold, 2023). There needs to be a stronger push to diversify agency leadership and staff at all levels and to create safe, welcoming spaces at local offices to address the discomfort reported by many producers visiting these facilities (Diaz et al., 2023).

[12] 1890 institutions are 19 historically Black land-grant universities in the U.S. established to provide agricultural and mechanical education. They receive federal funding for research and extension programs to support underserved communities and small farmers.

Future research is needed that measures the distribution and quality of TA programming across the country—especially regarding the intensity of engagement and associated measurable outcomes. In addition to qualitative research like this study, longitudinal and mixed-methods study that link funding and service delivery with farm-level economic and social outcomes are required to examine specific results. Since trust is a major factor in sustaining equity-focused TA programming, future research must examine how policy shifts like the ongoing ones have long-term effects, assess how subsequent reinvestments have (or have not) rebuilt trust and capacity, and identify strategies to make TA resilient to future political and funding fluctuations.



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Appendix. Structured Interview Guide for Technical Assistance Providers

Introduction

1. Can you please tell us about your organization; if it is a local or national nonprofit or for-profit, extension, institution, state or federal, if there are TA staff who are Black, Hispanic, or Tribal; where you are located, your position and role, and how long you have been with the current organization?
2. Thinking about a typical day in your work, what type of farming operations do you most frequently work with and what are the most common issues that you address?

Technical Assistance for Wholesale Marketing

3. Can you provide an overview of the technical assistance programs and resources you currently provide to assist producers in upscaling their agricultural operation to production for wholesale?
4. Are any of these programs specifically designed for Black, Hispanic, or Tribal producers or are they designed for all producers? If so, please elaborate.
5. Please share (or explain) your process for developing your technical assistance for wholesale market upscaling?
6. Do you do outreach to specifically recruit and engage Black, Hispanic, and Tribal producers in your wholesale farming programming? Please elaborate.
7. On average per year, how many are on staff at your organization to provide the technical assistance you described to producers overall, and specifically to Black, Hispanic, and Tribal producers?

Distinct Needs of Black, Hispanic, and Tribal Producers

8. How, if at all has your organization worked with Black, Hispanic, and/ or Tribal producers? Which, if any, of these communities does your organization focus on?
9. In your experience, what are some of the distinct needs that Black, Hispanic, and/ or Tribal producers have when scaling their operations for wholesale markets?
10. How do these needs differ from those of other producers in the same region?
11. What examples do you have of how you have tailored your services to meet these specific needs?
12. Are there any barriers or challenges that Black, Hispanic, and/ or Tribal producers face in accessing or utilizing technical assistance resources?

Feedback and Improvement

13. What are some qualities that you believe are essential for technical assistance providers when supporting Black, Hispanic, and/ or Tribal producers?
14. What are some issues that are preventing technical assistance providers from working with Black, Hispanic, and/ or Tribal producers?
15. What specific modes of delivery have been most effective in delivering technical assistance to Black, Hispanic, and/ or Tribal producers? Please elaborate.

Professional Development

16. Have you ever received training focused on wholesale marketing for Black, Hispanic, and/or Tribal producers. If so, please share more details about this training.
17. Have you received either through your organization or on your own, training in cultural and racial competency, ethics and/or racial bias? If so, please share more details about this training.

18. What other trainings, specific to wholesale marketing and/ or cultural and racial competency are you interested in?

Closing Remarks

19. Is there anything else you would like to share regarding your experiences working with Black, Hispanic, and Tribal producers in accessing wholesale markets and technical assistance resources?
20. Is there anyone who you would recommend that we talk to regarding this study?

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Promises and pitfalls: Small-scale farmers' perspectives on market access initiatives in Jozini, South Africa

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Abstract

Small-scale farmers remain systematically excluded from formal markets due to a combination of structural constraints, such as inadequate infrastructure, poor institutional support, and asset-related vulnerabilities that limit their ability to compete. Despite numerous public and private interventions designed to improve market access, these initiatives often fail to address the complexity of farmers' challenges and their long-term impact. This study critically examines market access interventions affecting the participation of small-scale producers in the Jozini Local Municipality, a socio-economically marginalized rural area in northern KwaZulu-Natal (KZN), South Africa, to determine whether they effectively reduce systemic barriers or reproduce inequalities. Guided by the asset vulnerability analytical framework (AVAF),

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Conflict of Interest
The authors declare no conflict of interest.

this study examines the relevance, implementation, and sustainability of these interventions. We used focus-group discussions and semi-structured interviews to investigate how farmers experience and interpret interventions aimed at improving market participation. The findings reveal widespread dissatisfaction with many programs due to poor implementation, limited reach, lack of coordination, inadequate maintenance, insufficient training, and weak communication. These shortcomings continue to limit farmers' ability to accumulate and effectively utilize physical, financial, and human assets, thereby reinforcing existing vulnerabilities. While the AVAF has been widely used to analyze livelihood and climate-related vulnerabilities in the region, its explicit use in examining market access interventions targeting small-scale farmers appears limited. This study, therefore, extends the application of the AVAF by examining how market access interventions shape producers' asset vulnerabilities and market participation from their perspectives. The study concludes that, while multiple market access interventions are present in the Jozini Local Municipality, they have not yielded meaningful improvements in farmers' participation in formal markets and are therefore unlikely to reduce vulnerability. The study notes that market access interventions in highly marginalized rural contexts are unlikely to reduce vulnerability unless they move beyond fragmented, project-based delivery toward institutionally coordinated, accountable, and context-responsive strategies that support sustained asset accumulation and meaningful integration into formal markets.

Keywords
asset vulnerability analytical framework (AVAF), agricultural interventions, asset vulnerability, market access, rural livelihoods, small-scale farmers

Introduction

Agriculture plays a crucial role in rural development and the sustenance of rural livelihoods, serving as the backbone of food security in South Africa, particularly in rural areas where it significantly contributes to economic growth and employment (Mokgomo et al., 2022). Globally, the Food and Agriculture Organization of the United Nations (FAO, 2022) estimates that 1.3 billion people engage in agriculture, with 97% residing in developing countries; among these, approximately 400 million rely on small-scale farming for their livelihoods. These global patterns are reflected in southern Africa, where small-scale agriculture remains central to rural livelihoods yet is persistently characterized by limited integration into formal markets. The Jozini Local Municipality exemplifies these dynamics, as small-scale producers operate in structurally constrained rural economies marked by weak infrastructure, high poverty levels, and uneven access to market-supporting assets. Small-scale farming is therefore central not only to ensuring household food security but also to shaping broader patterns of rural poverty, resilience, and local economic functioning. By providing households with both subsistence and marketable produce, it contributes to income generation and poverty alleviation. Moreover, it enhances resilience by enabling households to cope with economic and environmental shocks through diversified production strategies. Moreover, small-scale farming underpins local economic functioning by sustaining rural markets, facilitating employment opportunities, and supporting the circulation of goods and services in local value chains.

In South Africa, the agricultural sector contributes approximately 3% to the national gross domestic product (GDP), accounts for about 40% of export revenues, and provides roughly 4.6% of employment (KwaZulu-Natal Department of Agriculture and Rural Development, 2023). More importantly for rural development debates, it serves as the backbone of rural livelihoods, where a large proportion of households depends on small-scale farming as their primary income (Mbatha & Masuku, 2018). This reliance is particularly pronounced in provinces such as KwaZulu-Natal, where small-scale farming underpins household subsistence, food security, and coping strategies in the face of high unemployment and persistent poverty (Nhlozi, 2023).

Situated in the northernmost part of the uMkhanyakude District, the Jozini Local Municipality illustrates these dynamics. Classified among South Africa's poorest municipalities, Jozini rec-

ords poverty levels above 70% and youth unemployment rates exceeding 55% (Simelane, 2017; Statistics South Africa, 2022). Approximately 80% of households in this predominantly rural municipality engage in agriculture, combining crop cultivation and livestock production (Buthelezi, 2021). These activities frequently represent the sole income source for vulnerable groups such as women-headed households, the elderly, and unemployed youth (Wale & Mkuna, 2025). However, despite its importance, small-scale farming in Jozini remains largely subsistence-based, relying on traditional and labor-intensive methods, such as manual ploughing, hand sowing and weeding, small-scale irrigation with rudimentary tools, and limited mechanization. These methods, while culturally embedded, constrain productivity and exacerbate vulnerability to structural and environmental pressures, including unpredictable rainfall, soil fertility decline, and restricted access to modern agricultural inputs.

Small-scale producers in South Africa face a plethora of challenges that impede productivity and income generation. These include limited access to land and irrigation, insufficient financial and technological resources, labor constraints, and vulnerability to environmental shocks such as erratic rainfall and soil degradation. In this broader context, access to formal markets is particularly constrained. Empirical research (Agholor et al., 2023; Lantz, 2019; Mpandeli & Maponya, 2014) documents the barriers that constrain small-scale farmers' access to formal markets. Mpandeli and Maponya (2014), through surveys and focus group-based research in Limpopo, found that limited market information, high input prices (such as fertilizers), inadequate irrigation, high transportation costs, and natural constraints were major impediments to production. On the other hand, Lantz (2019), drawing on peer-reviewed literature in economics and agricultural sciences, found that stringent agro-food market requirements, technological limitations, information asymmetries, high transaction costs, inadequate infrastructure and inputs, limited government support, and unequal land distribution restrict farmers' participation in growth and trade opportunities. Complementing these findings, Agholor, Ogujiuba, and Shongwe (2023), using structured and semi-structured questionnaires, found that high transportation costs and inadequate market information limit market participation, while factors such as age and gender further exacerbate market exclusion. Collectively, these studies illustrate a convergence of physical, financial, institutional, and socio-demographic factors that collectively impede market integration for small-scale farmers, highlighting the multifaceted nature of market access constraints and the need for integrated, context-sensitive interventions.

Farmers in Jozini face enduring barriers when accessing formal markets, including infrastructural deficiencies, logistical constraints, and limited institutional support. Underdeveloped roads, fragmented value chains, and insecure land tenure compound these challenges, while socio-demographic factors such as youth outmigration and limited knowledge transfer restrict continuity and innovation (Avudufu, 2022; Dhilon & Moncur, 2023; Ndlovu & Masuku, 2021)). Adverse environmental conditions, including erratic rainfall and climate change, primarily reduce crops and livestock yields (Maziya, 2023; Mkhize, 2018). These biophysical constraints are compounded by structural and institutional barriers that directly impede access to formal markets. Socio-demographic factors, such as youth outmigration and limited knowledge transfer, further exacerbate these vulnerabilities. Collectively, these factors constrain productivity, undermine income security, and limit pathways into formal markets.

In response, various public-sector interventions have been implemented to reduce market access constraints. In Jozini, such measures include infrastructure investments such as the Value-Adding Center (JVAC), for processing and storage facilities; the Department of Agriculture and Rural Development's (DARD) "dam and dip" initiatives aimed at improving irrigation and livestock health; the Poverty Eradication and Sustainable Income (PESI) grant program; mechanization support by providing tractors and farming equipment; and market connection efforts such as the DARD-facilitated Hello Choice Market (KZN-DARD, 2023). These programs are designed to enhance farmers' production capacities, reduce post-harvest losses, and link producers to formal markets.

Existing evaluations and reports, however, suggest a persistent gap between policy intentions and on-the-ground outcomes. Farmers report mismanagement, underutilized infrastructure, dysfunctional equipment, and inconsistent delivery of promised support. While some initiatives have shown potential, their reach is limited by inadequate training, weak follow-through, and a lack of sustained institutional backing. Previous scholarship (Khambule, 2025; Matisson, 2024: Mfikili, 2023; Shapland et al., 2021) documents phenomena such as elite capture, administrative bottlenecks, and implementation failures in South African rural development programs, but these accounts are often drawn from program reports or macro-level evaluations and do not always reflect the lived experiences of intended beneficiaries.

It is this distinction between what program documentation and macro evaluations report and what beneficiary communities actually experience that motivates the present study. While existing literature (Agholor et al., 2023; Hlatshwayo et al., 2021; Ndlovu & Masuku, 2023) provides important descriptions of barriers and catalogues of interventions, a few related gaps remain apparent. First, numerous studies (Ndlovu & Masuku, 2021; Olabanji & Chitakira, 2025) evaluate market access interventions from a program or policy perspective (outputs, budgets, infrastructure), whereas few studies foreground the perceptions and lived realities of small-scale farmers themselves, particularly in deeply marginalized municipalities such as Jozini. Second, there is limited empirical evidence on whether interventions actually disrupt structural inequalities or reproduce them by privileging better-resourced households or local elites. Third, while asset-based approaches emphasizing physical, financial, human, social, and natural capital are well established in development theory (Chatsiwa, 2025; Ntsiapane et al., 2023; Skhosana, 2021), their use as an evaluative lens for assessing market access initiatives at the local level remains limited in empirical studies of South African rural interventions.

This study, therefore, addresses these gaps by centering on small-scale farmers' perceptions of such interventions in Jozini and applying the asset vulnerability analytical framework (AVAF) (Moser, 1998, 2021) as an interpretative and analytical tool. By examining how deficiencies across physical, financial, human, social, and natural assets mediate farmers' abilities to access and benefit from interventions, the study connects microlevel experiences to broader questions of policy effectiveness and equity. Empirically, the study draws on qualitative data collected from small-scale farmers in Jozini, prioritizing their narratives, evaluations, and strategies, to offer a place-based, farmer-centered account of how market access initiatives perform in practice.

In doing so, the study contributes in various interrelated ways. Empirically, it supplies new, contextually grounded evidence on beneficiary perceptions in a municipality that is underrepresented in the evaluation literature. Theoretically, it demonstrates the value of deploying an asset-vulnerability lens to interrogate whether interventions ameliorate or exacerbate structural inequalities. Practically, the study produces policy-relevant insights about the design, targeting, and governance of market-access initiatives, emphasizing the importance of participatory, asset-sensitive, and longitudinal approaches to program delivery and monitoring. Ultimately, the study aims to critically interrogate market-access interventions targeting small-scale farmers in Jozini Local Municipality to assess whether these interventions alleviate market-related vulnerabilities or reproduce existing patterns of exclusion. The study specifically seeks to:

(1) examine how small-scale farmers experience and interpret market access interventions in practice;
(2) analyze how asset deficiencies shape farmers' capacity to benefit from these interventions; and
(3) evaluate the implications of these dynamics for equitable market participation.

Theoretical Framework

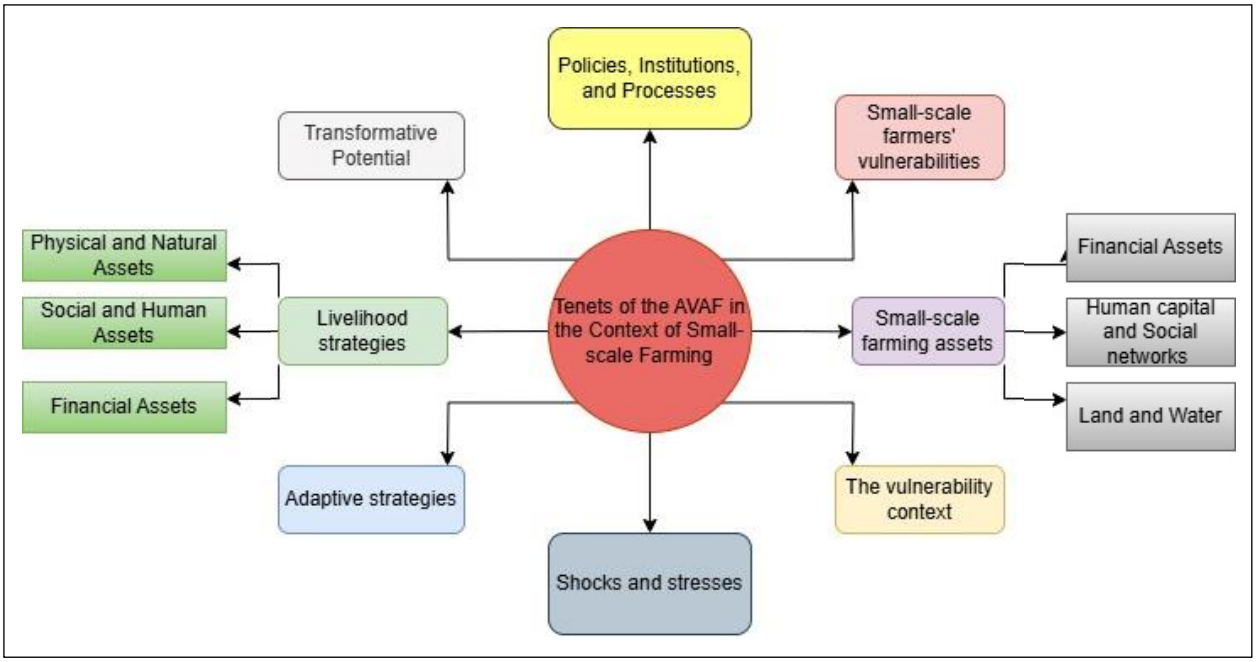
This study employs Caroline Moser's asset vulnerability analytical framework (AVAF) to critically examine the persistent structural and institutional constraints that undermine small-scale farmers' participation in formal agricultural markets in Jozini, KwaZulu-Natal. The AVAF highlights the importance of asset ownership, access, and control

in determining the resilience of individuals and communities to both chronic poverty and external shocks (Moser, 1998, 2021). In the context of small-scale agriculture, the AVAF provides a multi-dimensional lens to examine how deficiencies in physical, natural, financial, human, and social assets intersect with institutional constraints to shape market participation. In this study, physical assets were operationalized through access to infrastructure and equipment, financial assets through credit and production inputs, human assets through skills and training, social assets through networks and cooperative engagement, and natural assets through land and water resources. This organization enabled a systemic coding of farmers' experiences, facilitating analysis of how asset constraints influence the effectiveness of market access interventions.

In this framework, vulnerability is shaped by three interrelated components: the asset portfolio of households, the vulnerability context (including environmental, economic, and policy shocks), and the institutional and policy landscape that mediates asset access and livelihood strategies (Moser, 2021). In this study, the AVAF was applied to interpret focus group data and to assess the extent to which small-scale farmers' market exclusion is rooted in systemic asset deprivation and the inadequacy of existing state-supported agricultural programs. The framework enabled the identification of entrenched barriers such as poor transport and irrigation infrastructure, limited access to credit and production inputs, tenure insecurity, and the ineffective implementation of key interventions such as the Comprehensive Agricultural Support Program (CASP), the Agri-Parks initiative, and broader frameworks like the Integrated Rural Development Strategy (IRDS) and the National Development Plan (NDP).

As illustrated in Figure 1, the AVAF provides a structured method for conceptualizing how market access interventions interact with small-scale farmers' asset endowments to shape patterns of vulnerability and exclusion. The framework situates market participation in a broader vulnerability context, thus facilitating an assessment of how environmental, economic, and infrastructural stressors interact with asset deficiencies to condition farmers' capacity to benefit from such interventions. In this respect, reliance on informal markets is understood

Figure 1. Application of the Asset Vulnerability Analytical Framework (AVAF) in the Context of Market Access Interventions



Source: Adapted by the authors.

not as a discretionary choice, but as an outcome of constrained asset environments that offer limited protection against price fluctuations or market saturation (Gaillard, 2021). The AVAF therefore provides an analytical basis for examining farmers' experiences of market access interventions, the asset-mediated constraints they encounter, and the broader equity implications arising from these dynamics.

The AVAF provides a concise analytical basis for examining how market access interventions mediate small-scale farmers' vulnerability through their interaction with asset endowments and institutional arrangements (Müller et al., 2020). In this study, the framework is employed to examine whether market access programs enhance farmers' capacity to engage formal markets or reproduce conditions of exclusion by failing to address underlying asset constraints. The AVAF enables farmers' continued reliance on informal markets to be interpreted as an outcome of structurally constrained choices rather than individual preference. While the framework informs the analytical approach, the empirical findings remain the primary focus of the study.

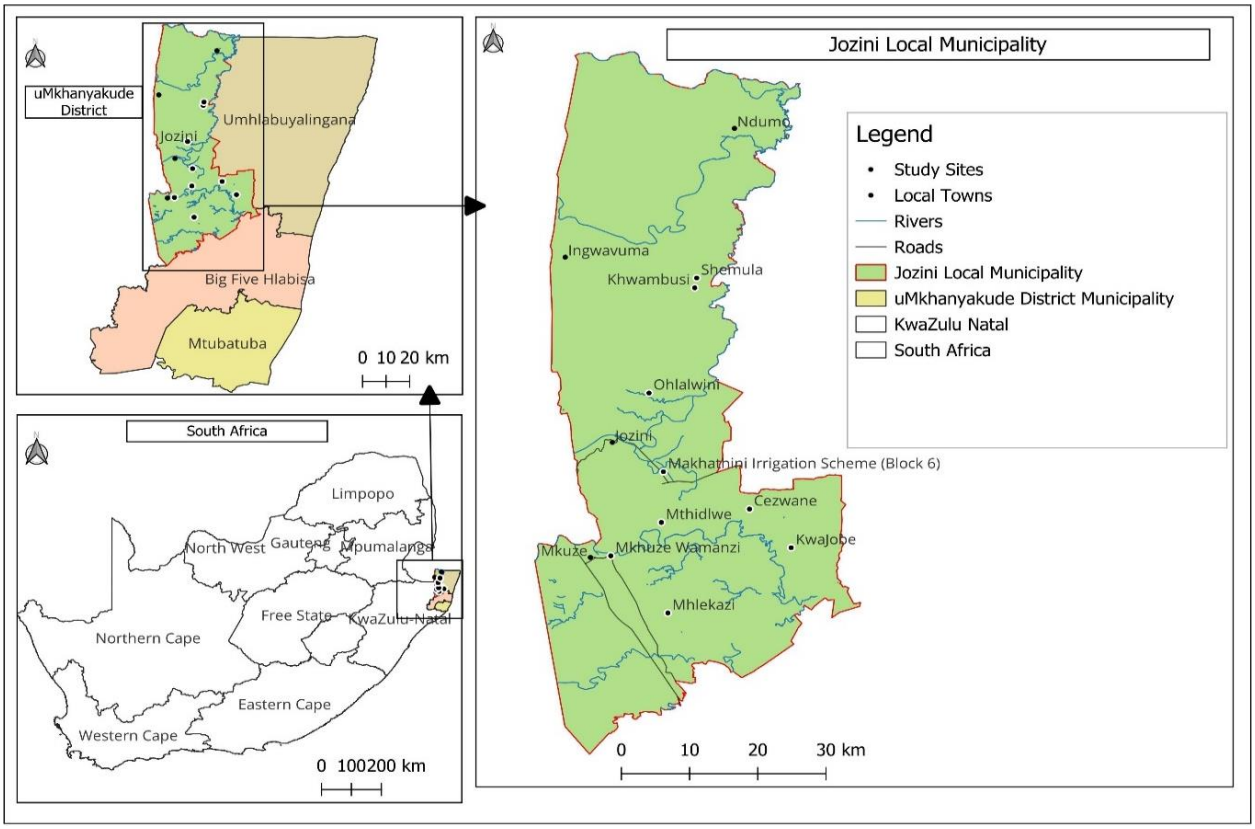
Research Materials and Methods

This section outlines the methodological framework of the study and the procedures employed to generate and analyze data. The discussion proceeds from the study area and its contextual setting to the research approach, sampling strategy, and data collection procedures. It further addresses the conceptualization and operationalization of key study constructs, data analysis techniques, and measures taken to ensure trustworthiness and reflexivity, concluding with the ethical considerations that governed the research process.

Study Area and Context

This study was conducted in the Jozini Local Municipality (JLM), located in the uMkhanyakude District in northern KwaZulu-Natal, South Africa (as shown in Figure 2). Jozini is one of the coun-

Figure 2. Map of the Study Area: South Africa, uMkhanyakude District, and Jozini Local Municipality



try's most socioeconomically marginalized municipalities, with high levels of poverty, unemployment, and food insecurity. Agriculture plays a pivotal role in sustaining rural livelihoods in the region, particularly through small-scale farming practices. The municipality borders Mozambique to the northeast and Eswatini to the northwest, placing it in a context of cross-border trade, seasonal labor migration, and informal economic flows (KZN-DARD, 2023). Despite this strategic location, small-scale farmers in Jozini continue to face significant challenges in accessing formal local and cross-border markets. These challenges are largely rooted in structural constraints such as poor road conditions, limited access to irrigation, and a weak integration into formal trade networks.

Although the region hosts the Pongola poort (Jozini) Dam and the historically significant Makhathini Irrigation Scheme, most smallholders depend on rain-fed cultivation due to the dysfunctional state of irrigation infrastructure (Nxumalo, 2014). The communal land tenure system, administered by traditional authorities, further complicates agricultural investment by preventing local small-scale farmers from using land as collateral for credit. Poor transportation infrastructure and limited extension services continue to elevate the vulnerability of local farmers (Maziya, 2023).

These geographical, socio-economic, and institutional dynamics make Jozini an ideal case study for exploring the constraints to formal market access and assessing the effectiveness of market-related interventions.

Research Approach

The study adopted a qualitative research approach guided by a phenomenological method to explore the lived experiences of small-scale farmers in engaging with formal agricultural markets. A phenomenological lens was employed to uncover the meanings participants ascribe to their experiences navigating systemic barriers (Creswell & Creswell, 2017). This approach aligns with the asset vulnerability analytical framework (AVAF), which foregrounds the role of asset access and control in shaping livelihood strategies, particularly under conditions of structural vulnerability.

Sampling Methods

Purposive sampling was used to identify individuals and institutions with direct experience in small-scale agricultural production and market engagement. Two distinct participant groups were targeted: cooperative-affiliated small-scale farmers, and institutional stakeholders. Farmers were selected from six key agricultural areas in Jozini: Shemula, Mkhuze Wamanzi, Mhlekazi, Mthidlwe, Cezwane, and Ohlalwini. These sites were chosen based on their high concentration of cooperative activity and observable dependence on both formal and informal market structures.

In total, six focus group discussions (FGDs) were conducted with 124 small-scale farmers representing 25 agricultural cooperatives. Additionally, seven semi-structured interviews were held with key informants from the KwaZulu-Natal Department of Agriculture and Rural Development (DARD) and the Local Economic Development (LED) office (these included five agricultural advisors and two senior management officials), as these institutions are directly responsible for the design, implementation, and oversight of agricultural support and market access interventions affecting small-scale farmers in Jozini. Their inclusion enabled an institutional analysis of how such interventions are operationalized and how they intersect with small-scale farmers' asset constraints and market participation outcomes. This sample structure enabled a multidimensional analysis of farmers' lived experiences, technical and infrastructural constraints, and institutional responses to market access challenges. A detailed summary of participants is provided in Table 1.

The distribution of participants across different study areas reflected a range of agricultural backgrounds and local contexts that enriched the analysis (see Table 1). The study included five agri-advisors and two managerial officials, whose diverse expertise in farming practices, economic conditions, and policy frameworks provided valuable insights.

We did not systematically collect gender and age disaggregated data during participant recruitment or data collection, as the primary focus of the study was on farmers' institutional positioning, asset endowments, and engagement with formal

Table 1. Summary of Participants

Study Area	Focus Group Name (Agricultural cooperatives)	Number of participants	Number of cooperatives
Shemula	FG-1	16	2
Mkhuze Wamanzi	FG-2	16	1
Mhlekazi	FG-3	18	6
Mthidlwe	FG-4	40	9
Cezwane	FG-5	10	2
Ohlalwini	FG-6	24	5
Agri-advisor 1	SI- 1	1	1
Agri-advisor 2	SI- 2	1	1
Agri-advisor 3	SI- 3	1	1
Agri-advisor 4	SI- 4	1	1
Agri-advisor 5	SI- 5	1	1
Municipal Official—Management	SI- 6	1	1
DARD Official—Management	SI- 7	1	1

markets, rather than demographic characteristics. Accordingly, this study does not make claims regarding the proportional representation of women or youth in the sample. The absence of gender and age data, however, may limit insights into how asset access and market participation are shaped differentially by gendered and generational dynamics well documented in South African agriculture, particularly with respect to land access, access to capital, and engagement with formal market institutions. While this constrains the ability to conduct intersectional analyses, the emphasis on cooperative membership, land tenure, and market participation facilitated a rigorous examination of structural and institutional factors shaping small-scale farmers' experience. Future research should consider the systematic inclusion of gender and age variables to enable more comprehensive, equity-oriented evaluations of market access interventions.

We collected primary data through FGDs and semi-structured interviews. The FGDs were conducted in isiZulu by the lead researcher to ensure cultural and linguistic relevance while capturing farmers' perspectives on barriers. Both instruments were carefully designed to operationalize key constructs informed by the AVAF. Furthermore, they facilitated an in-depth understanding of how asset availability, institutional processes, and policy implementation intersect to influence small-scale farmers' participation in formal markets. The data provided critical grassroots insights into the practical realities of market access initiatives and the extent to which they align with farmers' needs. These instruments enabled a comprehensive analysis of market access interventions from both beneficiary and institutional perspectives, grounded in the AVAF theoretical lens. Audio recordings were then transcribed and translated into English by the same researcher. To enhance translation accuracy and maintain analytical rigor, transcripts were cross-checked against the original recordings, and key excerpts were backtranslated to verify consistency. Coding and thematic analysis were performed by the lead researcher through an iterative and reflexive process, with regular reviews of emerging codes and themes to ensure internal consistency and reliability. While no formal external validation of a coded subset was undertaken, the use of a single-coder approach was methodically appropriate for this study, given the in-depth, interpretive nature of the analysis and the researcher's sustained immersion in the data. Analytical rigor was further supported by the application of a theoretically informed coding framework (the asset vulnerability analytical framework), the systematic comparison of codes across focus group discussions, and the maintenance of a transparent audit trail linking raw data, codes, and emergent themes. These procedures provided systematic validity checks and supported the credibility of the findings.

Conceptualizing and Operationalizing Constructs: Alignment with Market-Access Interventions Study

This study employed FGDs with small-scale farmers and semi-structured interviews with govern-

ment and municipal officials to examine market access interventions in the Jozini Local Municipality. Both instruments were designed to operationalize key constructs from the AVAF, focusing on asset availability, institutional processes, and policy implementation. The FGDs captured the farmers' experiences of barriers to market access and the assets they use to participate in formal markets, while the interviews explored institutional perspectives on policy and programmatic factors shaping market access. This design ensured that data collection addressed both grassroots realities and institutional contexts relevant to small-scale farmers' engagement with formal markets.

Data Analysis

We applied an inductive thematic analysis, following Clarke and Braun's (2014) six-step approach. All audio recordings were transcribed, translated into English where necessary, and coded manually using NVivo software. Emerging patterns and recurring themes were categorized and interpreted in relation to the study's research objectives. The AVAF guided the organization and interpretation of the data. Special attention was given to how the availability and adequacy of physical, financial, human, natural, and social assets influenced participants' engagement in formal markets. The analysis also explored how the broader vulnerability context, including climate shocks, policy deficiencies, and infrastructural exclusion, interacted with asset constraints to shape livelihood strategies.

Data Trustworthiness and Reflexivity

To ensure methodological rigor and the credibility of findings, the study adopted multiple strategies addressing Guba and Lincoln's (1994) criteria of credibility, dependability, confirmability, and transferability. All FGDs and semi-structured interviews were audio-recorded and systematically transcribed. Detailed field notes documented contextual observations, nonverbal cues, and immediate reflections, complementing the audio data. Digital records were organized using standardized file naming conventions, secured via password protection, and regularly backed up to preserve data integrity.

To enhance credibility, member checking was employed post-data collection, allowing participants to confirm the accuracy of transcripts and clarify statements. Peer debriefing was conducted with experts in rural agricultural systems, facilitating critical evaluation of coding frameworks and interpretations. Reflexive practices were applied throughout, acknowledging the researcher's positionality as a critical realist, thereby mitigating interpretive biases in analysis.

Analytical rigor was further ensured through a systematic inductive thematic analysis following Clarke and Braun's (2014) six-step approach. Coding was consistently applied across all data sources, and an audit trail documented analytical decisions, including code development, theme refinement, and the integration of the AVAF. This approach facilitated a nuanced understanding of how asset deficiencies intersect with institutional constraints to shape small-scale farmers' engagement with formal markets.

Finally, transferability was addressed through thick description, presenting detailed accounts of participants' experiences alongside contextual factors such as institutional practices and environmental conditions. Divergent and contradictory cases were explicitly discussed, reflecting the complexity of farmers' market engagement and ensuring a balanced and transparent representation of findings. By integrating these practices, the study provides findings that are credible, dependable, and grounded in the realities of small-scale farmers in Jozini.

Ethical Considerations

The study was reviewed and approved by the Humanities and Social Sciences Research Ethics Committee (HSSREC) at the University of KwaZulu-Natal (Reference number HSSREC/00007136/2024). All participants were provided with detailed information about the study's purpose, procedures, and ethical safeguards. Informed consent was obtained from all participants before data collection, and participants were made aware of their right to withdraw from the study at any stage without penalty. Anonymity and confidentiality were strictly upheld, and data were securely stored in compliance with the university's research ethics protocols.

Results

The analysis shows that small-scale farmers in Jozini, most of whom operate in cooperative structures and communal land and produce at subsistence to semi-commercial levels, face persistent barriers to formal market participation. The findings identify four dominant patterns across the market access interventions examined: uneven and limited implementation, weak institutional coordination, underutilized or nonfunctional infrastructure, and unequal distribution of program benefits. Farmers consistently reported constraints related to inadequate production support, insufficient skills development and extension services, high transaction and transport costs, and unstable or short-lived market linkages. Together, these findings indicate differences between the intended objectives of market access interventions and small-scale farmers' experiences.

The Jozini Value-Adding Center

The Jozini Value-Adding Center (JVAC) is an agricultural initiative aimed at enhancing the value chain of small-scale farmers in the region. The focus was on adding value to locally produced agricultural products by offering processing, packaging, and product development facilities. Participants consistently reported that the JVAC facility had been constructed but remained non-operational. Farmers indicated that the facility was intended to provide cleaning, packaging, and storage services for fresh produce, yet these services were never implemented. As a result, farmers were unable to use the center for value addition or post-harvest handling.

A small-scale farmer from FG-5 mentioned an example of programs that never materialized:

> There was once a program introduced here that was meant to work for all of us. The JVAC was built, and we were told that we could produce fresh produce of our choosing and store it in the JVAC in order for it to be cleaned and packaged. However, the building is still standing, but it has never been used. Each farmer would've used that place, but this did not come to fruition.

Across discussions, farmers described their continued reliance on selling unprocessed produce immediately after harvest. Participants reported that the absence of functional processing and storage facilities limited their ability to delay sales or access higher-value markets. No participants indicated having used the JVAC since its construction, despite its physical presence in the area. Although the infrastructure exists, farmers reported that its nonfunctionality prevents them from using it for processing, storage, or value addition.

DARD Dam and Dip Initiative

The DARD dam and dip initiative is an agricultural project aimed at improving the farming conditions of small-scale farmers in the area. Farmers and agricultural advisors reported that the dam and dip initiative, implemented by DARD, focuses on providing essential infrastructure such as dams for water storage and dips for livestock health management. However, access to this infrastructure was described as limited relative to the number of farmers in the area. An agri-advisor noted that:

> We have the dam and dip initiative; the facilities and equipment are there, but not up to par to help everyone due to limited access. We have targets we are given each year for dams and dips. (SI- 4)

Agri-advisors noted that despite the availability of two dams and a dip, the targets are insufficient for the more than 500 farmers in the area, creating a backlog and leaving many without access. Both small-scale farmers and agricultural advisors reported long waiting periods and uneven access to these facilities, with many farmers unable to benefit from the infrastructure. Farmers described continued challenges related to water availability for irrigation and livestock health management, despite the presence of these initiatives.

PESI Grant Program

The PESI program focuses on supporting small-scale subsistence farmers in improving their productivity. The program typically provides inputs such as seeds, fertilizers, tools, and irrigation systems, helping small-scale farmers to transition from

subsistence farming to market-oriented farming. Farmers reported having mixed experiences with the PESI program. Small-scale farmers reported receiving material support, such as inputs for poultry production, and some market linkages were facilitated. Mixed experiences were shared by small-scale farmers in FG-4 who said:

> We were once recipients of the PESI program, and our advisor helped connect us to the Hello Choice market. Our chicken breeders applied for PESI, and we received help. However, we do not receive much training on how to grow our businesses and sustain them.

Farmers described mixed experiences with the PESI program. While farmers acknowledged the value of inputs and market linkages, they consistently noted limited access to training in business management, production planning, and market sustainability. Support was described as short-term and input-focused, with minimal follow-up after the initial provision of resources. Farmers reported that PESI strengthened financial assets through input provision; however, insufficient investment in human assets, particularly skills development and capacity-building, was said to constrain longer-term sustainability and equitable access to formal markets.

DARD Mechanization Program

The DARD Mechanization Program was reported to enhance small-scale farmers' productivity and efficiency by granting access to mechanized farming equipment. Small-scale farmers noted that the program provides tractors, plows, and essential machinery to support land preparation, planting, and harvesting. By reducing the reliance on manual labor, the program helps farmers increase their operational capacity and scale up production. Farmers reported that mechanized equipment allowed them to prepare land and plant crops more efficiently. Farmers described this support as beneficial but unevenly distributed. A small-scale farmer from FG-6 said:

> When it comes to livestock (goat, sheep, cows, and piggery) production, we know nothing about such programs. We just fend for ourselves. It is a bit different in crop production because we receive assistance with tractors from the department, which has helped ensure that everyone is up and working. The tractor comes and does what it needs to do, and the onus is then on us to produce.

This farmer reveals a difference in support received by livestock (*goat*, *sheep*, *cows*, *and piggery*) farmers and crop farmers. While the assistance is appreciated, farmers reported that it is not comprehensive enough to address the broader challenges they face, and it places the responsibility on the farmers to ensure they can produce. An agri-advisor stated that:

> There are quite a few interventions in place. One such intervention is our mechanization program. Our main challenge with this program, while it is a good program, is its limited reach. We are unable to reach the whole of Jozini, and so we find ourselves in a predicament because some farmers benefit while others do not. (SI-1)

The advisors' remarks confirm that the program did not reach all farmers in the municipality. Livestock producers reported limited awareness of or access to mechanization-related interventions. Both these accounts indicate that access to physical assets (mechanized equipment) and the institutional environment were uneven, with some farmers receiving support while others did not.

DARD—Hello Choice Market

The Hello Choice Market was created to connect small-scale farmers with markets to sell their produce directly to consumers. This initiative aims to improve market access for farmers in rural areas by offering a platform that allows them to sell fresh and locally grown products. Small-scale farmers identified the Hello Choice Market as one of the more functional market access interventions, granting farmers access to a wider customer base and securing better prices for their products. Farmers reported that agricultural advisors facilitated their participation, enabling them to sell produce directly

to consumers. A farmer from FG-6 shared a somewhat positive experience:

> We have our advisor who connected us to the Hello Choice market. That has been one of the most successful interventions in our area. There was also a boy who came here from the municipality. He said he would help us with fencing, and he took down our details. We never saw him again.

Farmers in FG-6 highlighted the positive impact of their connection to the Hello Choice Market. Through their agricultural advisor, they were able to sell fresh produce directly to consumers, gaining access to a broader customer base and better prices. Farmers reported improved market access and better prices through this initiative. However, participants also described instances where other promised forms of support, such as fencing assistance from municipal representatives, did not materialize.

These experiences highlighted variability in implementation, effectiveness, and follow-through across different market access initiatives. Across all the interventions examined, agricultural producers and officials consistently reported a divergence between program design and practical functionality. Initiatives centered on fixed infrastructure and productive support, such as the JVAC, dam and dip facilities, and mechanization services, were widely described as unevenly accessible, partially implemented, or non-operational, limiting their effective use by the majority of farmers. In contrast, market-linkage interventions facilitated through direct advisory support, most notably the Hello Choice Market, were more frequently reported as functional, albeit constrained by limited scale and inconsistent complementary support. Input-focused programs, including PESI, were characterized by short-term material assistance with limited follow-up, which participants associated with difficulties in sustaining production and market participation over time. Small-scale farmers and agricultural officials frequently reported that the usefulness of interventions depended on whether they were accessible, functional, and consistently supported. Furthermore, they described how asset-based constraints interact with institutional gaps to limit their market participation.

Table 2 summarizes the intended AVAF asset targets and key implementation gaps for each intervention, providing a concise overview to complement the detailed narrative above.

Discussion

The findings highlight a fundamental disconnect between the objectives of agricultural market access interventions and the lived realities of small-scale farmers in the Jozini Local Municipality. While programs such as the Jozini Value-Adding Center (JVAC), mechanization support, dam and dip infrastructure, PESI grants, and digital platforms like Hello Choice were intended to strength-

Table 2. Market Access Interventions and Associated Asset Vulnerability Analytical Framework (AVAF) Assets and Implementation Gaps

Intervention	Primary AVAF Asset Category	Key Implementation Gap
Jozini Value-Adding Center (JVAC)	Physical assets	Infrastructure exists but remains non-functional; farmers are unable to use the center for processing, storage, or value addition.
DARD Dam and Dip Initiative	Physical and natural assets	Limited access relative to the farmer population; uneven distribution and long waiting periods reduce operational utility
PESI Grant Program	Financial and human assets	Short-term input provision with minimal follow-up; insufficient capacity-building limits sustainable production and market engagement
DARD Mechanization Program	Physical assets	Uneven distribution of machinery; limited reach; some farmers, especially livestock producers, remain unserved
Hello Choice Market	Social and financial assets	Advisory support facilitates market access, but scale limitations and inconsistent follow-through reduce overall effectiveness.

en production and link farmers to formal markets, their implementation has largely failed to address the interconnected structural and asset-based constraints facing local farmers. For instance, one participant reported that "the JVAC was built, and we were told that we can produce fresh produce of our choosing and store it there to be cleaned and packaged. However, the building is still standing, but it has never been used" (FG-5), demonstrating how non-operational infrastructure prevents value addition and contributes to post-harvest losses. Similarly, a farmer reflected on the uneven reach of mechanization support, stating that "when it comes to livestock production, we know nothing about such programs. We just fend for ourselves. It is a bit different in crop production because we receive assistance with tractors from the department" (FG-6). These experiences indicate that partial coverage and inconsistent program implementation exacerbate existing vulnerabilities and reinforce dependency on informal markets. This pattern reflects broader critiques in the literature, where poorly contextualized development initiatives risk reinforcing exclusion rather than enabling meaningful integration into formal markets (Shilomboleni et al., 2024).

Across interventions, issues of scale, coverage, and institutional responsiveness emerged as key weaknesses. Livestock infrastructure and mechanization support were implemented at levels insufficient to meet local demand, resulting in uneven access and limited functional impact. Comparable patterns are reported by Mapiye and Dzama (2024), who reveal that livestock development programs in rural South Africa are frequently driven by centrally defined delivery targets rather than locally grounded needs, leading to infrastructure that exists but remains inaccessible to most producers. Similarly, institutional failures were evident in crop-focused interventions, particularly the JVAC, which was envisioned as a facility to reduce post-harvest losses and provide value-adding opportunities for crop producers, but remains non-operational. Singh et al. (2025) similarly demonstrate that when agro-processing facilities are poorly maintained or fail to become operational, small-scale farmers are compelled to sell produce immediately after harvest at low prices, undermining income stability and food security. Together, these parallels suggest that the effectiveness of market access interventions depends less on their nominal presence than on their sustained functionality and responsiveness to local production realities.

Governance and accountability failures emerged as a significant constraint undermining the effectiveness of market access interventions. Reports on financial mismanagement, corruption, and weak oversight mirror findings by Mtero et al. (2023), who document how elite capture and limited institutional capacity in rural development programs distort resource allocation and weaken accountability mechanisms. For example, one farmer documented how elite capture and limited institutional capacity in rural development programs distort resource allocation and weaken accountability mechanisms. For example, participants reported that infrastructure intended to support produce cleaning, packaging, and storage through the JVAC remained unused despite being established to benefit local farmers.

Another farmer acknowledged the value of mechanization interventions but emphasized that their benefits were unevenly distributed because limited program reach meant no only some farmers in Jozini were able to access support.

Although program reforms have attempted to improve delivery by channeling support through service providers rather than direct cash transfers, the absence of robust monitoring has limited progress. These accounts indicate that governance deficits not only waste resources but also erode farmers' trust in institutions meant to support them, thereby reinforcing inequalities in market access and participation.

Targeted initiatives, such as the Hello Choice platform and the RASET transport support program, demonstrated more promise when backed by committed local agri-advisors. Farmers' participation and market engagement improved in these instances, indicating the importance of intermediary support in enabling access to markets. However, their impact remained limited in scale due to a lack of resources and poor institutional coordination. This mirrors findings by Mapiye et al. (2023), who demonstrate that digital and market-linkage platforms yield sustained benefits when accompa-

nied by broader support measures, including training, infrastructure development, and consistent extension services. In the absence of these enabling conditions, such interventions remain fragmented and unable to generate widespread livelihood or food security gains.

Comparative evidence from other African contexts further situates these findings in broader regional patterns. In Kenya, small-scale farmers' engagement with digital market platforms resulted in tangible improvements in market linkages only when sustained advisory support and extension services were provided alongside the technology (Muriuki et al., 2021). Similarly, in Ghana, market access programs achieved lasting benefits primarily when interventions combined training, infrastructure development, and continuous technical assistance (Odonkor, 2021). These examples highlight that digital and market-linkage interventions, while promising, require complementary support to effectively strengthen farmers' livelihoods and enhance resilience. Without such integration, initiatives remain fragmented, and their potential to mitigate market-related vulnerability is severely constrained.

The continued presence of these shortcomings illustrates how interventions have not effectively consolidated the asset base necessary for sustained market engagement. Persistent deficiencies in infrastructure, access to finance, and skills development have limited farmers' ability to transition away from informal markets and reduced their capacity to respond to economic and production shocks. Similar patterns are documented in the literature (Pancras et al., 2025; Reddy & Barbalat, 2022), where fragmented and short-term interventions fail to generate durable asset accumulation and, in some cases, exacerbate rural vulnerability by raising expectations without delivering sustained support.

In conclusion, the data reveal that, despite the presence of multiple public and private interventions implemented in the Jozini Local Municipality, they have not fundamentally shifted small-scale farmers' vulnerability to market access constraints. Farmers' accounts suggest that interventions are frequently characterized by weak implementation, limited coverage, and inadequate responsiveness to local conditions, constraining their effectiveness in practice. The persistence of deficiencies in critical assets further shapes farmers' capacity to engage with and benefit from these interventions, often reproducing rather than alleviating existing patterns of exclusion. In response, local government and nongovernmental organizations (NGOs) should prioritize sustained capacity-building initiatives that provide ongoing technical and business support, ensure interventions are co-designed with farmers to reflect local realities, establish robust accountability and monitoring mechanisms to improve transparency and institutional responsiveness, and integrate support across critical assets to strengthen resilience. Implementing such measures is essential for fostering equitable access to markets, enhancing livelihoods, and supporting long-term food security for small-scale farmers in the region.

Limitations

This study is contextually bound to the Jozini Local Municipality, a predominantly rural area with distinct infrastructural and institutional characteristics. As such, the findings may not be generalizable to other regions in South Africa with differing institutional, infrastructural, or market conditions. While the study draws strength from in-depth qualitative data gathered through focus groups and semi-structured interviews, its reliance on farmers' and government officials' perspectives limits the analysis of how other critical actors, such as private-sector buyers, market agents, or nonparticipating stakeholders, perceive or experience these interventions.

Given the focus on marginalized farming communities, potential power dynamics in focus group settings and between the researcher and participants may have influenced how experiences were articulated, including the possibility of social desirability bias or restrained criticism of state-led programs. To mitigate this, discussions were facilitated in familiar community settings, emphasized confidentiality, and encouraged open reflection; however, the influence of researcher positionality cannot be fully eliminated.

Additionally, the qualitative research design prioritized in-depth exploration of farmers' experiences and institutional dynamics rather than quantitative measurement; consequently, the study does

not employ graphs, charts, or numerical indicators to assess intervention performance or outcomes over time. Demographic variables such as age and gender were not systematically collected during data gathering, as the analytical focus centered on farmers' institutional positioning, asset access, and modes of market participation, which limits the scope for intersectional analysis of vulnerability.

Notwithstanding these limitations, the study provides robust, contextually grounded insights into how market access interventions are implemented and experienced in practice, offering a credible basis for understanding the structural and asset-based factors shaping small-scale farmers' engagement with formal markets. Future research could expand on this by incorporating longitudinal data and engaging a wider range of market actors to build a more comprehensive account of intervention outcomes.

Conclusion

This study critically evaluated small-scale farmers' perceptions of public and private market-access interventions in the Jozini Local Municipality to assess whether these initiatives mitigate market-related vulnerabilities or perpetuate existing patterns of exclusion. Guided by the asset vulnerability analytical framework and informed by qualitative evidence, the findings indicate that, despite the presence of multiple market access interventions, including the Jozini Value-Adding Center, dam and dip infrastructure, PESI grants, mechanization support, and market linkage platforms, meaningful improvements in farmers' access to formal markets remain limited.

Farmers' experiences suggest that market-access interventions are undermined by persistent implementation challenges, including inadequate maintenance, inconsistent institutional support, poor communication, and insufficient farmer training. These constraints shape how interventions are encountered in practice and contribute to a pronounced disconnect between policy intent and farmers' lived realities. Rather than functioning as pathways into formal markets, many interventions operate in fragmented and uneven ways, reducing their capacity to support sustained market participation.

The study further demonstrates that small-scale farmers' capacity to derive benefits from market access interventions in Jozini is constrained by persistent deficiencies across critical asset domains. Limitations in physical assets, including inadequate water infrastructure, non-operational storage and processing facilities, and restricted transport networks, undermine consistent production and the ability to meet formal market requirements. Financial constraints further restrict farmers' capacity to absorb input costs, transaction fees, and other market-related expenditures, limiting their engagement with programs such as PESI grants. Concurrently, gaps in human assets, notably insufficient training, business management guidance, and market knowledge, inhibit farmers from fully leveraging mechanization support and digital platforms such as Hello Choice. These intersecting deficits not only reduce the effectiveness of market access interventions but also reinforce dependence on informal markets, which, while providing immediate livelihood support, remain precarious and insufficient to secure sustainable income or food security.

Small-scale farmers in the Jozini Local Municipality continue to experience significant barriers to formal market participation. Addressing small-scale farmers' market access challenges in Jozini demands an integrated strategy that holistically considers infrastructural constraints, institutional weaknesses, and asset vulnerabilities. Interventions should not only focus on providing infrastructure and mechanization support but also ensure consistent program implementation, ongoing maintenance, and robust training and advisory services to enhance farmers' capacity to engage with formal markets. Strengthening coordination, accountability, and communication across public and private initiatives is essential to prevent fragmented delivery that reinforces existing patterns of exclusion. These measures are crucial for facilitating the meaningful integration of small-scale producers into formal markets, thereby strengthening rural livelihoods and contributing to broader food security objectives in the region. Looking forward, the strengthening of such interventions can contribute not only to local economic resilience but also to broader development goals, supporting SDG 2

("Zero Hunger") by enhancing food security and SDG 8 ("Decent Work and Economic Growth") by promoting inclusive, market-based opportunities for small-scale producers.



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Improving USDA's public price and volume data for an equitable organic food value chain

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Abstract

Since 1915, the U.S. Department of Agriculture (USDA) Agricultural Marketing Service (AMS) Market News has supported a key element of our agricultural economic system: equity in access to pricing information between buyers and sellers and across operations of various sizes. Today, the privatization of agricultural information and market concentration in the food system make this public data source especially important for supporting a more fair and stable market for the growing organic sector. In this study, we use a mixed-methods approach to explore how AMS Market

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News organic price and volume data can be improved to better support organic agrifood system actors. Based on 26 interviews and 227 survey responses from organic producers, processors, distributors, and retailers across California, we find consistent interest in increased organic market data presented in visual formats with trend explanations, despite only limited direct reliance on Market News organic data throughout most of the sector. We also identify three main areas where Market News organic price and volume data could be improved: the data interface should be made more accessible and informative, inaccuracies and gaps in the data should be addressed or explained, and efforts to include more organic specialty crops should continue. These improvements will help the development of a more robust public source of organic market data that could especially benefit smaller-scale operations, given the increasing corporate consolidation in the agrifood system.

Keywords
organic agriculture, public data & information, AMS Market News, market data use, value chain

Introduction: USDA's Agricultural Marketing Service (AMS) Market News (MN) & Organic Agrifood Systems

For over a century, the U.S. Department of Agriculture (USDA) Agricultural Marketing Service (AMS) Market News (MN) has provided free, up-to-date, unbiased information on agricultural commodity prices, volumes, and movements in order to help producers and agrifood businesses "evaluate market conditions, identify trends, make purchasing decisions, monitor price patterns, evaluate transportation equipment needs and accurately assess movement" (USDA AMS, 2023b). The first MN report, which documented strawberry prices in Louisiana, was shared via telegraph in 1915 (USDA, 2015). Since then AMS has continually updated their dissemination technologies and commodity and market coverage; for example, they added air shipments, international trade, and telephone access in the 1960s and 1970s, and organic products and web access in the 1990s (USDA, 2015; USDA AMS, 2015). Today, MN has a modern data platform, interactive website, and an application programming interface (API) allowing for automated pulls of raw data (USDA AMS, 2025). Nearly a thousand agricultural and livestock commodities are included in the more than 250,000 reports issued by MN that cover retail, shipping point, and terminal markets, as well as commodity movement, feedstuffs, truck rates, and more; these reports get more than 53 million views annually (USDA, 2015; USDA AMS, 2021, 2023; USDA Office of Communications, 2015).

MN promotes stability and fairness in the agricultural economy by providing equitable access to pricing information between buyers and sellers and across operations of various sizes; this encourages honesty in market trades and balanced bargaining power across market positions and operation size (Lesser, 1993; McCallister, 1950). MN was established in response to the post–Civil War agricultural recession, when farmers lacked economic power and market knowledge and the public supported stabilizing incomes for farmers and prices from consumers (Lesser, 1993). Later, MN developed shipping reports and expanded the commodities covered (USDA, 2015) to help maintain equitable and effective marketing practices when widespread adoption of trucking and fruit and vegetable processing in the 1940s again left farmers with limited pricing information for their products (McCallister, 1950).

In this paper, we explore how MN organic data can be improved to better support organic agrifood system actors. While consumer demand has successfully driven growth in U.S. organic retail sales without much public-sector involvement, organic production, and the consequent environmental improvements to our farm land, has not kept pace; imported organic commodities have largely filled this gap (Carlson et al., 2023; Damewood, 2025). As organic production can limit environmental degradation (Reganold & Wachter, 2016), this public benefit is important for the public sector to focus on because it has been repeatedly under-supported in profit-driven privatization trends in agriculture (Duncan et al., 2021; Foster, 2000; Ryan, 2020; Wolf, 1998).

Today, the growing organic agrifood sector needs more high-quality market data (Home et al.,

2017). U.S. organic sales have grown steadily, from about US$10 billion in 2000 to $40 billion in 2015 to US$70 billion in 2024 (a 5.2% growth rate that outpaced the market overall), and organic growth is expected to continue (Carlson et al., 2023; Pfaff, 2025). However, less than 60% of organizations that collect organic market data report performing any kind of data quality checks (Home et al., 2017), limiting organic businesses' ability to rely on the data and leaving many at a competitive disadvantage in relation to conventional growers (Home et al., 2017). Reporting of organic data in MN began in 1992 and was formally supported in the 2002 farm bill (USDA AMS, 2023). Organic commodities are now included when they are consistently present in a market with enough price sources to maintain confidentiality (at least three). However, because of the limited market presence of organic products, data are available on organic versions of only about 200, or 20%, of the current MN commodities (USDA AMS, 2023).

Improving organic MN data could especially benefit organic farmers with small and/or artisanal operations, as market control is increasingly concentrating into the hands of only a few large businesses in the food system (Clapp, 2021, 2025; Frerick, 2024; Howard, 2021; Levins, 2000). In much of our agrifood industry, the top four companies control 40% or more of the market, a level of concentration economists agree poses a serious risk to market functionality (Clapp, 2025; Frerick, 2024; Howard, 2021; Levins, 2000). For example, as of 2018, the top four grocery retailers control 45.2% of the U.S. market and the top four seed and agrochemical firms control more than 50% of their respective global markets (Clapp, 2025; Howard, 2021). Large corporations have also gained prominence in the organic sector; by 2009, 14 of the top 20 North American food processors had organic brands (Howard, 2009). While lower prices may follow some consolidation, this level of concentrated market control has given an increasingly small number of companies disproportionate power to shape agricultural markets, technology, and policy, positioning many farmers, especially smaller operations, at a competitive disadvantage in the marketplace (Clapp, 2025). Equitable access to organic market data can help small organic operations obtain fair prices for their products and better crop insurance and business planning options.

AMS contracted with our research team to evaluate the market data needs of California's organic stakeholders. While we received funding from AMS, our research was conducted independently; AMS had no oversight over our academic output, and input on research decisions was limited. For example, we developed our survey and interview instruments and sampling strategy independently and incorporated AMS feedback on accuracy and coverage of our questions and research population. In our study, we contextualize some of our findings and recommendations within the larger body of academic literature focused on the role of the private and public sectors in agriculture knowledge production. More specifically, we attempt to answer the question: how can MN organic price and volume data be improved for the organic agrifood industry, with an eye towards specialty crops and other important commodities in California?

The Agricultural Information Landscape

MN is one of many public agricultural information sources. The USDA also publishes information on commodity outlooks (USDA, 2026), often used for investment and/or speculation on commodities futures (Karali et al., 2019; McKenzie & Darby, 2017), and the Census of Agriculture focuses on land use, agricultural production practices, and producer income (USDA National Agricultural Statistics Service [NASS], 2025). More broadly, university and county extension programs and local water and conservation districts also produce agricultural information directly relevant to farmers (Beethem et al., 2023), such as methods to reduce yield gaps between conventional and organic production (Carlson et al., 2023).

Public-sector agricultural data, especially those published by USDA, are impactful and highly trusted. For example, USDA crop production estimates continue to impact corresponding commodity prices in the market (Karali et al., 2019; Massa et al., 2024; McKenzie & Darby, 2017). Agrifood businesses—growers, handlers, and banks working

with wheat and potatoes in Washington, hogs in Iowa, and tomatoes in California—are more likely to rate market information as more valuable—that is, more accurate, timely, accessible, and specific—when it comes from USDA (rated 6.9 on a scale of 1 to 10) than from extension services (6.0), commercial sources (5.9), commodity associations (5.7), and informal sources (5.1) (Wolf et al., 2001). It has also been determined that 69% of the market information accessed by agricultural businesses originated from public-sector sources; 30% was accessed directly, but 39% was accessed indirectly through private data intermediaries, like commercial vendors and agricultural consultants (Wolf et al., 2001). While the persistence of embedded public data is somewhat unclear, a more recent report found that nearly 70% of the policy-focused studies published in the *American Journal of Agricultural Economics* relied on public data sources in their empirical analyses (Lusk, 2016).

Nevertheless, agrifood businesses have increasingly turned to private agricultural information sources, like agricultural consultants and commercial information sources, while investment in public sector agricultural data and knowledge production has been cut (Beethem et al., 2023; Prokopy et al., 2015; Wolf, 1998, 2006). A recent survey of large (100+ acres) commercial corn and soybean farmers in the eastern U.S. Corn Belt showed that more farmers rely on chemical and seed dealers (96% used each source) and other farmers for information (91%) than public sources like USDA (79%), conservation districts (67%), and university extension (64%) (Beethem et al., 2023). In 2014, private food and agricultural input companies provided about three times more funding for U.S. food and agriculture research than federal and state agencies (Heisey & Fuglie, 2018).

This shift exemplifies a privatization of agricultural information, which causes market information imbalances (Beethem et al., 2023; Jiang et al., 2020) that could lead to market failure if not addressed (Akerlof, 1970). Publicly available agricultural information, such as the corn yield predictions published publicly by Descarts Labs and TellusLabs from 2015 to 2017, are increasingly privatized; both labs stopped publishing their high-quality reports publicly after partnering with major grain traders (Jiang et al., 2020). Concentrated market control also gives some firms disproportionate informational advantage; in 2011, the pork bellies futures market stopped functioning because traders could not compete with the informational base of Smithfield, which at that time produced and sold 30% of the commodity (Jiang et al., 2020).

The focus on profit in the private sector is unlikely to yield high-quality information on agricultural practices that promote a healthy natural environment. In precision agriculture and Agricultural Big Data, developers have focused on the goals and motivations of funders bolstering their profitability; these tools therefore largely benefit the financial and technology industries at the expense of farmer autonomy, including efforts to improve the social and/or environmental aspects of their food production practices (Duncan et al., 2021; Ryan, 2020). The preservation of public sector agricultural information is critical for the future of farming, especially organic farming, and for its viability vis-à-vis the powerful actors on both sides of the farmer (Levins, 2000).

Despite the current federal leadership focus on reducing government functionality (Kamarck, 2026) and USDA's historical focus on adoption of large industrialized farming practices (Levins, 2000), a recent USDA Economic Research Service report emphasizes the importance of public sector research for growing the organic sector over the past twenty years, and supports further increases to public organic market and trade data (Carlson et al., 2023). And the 2018 farm fill tasked AMS with improving data reporting on certified organic agricultural products (USDA AMS, 2023a). As the organic agrifood sector grows, high-quality, comprehensive, publicly accessible market information can promote more equitable economic power and market stability.

Methods: Data Collection and Analysis

We used a mixed-methods approach to generate a thorough understanding of the data needs of different actors in California's organic agrifood industry. Interviews brought a nuanced understanding of people's experiences and needs and helped refine the meaning behind some of our

survey findings. Online surveys[1] reached more respondents, captured details of their data use preferences and individual business operations, and helped show the broader frequencies of various themes present in our interview findings. We focused on collecting data from four distinct links within California's organic agrifood supply chain: producers, processors, distributors, and retailers.

For recruitment, we aggregated contact information for 7,027 organic agrifood industry stakeholders across California from the USDA Organic Integrity Database, with supplementation from the California Department of Food and Agriculture, the California Department of Public Health, the Independent Natural Food Retailers Association, the USDA Supplemental Nutrition Assistance Program, and the National Produce Blue Book. We used emails and/or phone calls to request interviews from 200 producers, 667 handlers,[2] and 84 retailers randomly selected from this list. Because mailing addresses were the most common contact information available, we sent three rounds of survey recruitment postcards to 2,987 producers, 2,503 handlers, 926 producer/ handlers, and 393 retailers in early 2024. We supplemented this outreach with emails and phone calls where possible. To avoid possible infiltration by bots and fraudulent survey takers of our online survey (Pinzón et al., 2024), we reached out directly to each intended recipient, rather than posting on listservs or social media.

We completed a total of 26 interviews between December 2023 and May 2024: ten with producers, five with processors, six with distributors, and five with retailers. In the in-depth interviews, we focused on details about the respondent and their organization, marketing and buying strategies, and data use and outstanding needs. All interviews were conducted in English by the lead author and lasted from 20 to 60 minutes. Most interviews were conducted over the phone or via Zoom and were recorded and transcribed using the automated transcription software Otter.[3] Transcriptions were reviewed and edited for accuracy by the lead author, who also analyzed the interview data, using grounded theory, to code for common themes in QualCoder.

Our surveys asked for details about the respondent, their operation and business practices, the organic market data they use, their ideal organic market data, and their opinion of MN organic data. We developed similar but distinct sets of survey questions for producers, processors, distributors, and retailers. Respondents were offered a US$40 incentive for participating. Survey data were collected using Qualtrics and cleaned and analyzed using R and RStudio. All survey results presented are from the 227 responses that were at least 50% complete (from 152 farmers, 34 processors, 27 distributors, and 14 retailers). As anticipated, we received more responses from producers than other supply chain links, reflecting the overall distribution of California's certified organic operations/businesses.

We use two main analytical approaches to our survey data. First, we present descriptive statistics in order to generalize to the overall organic industry in California. Second, we conducted an importance-satisfaction analysis (Galt et al., 2019) that helped identify specific areas where MN may not be meeting the needs of those familiar with the data source. Following this analysis for each market segment, we graphed the average ratings of satisfaction with aspects of MN organic data (x-axis) against the average ratings of importance of aspects of an ideal data source (y-axis) to highlight areas where average importance scores were disproportionately higher than average satisfaction scores.

[1] We used online rather than paper surveys due to budgetary constraints. As of 2023, 91% of California farmers had internet access and 85% had computer and/or smartphone access (USDA NASS, 2023).

[2] Several of our contact information sources (including the USDA) categorized all industry actors handling organic products, including distributors and processors, as "handlers." We differentiated between distributors and processors based on respondents' own identification. We contacted more handlers for interview recruitment because their disproportionate market control may have discouraged participation in our study.

[3] One interview took place in person and was not recorded; detailed notes were made and coded for this interview.

Findings

Little Direct Reliance on Formal Organic Market Data

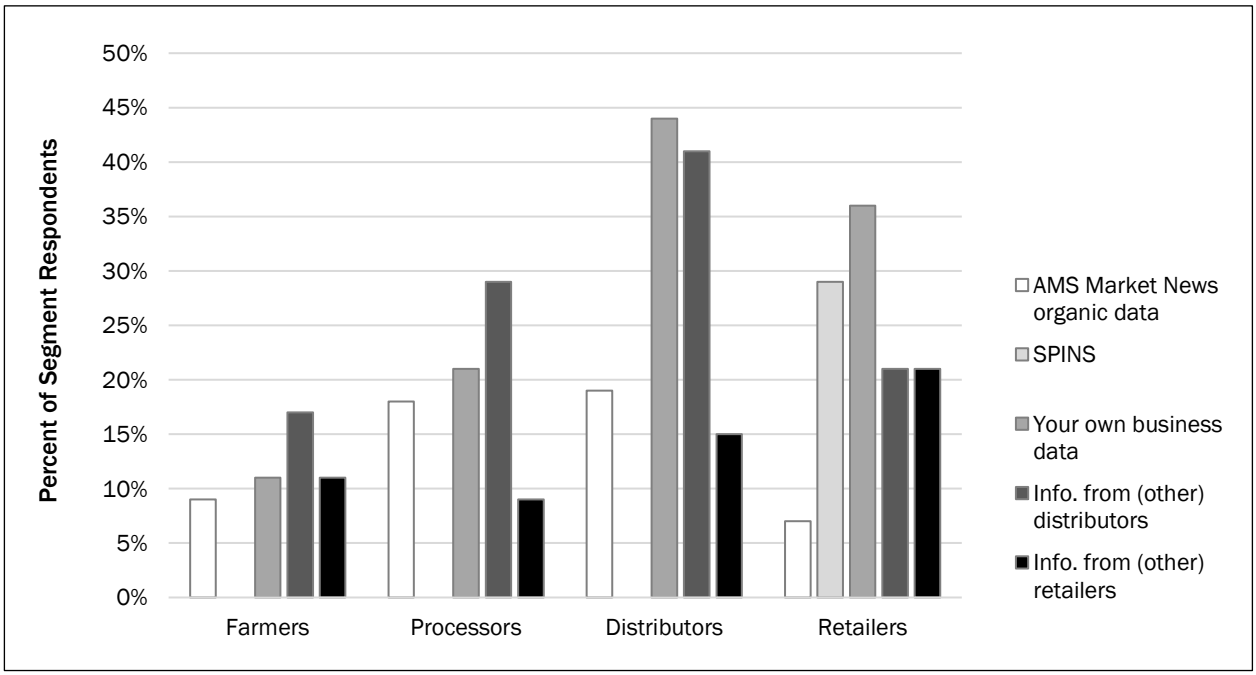
Overall, our research participants regularly used organic price and volume information, often gathered through informal practices like price comparisons and conversations with industry connections. Thirty-nine percent of respondents regularly used some kind of organic price and/or volume data and primarily reported using informal data, including data that their own organization tracks, information from distributors, and information from retailers (Figure 1 and Table 1). Distributors (44%) and retailers (36%) most commonly used data that their own business tracks about its operations, while farmers (17%) and processors (29%) most commonly used information from distributors or wholesalers outside their organization. While rates of direct reliance on MN were low (7% to 19% across supply chain links), distributors may facilitate a wider influence by this data throughout the industry. Distributors are centrally positioned in the market, serving as market information sources for 20 to 30% of all other respondents (41% of distributors also use other distributors), and many (19%) relying on MN organic data regularly (Table 1).

Interviewees also demonstrate consistent use of informal data sources, providing detail about how the infotablermation is gathered. Twenty-one of our 26 interviewees discussed comparing prices with others informally in the marketplace as a main information source. Four out of five interviewed retailers checked competitor prices to understand the local market better. A small grocery retailer described their staff regularly going to their local competitors' stores and looking at their prices to get a better sense of how their own pricing compares to their local market:

> All of our fresh teams, produce, meat, and seafood, are always checking out what the other grocery stores are charging in town. … They'll literally go and just take a look (Interview 5).

Of the six interviewed producers who sold their products directly to consumers and/or retailers, five reported observing competitor pricing

Figure 1. Main Data Sources Used by Value Chain Link



Source: Organic Data Initiative Gap Analysis Surveys (2024).

Table 1. Use of Organic Price and Volume Data Sources by Value Chain Link

Data Source Used	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)	Total (*N* = 227)
None	93 (61%)	12 (35%)	5 (19%)	6 (43%)	116 (51%)
Any	52 (34%)[b]	14 (41%)	16 (59%)	7 (50%)	89 (39%)
Agricultural Marketing Service (AMS) Market News organic data	14 (9%)	6 (18%)	5 (19%)	1 (7%)	26 (11%)
USDA National Ag. Statistics Service (NASS) Census of Ag.	6 (4%)	2 (6%)	0	0	8 (4%)
SPINS[a]	n/a	n/a	n/a	4 (29%)	n/a
Nielsen[a]	n/a	n/a	n/a	0	n/a
Organic Farmers Agency for Relationship Marketing (OFARM)	1 (0.7%)	1 (3%)	1 (4%)	0	3 (1%)
Mercaris, Inc.	0	0	0	0	0
Organic Grain Research and Information Network (OGRAIN)	1 (0.7%)	1 (3%)	0	0	2 (1%)
Organic Trade Association (OTA)	1 (0.7%)	0	1 (4%)	1 (7%)	3 (1%)
Maine Organic Farmers & Gardeners Assn Price Reports	0	0	0	0	0
Data your own business/org. tracks about its operations	17 (11%)	7 (21%)	12 (44%)	5 (36%)	41 (18%)
Info. from distributors/wholesalers outside your organization	26 (17%)	10 (29%)	11 (41%)	3 (21%)	50 (22%)
Info. from retailers outside your organization	17 (11%)	3 (9%)	4 (15%)	3 (21%)	27 (12%)
Other	14 (9%)	1 (3%)	2 (7%)	0	17 (7%)
Total number of data sources used within each link	9	8	7	6	10

Source: Organic Data Initiative Gap Analysis Surveys (2024)

[a] SPINS and Nielsen were only included as survey response options in the retailer survey and are therefore listed as n/a for the other links in the value chain. The zero listed for retailers for Nielsen therefore represents no retailers using that data source.

[b] Rates of market data use were higher among larger farmers; 53% of the 19 farmer respondents with gross sales of US$1,000,000 or more in the previous year used some form of market data.

at farmers' markets or local grocery stores. One produce and wine grape grower noted: "So whatever the co-op's paying, that is kind of what we go by, what I go by" (Interview 8). They mentioned setting their own prices somewhat subjectively, sometimes lower to move a product, sometimes higher because they could. But it was local food co-op prices that they used as their main information source, rather than as a strict guide, for the market-wide price for commodities.

Many interviewees—four of five processors, four of six distributors, and three of four producers who worked with brokers—described price comparison that relied on personal experience and/or market relationships. Often comparison consisted of phone calls with other buyers and/or comparing prices to their own experience of working in the market for many years. Sometimes it involved reviewing the pricing sheets from relevant distributors. One mid-sized produce distributor described the process as calling their "shipping friends" and their buyers to gather their thoughts on the market:

> Before I start a season, I start calling people and I say, "What are you hearing? What do you know? What's the price? What do you think you want?" … "What regions are in production? What are you getting? How's the quality?" … Preseason, and during the season, you call around and you're collecting information from your customers. (Interview 24)

This distributor described collecting nuanced information specific to their products through relationships they have with other people in the marketplace and their customers. Their experience working with their products allows them to interpret the information they gather through their market relationships clearly enough to make pricing and market decisions and manage their operation successfully.

Improving AMS Market News (MN) Organic Data

Of the 14 industry actors we interviewed who were familiar with USDA organic price and volume data, ten did not use it because they felt the data interface, accuracy, and/or product coverage were inadequate for their needs. Survey results specific to attributes (Table 2) and important aspects (Table 3) of an ideal organic market data source support the broader relevance of these interview findings, as does our importance-satisfaction analysis (Figures 2–5).

Data Interface

Overall, survey respondents' ideal data source was a visual format with individual data points, trend information, and some explanation. Sixty-five percent of survey respondents preferred organic market data presented in a standardized visual format like a report or figure, and 22% preferred an interactive visual format like a live dashboard (Table 2). Thirty-eight percent of our survey respondents preferred highly detailed data with individual data points, but almost as many wanted additional explanation for those data points (32%) and summary data (32%) with additional explanation (29%) (Table 2). Furthermore, 37% of survey respondents rated interpretability as "important AND essential" for using an ideal organic market data source; 36% also rated accessibility as important and essential for using the data (Table 3).

Similarly, interviewees were often interested in trend information and additional explanation that would improve their confidence in MN. One producer, four processors, all six distributors, and two retailers discussed using organic commodity data to track longer-term trends and improve market predictions. One small retailer, discussing USDA data in general, described wanting data that could help them better predict future market trends:

> Like to say … the wheat crop is looking like it's gonna be like XYZ right now. That's never really felt accessible to me as a retailer. … I just don't know how to distill it from the commodity information that I have looked at over time. (Interview 4)

This retailer explained that knowing features of production timing would be helpful for them as

Table 2. Ideal Organic Price and Volume Data Attributes by Value Chain Link

	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)	Total (*N*=227)
Preferred format[a]					
Standardized/static audio format (like recordings)	8 (5%)	0	2 (7%)	0	10 (4%)
Standardized/static visual format (like reports or figures)	105 (69%)	19 (56%)	16 (59%)	8 (57%)	148 (65%)
Standardized/static mixed audio/visual format (like informational videos)	21 (14%)	2 (6%)	4 (15%)	3 (21%)	30 (13%)
Interactive audio format (like conversations)	9 (6%)	1 (3%)	1 (4%)	3 (21%)	14 (6%)
Interactive visual format (like live dashboards)	26 (17%)	8 (24%)	8 (30%)	8 (57%)	50 (22%)
Interactive mixed audio/visual format (like presentations)	17 (11%)	1 (3%)	4 (15%)	3 (21%)	25 (11%)
Preferred level of detail[a]					
Individual data points (like the price of a commodity at a specific time/place)	59 (39%)	12 (35%)	10 (37%)	6 (43%)	87 (38%)
Individual data points with some explanation	42 (28%)	12 (35%)	11 (41%)	8 (57%)	73 (32%)
Summary data (like the average price of a commodity over time)	48 (32%)	11 (32%)	7 (26%)	7 (50%)	73 (32%)
Summary data with some explanation	38 (25%)	11 (32%)	9 (33%)	7 (50%)	65 (29%)
Preferred frequency					
Daily	6 (4%)	1 (3%)	0	2 (14%)	9 (4%)
Weekly	37 (24%)	5 (15%)	12 (44%)	3 (21%)	57 (25%)
Monthly	29 (19%)	5 (15%)	5 (19%)	4 (29%)	43 (19%)
Quarterly	15 (10%)	8 (24%)	0	3 (21%)	26 (11%)
Seasonally	22 (14%)	0	0	0	22 (10%)
Yearly	13 (9%)	4 (12%)	1 (4%)	0	18 (8%)
Less often than yearly	3 (2%)	0	0	0	3 (1%)
We're not interested in these data	10 (7%)	2 (6%)	1 (4%)	0	13 (6%)

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Table 2. (Continued) Ideal Organic Price and Volume Data Attributes by Value Chain Link

	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)	Total (*N* = 227)
Preferred way to access and/or receive data updates[a]					
Email	98 (64%)	19 (56%)	16 (59%)	9 (64%)	142 (65%)
Website	59 (39%)	15 (44%)	11 (41%)	8 (57%)	93 (41%)
Smartphone app	30 (20%)	4 (12%)	2 (7%)	2 (14%)	38 (17%)
Printed materials	27 (18%)	2 (6%)	3 (11%)	4 (29%)	36 (16%)
Automated data updates that allow us to maintain our own data tables, visualizations, and/or reports (i.e. via API)	7 (5%)	1 (3%)	2 (7%)	3 (21%)	13 (6%)
Other[b]	16 (11%)	6 (18%)	2 (7%)	2 (14%)	26 (11%)
We're not interested in these data	9 (6%)	2 (6%)	1 (4%)	1 (7%)	13 (6%)
Additional data on organic products would be very or extremely useful, by category					
Major specialty crops	45 (30%)	11 (32%)	9 (33%)	7 (50%)	72 (32%)
Major grain crops	11 (7%)	8 (24%)	3 (11%)	3 (21%)	25 (11%)
Other crops	24 (16%)	3 (9%)	4 (15%)	3 (21%)	35 (15%)
Livestock and/or poultry	7 (5%)	5 (15%)	3 (11%)	8 (57%)	23 (10%)
Dairy and/or eggs	14 (9%)	4 (12%)	1 (4%)	8 (57%)	27 (12%)
Non-food commodities like cotton or other fibers	4 (3%)	3 (9%)	1 (4%)	0	8 (4%)
Value-added specialty crop products	22 (14%)	5 (15%)	4 (15%)	2 (14%)	33 (15%)
Value-added grain products	8 (5%)	7 (21%)	2 (7%)	2 (14%)	19 (8%)
Value-added livestock and/or poultry products	4 (3%)	5 (15%)	1 (4%)	3 (21%)	13 (6%)
Value-added dairy and/or egg products	8 (5%)	2 (6%)	1 (4%)	4 (29%)	15 (7%)
Value-added non-food products like textiles	5 (3%)	2 (6%)	1 (4%)	1 (7%)	9 (4%)
Other value-added products	6 (4%)	4 (12%)	3 (11%)	2 (14%)	15 (7%)

Source: Organic Data Initiative Gap Analysis Surveys (2024)

[a] Because we allowed participants to select multiple response options, the sum of all responses is greater than the total number of participants.

[b] "Other" includes the following category options in the original question: "Social media (Facebook, Instagram, etc.)," "Phone call," "Radio," "Podcast," "In-person," and "Other"

Table 3. Importance of Various Aspects of Ideal Data Source by Value Chain Link

	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)	Total (*N* = 227)
Timeliness: the data are available and/or updated as often as we need					
Important AND essential for using the data	36 (24%)	9 (26%)	6 (22%)	6 (43%)	57 (25%)
Important BUT NOT essential for using the data	21 (14%)	6 (18%)	7 (26%)	1 (7%)	35 (15%)
Moderately important	29 (19%)	6 (18%)	3 (11%)	3 (21%)	41 (18%)
Not at all important/Of minor importance	38 (25%)	2 (6%)	2 (7%)	1 (7%)	43 (19%)
Products: the data cover the right products					
Important AND essential for using the data	60 (39%)	13 (28%)	8 (30%)	9 (64%)	90 (40%)
Important BUT NOT essential for using the data	18 (12%)	4 (12%)	4 (15%)	0	26 (11%)
Moderately important	17 (11%)	5 (15%)	4 (15%)	2 (14%)	28 (12%)
Not at all important/Of minor importance	28 (18%)	1 (3%)	2 (7%)	1 (7%)	32 (14%)
Geographies: the data cover the right geographic area(s)					
Important AND essential for using the data	55 (36%)	6 (18%)	4 (15%)	7 (50%)	72 (32%)
Important BUT NOT essential for using the data	22 (14%)	5 (15%)	6 (22%)	0	33 (15%)
Moderately important	17 (11%)	8 (24%)	4 (15%)	3 (21%)	32 (14%)
Not at all important/Of minor importance	17 (11%)	4 (12%)	3 (11%)	2 (14%)	26 (11%)
Accessibility: the data are easy to access					
Important AND essential for using the data	57 (38%)	12 (35%)	6 (22%)	6 (43%)	81 (36%)
Important BUT NOT essential for using the data	18 (12%)	6 (18%)	8 (30%)	3 (21%)	35 (15%)
Moderately important	21 (14%)	5 (15%)	2 (7%)	2 (14%)	30 (13%)
Not at all important/Of minor importance	28 (18%)	0	2 (7%)	1 (7%)	31 (14%)

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Table 3. (Continued) Importance of Various Aspects of Ideal Data Source by Value Chain Link

	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)	Total (*N* = 227)
Accuracy: the data are accurate					
Important AND essential for using the data	75 (49%)	16 (47%)	11 (41%)	10 (71%)	112 (49%)
Important BUT NOT essential for using the data	11 (6%)	1 (3%)	3 (11%)	0	15 (7%)
Moderately important	13 (9%)	3 (9%)	2 (7%)	1 (7%)	19 (8%)
Not at all important/Of minor importance	24 (16%)	1 (3%)	2 (7%)	1 (7%)	28 (12%)
Interpretability: the data are easy to understand and interpret					
Important AND essential for using the data	63 (41%)	10 (29%)	7 (26%)	5 (36%)	85 (37%)
Important BUT NOT essential for using the data	22 (14%)	7 (21%)	6 (22%)	4 (29%)	39 (17%)
Moderately important	14 (9%)	5 (15%)	3 (11%)	2 (14%)	24 (11%)
Not at all important/Of minor importance	23 (15%)	0	2 (7%)	1 (7%)	26 (11%)
Usability: we are able to use the data the way we want to					
Important AND essential for using the data	43 (28%)	10 (29%)	4 (15%)	6 (43%)	63 (28%)
Important BUT NOT essential for using the data	27 (18%)	6 (18%)	6 (22%)	3 (21%)	42 (19%)
Moderately important	23 (15%)	6 (18%)	4 (15%)	2 (14%)	35 (15%)
Not at all important/Of minor importance	27 (18%)	0	3 (11%)	1 (7%)	31 (14%)
Automation: the data work well with automated reports we use or want to use					
Important AND essential for using the data	17 (11%)	6 (18%)	3 (11%)	2 (14%)	28 (12%)
Important BUT NOT essential for using the data	19 (13%)	9 (26%)	5 (19%)	3 (21%)	36 (16%)
Moderately important	21 (14%)	5 (15%)	3 (11%)	5 (36%)	34 (15%)
Not at all important/Of minor importance	49 (32%)	2 (6%)	4 (15%)	1 (7%)	56 (25%)

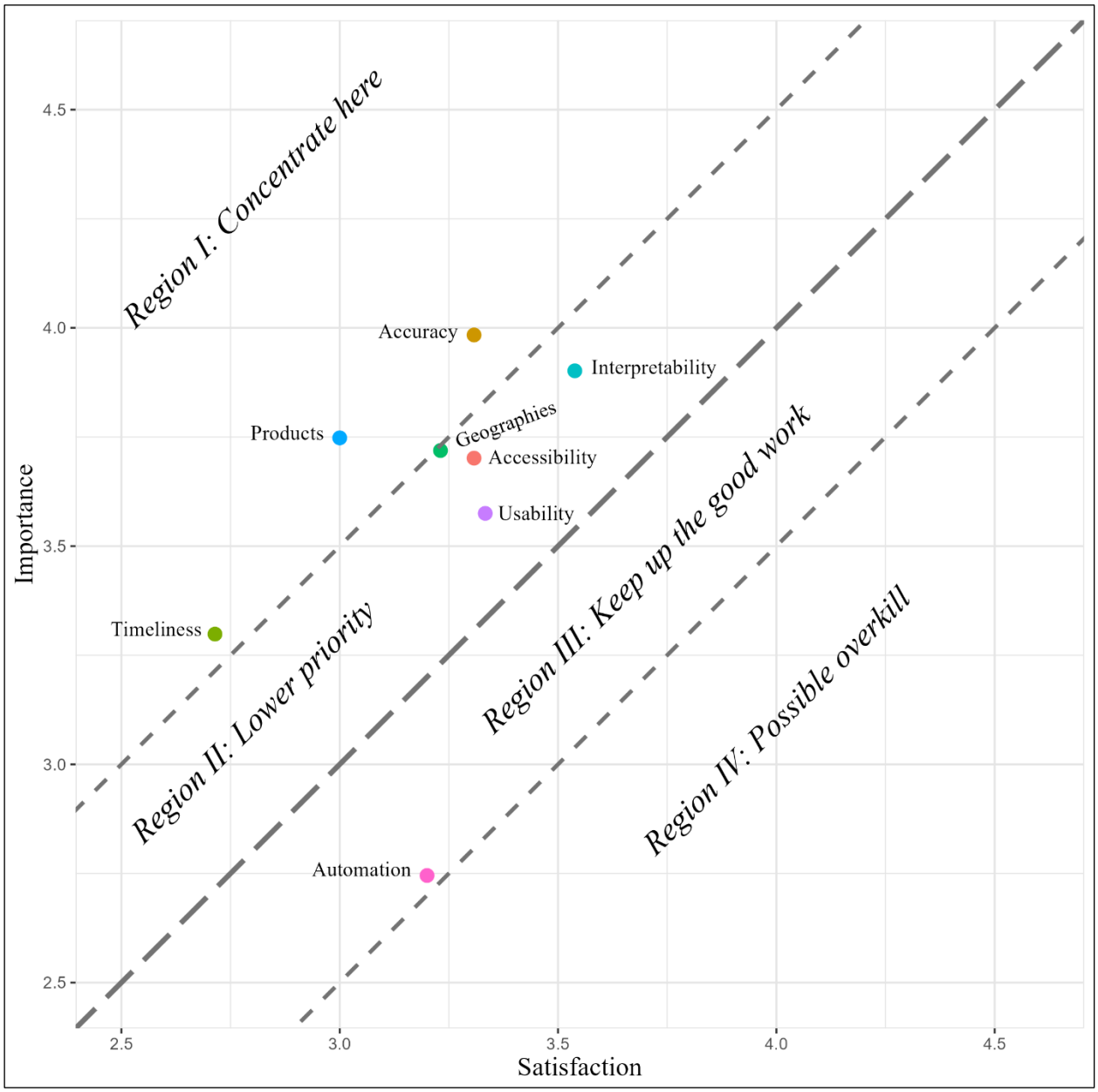
Source: Organic Data Initiative Gap Analysis Surveys (2024)

a retailer; however, despite their general sense that USDA probably has data that could help them, they were unsure about how to make predictions from data they could find and understand. This indicates a need for more explanation of trends for organic products but also demonstrates the desire to use agricultural information to make longer-term business decisions.

Relatedly, a processor of fresh cut greens stated that their data needs included better access to information about why prices might be changing over time:

> If we're gonna go out to our big customers and ask for a price increase, a lot of times we need information … and validation to make that

Figure 2. Producers' Average Importance and Satisfaction Ratings

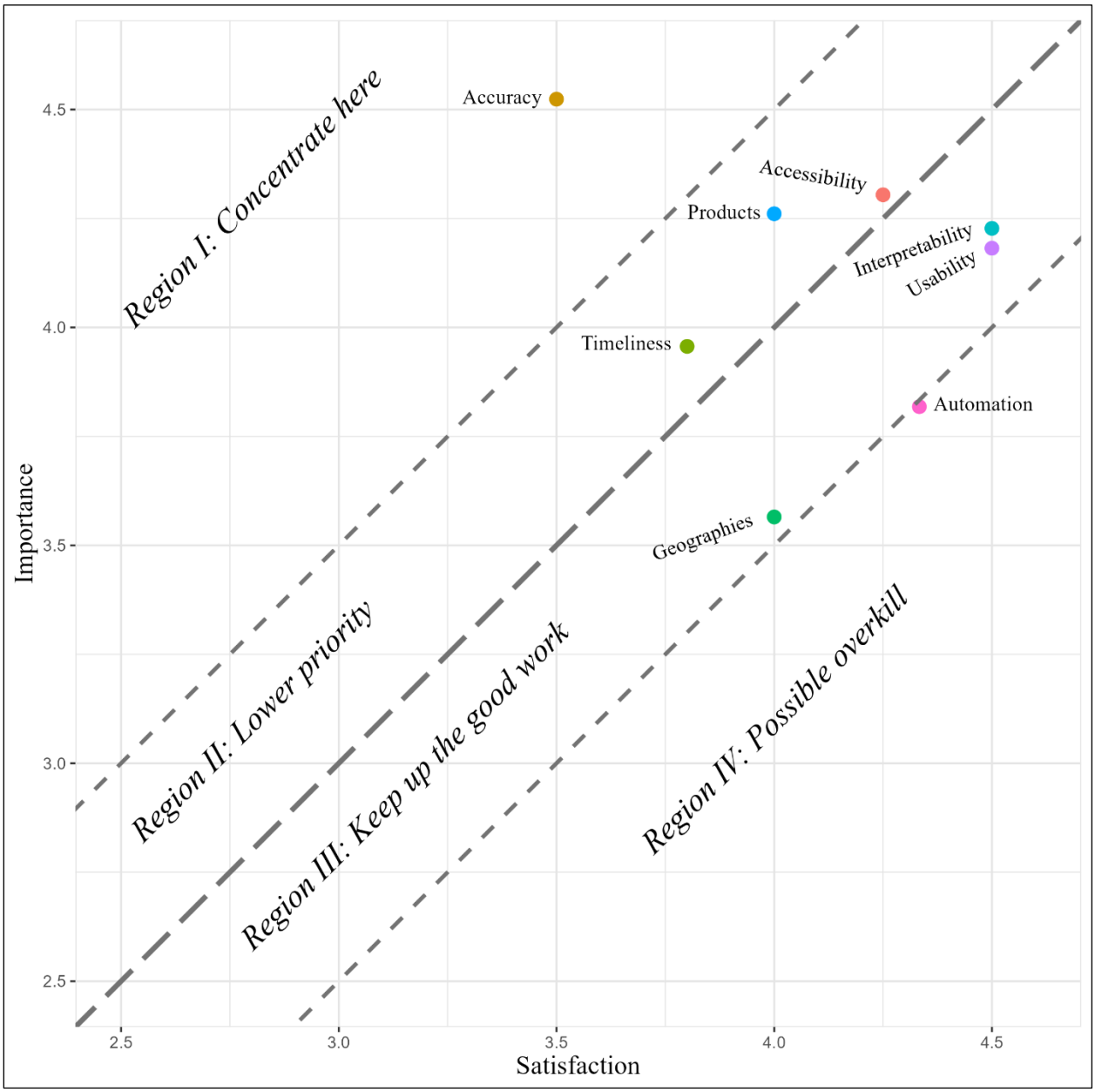


Source: Organic Data Initiative Gap Analysis Surveys (2024).

increase. So, let's say organic kale pricing's up 5% year-over-year, having some sort of grower input onto why that 5% is happening, whether it's labor or water or … I think we understand a lot of those challenges, because we were growers, but having that data published in a kind of fair report that's … from AMS. … I think that would be helpful. (Interview 1)

This processor needed more than just points of data that indicated changes in the market price. They needed a clearer explanation for their customers of the root cause of price increases, as the information would facilitate negotiating a fairer price with customers when they experience price increases from the producers they worked with. They noted the value of a neutral party, such as

Figure 3. Processors' Average Importance and Satisfaction Ratings



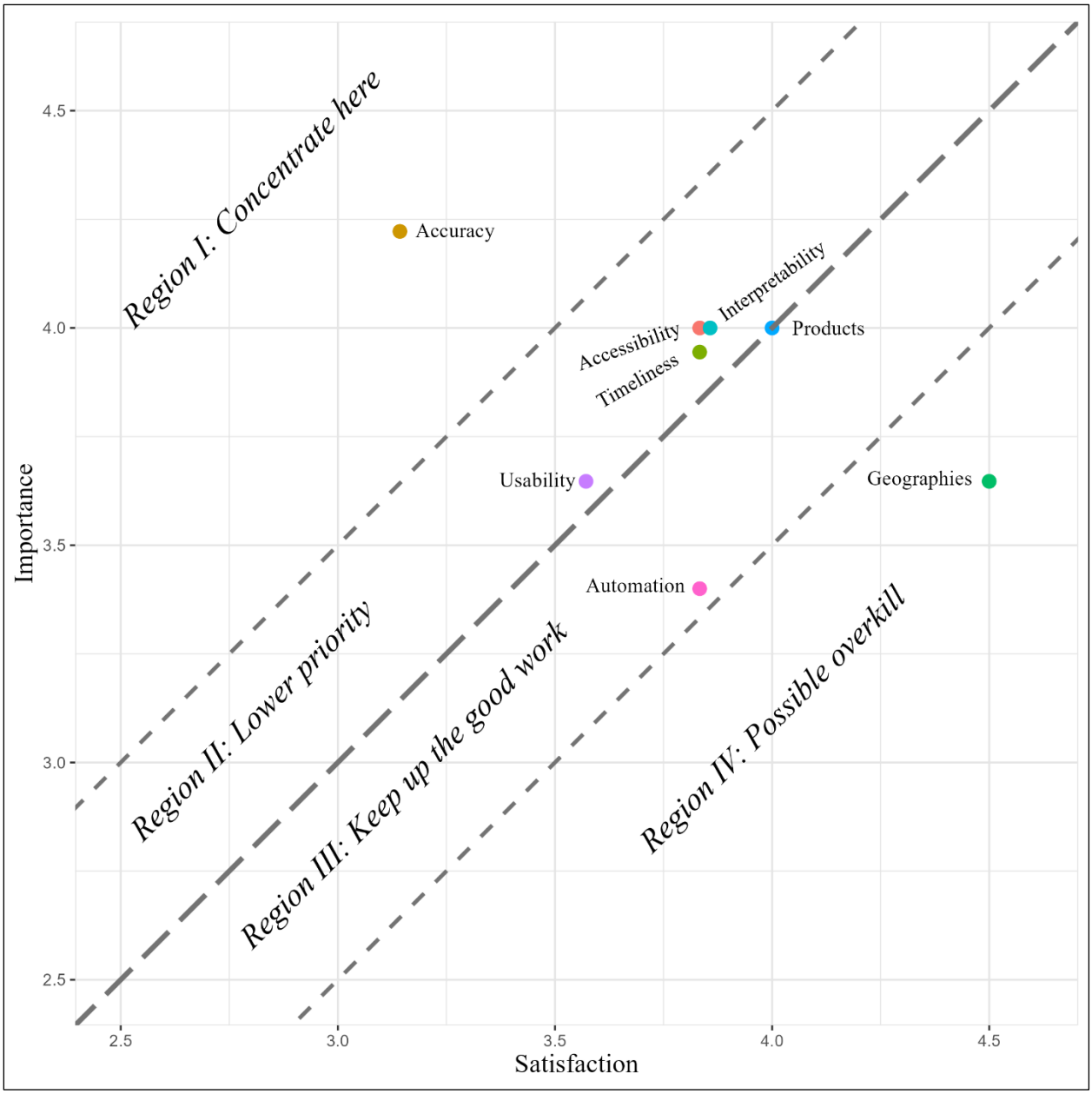
Source: Organic Data Initiative Gap Analysis Surveys (2024).

AMS, being the source for this information.

Consistent with this need for more explanation, 16 interview participants seemed to need more clarity and improved functionality of organic market data already available through MN. Some asked how these data are collected and what types of pricing, products, or item sizes are included. One large grower wondered how transportation costs are factored into the pricing numbers, especially for the organic feed and seed commodities they grow.

> To have a national thing to tell me, "hey, the price of hay in Wisconsin is US$100." It's completely different here [in California]. … Would it be good for me to see that? I'm

Figure 4. Distributors' Average Importance and Satisfaction Ratings

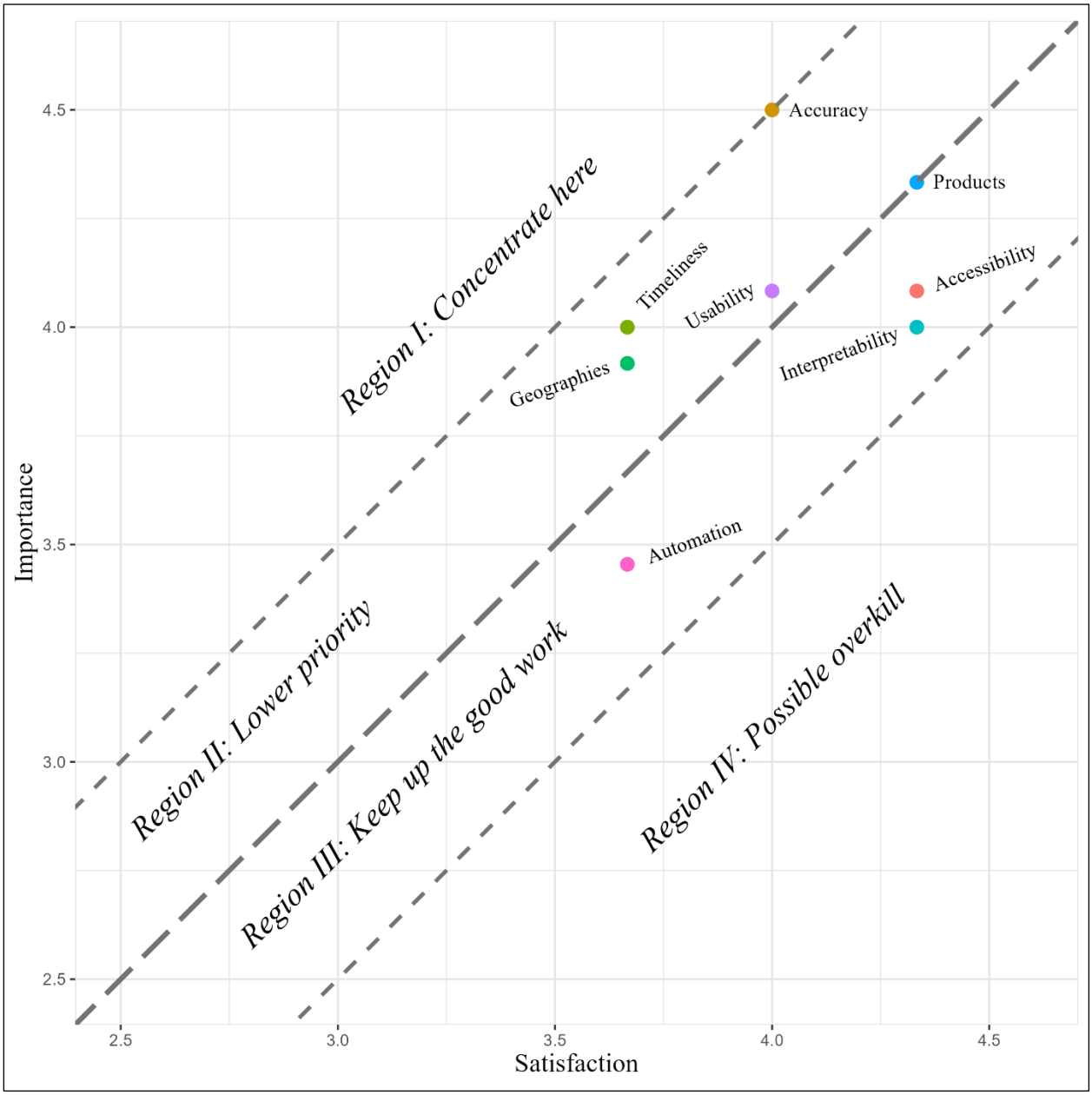


Source: Organic Data Initiative Gap Analysis Surveys (2024).

always interested in that. I like to look at a lot of different things, right? But I need to know what's going on around here. … I need to know because it's all based on transportation … my broker would haul the hay at 20 bucks a ton. Now it's 30 bucks a ton. So is he going to buy my hay from here? Or is he gonna buy [from] a guy in [another county] that he has to haul it for US$14 a ton instead of hauling m[ine for] US$35? So automatically, my hay went up US$17 a ton just because of the trucking. (Interview 15)

In short, the variation in transportation costs made it difficult to apply existing USDA data to their business. They need additional details about

Figure 5. Retailers' Average Importance and Satisfaction Ratings



Source: Organic Data Initiative Gap Analysis Surveys (2024).

the contexts in which data are collected for them to be useful.

Data Accuracy

Overall, about half (49%) of survey respondents felt data accuracy was important and essential for an ideal organic price and volume data source (Table 3). Our importance-satisfaction analysis (Figures 2–5) further suggests that data accuracy is the most important aspect of MN organic data to improve. Each figure in the analysis contains demarcations of four separate areas of attention. Region I is where most concentration should be focused; items in this area had average importance ratings at least a half point higher than their satisfaction rating. Items in Region II have average importance ratings less than a half point higher than average satisfaction ratings and are less pressing to address. Items in Region III have average importance scores less than a half point lower than average satisfaction scores, so the region represents areas where MN is meeting users' needs. Items in Region IV, where average satisfaction scores are at least half a point higher than average importance scores, require less attention.

Data accuracy falls in the high priority region (Region I) for producers, distributors, and processors, and in the lower priority region (Region II) for retailers. The average importance score for data accuracy is 3.98 among producers, 4.52 for processors, and 4.22 for distributors, but the average satisfaction score for data accuracy of MN organic data is only 3.31 among producers, 3.5 among processors, and 3.14 among distributors (Figures 2–4). The gap between importance and satisfaction scores is about two-thirds of a point for producers, and more than one entire point for both processors and distributors. For data accuracy, retailers have an average importance score of 4.5 and an average satisfaction score a half-point lower at 4.0 (Figure 5).

Of our 14 interviewees familiar with USDA organic price and volume data, five were frustrated with inaccuracies in the data for organic products. An organic tree fruit grower-shipper showed the first author gaps in the MN data they use to demonstrate to investors longer-term trends. They came to the interview with an excel spreadsheet with some figures to illustrate the problem:

> This is something that I took out of the USDA website because I needed to make a report for some of the investors we have on the [specific variety] orchards. And this here [referring to the spreadsheet and figures] is what I mainly needed to show them, is that the [specific variety] pricing is always higher than … the [several] core [main] varieties, so it's always higher. But look at this. They just didn't collect data for these two months [referring to two months where the figures showed no data for organic]. … And this kind of stuff is rampant in the USDA website … and this is our peak season right here [referring to the months for which data was missing]. So I had to tell the investors like, "yeah, I guess it would be a nice little mountain here where we'd have better pricing, but I don't really know." For whoever at the USDA decided not to get store pricing that day. So that is my main grievance. I also just think it's pretty clunky that I have to drop it out of the website into Excel in order to do anything. It's inconsistent … by region. Sometimes they collect data for a particular region on a particular month and then the next month they don't. So I don't know how that works, but I think it's not very helpful. (Interview 22)

The spreadsheet they shared included a line graph that tracked the price over 12 months of one specific tree fruit variety as compared to others. Datapoints for two of the months, as explained in the quote above, are simply missing for that variety. Their explanation of the impact of this data gap—having to guess for investors at what peak-season pricing might be— shows that the gaps limit the utility of MN organic data for businesses wanting to look at longer-term trends. They further described data gaps as common for organic commodities in MN, limiting data usability, especially for tracking longer-term trends. They also echoed sentiments from other interviewees that the interface is "clunky," requiring them to copy the data to Excel to make needed illustrations.

Data Coverage

Overall, 40% of survey respondents indicated that product coverage was important to essential for use of organic market data (Table 3). Thirty-two percent of survey respondents also wanted more information on major specialty crops (Table 2). Our importance-satisfaction analysis suggests that products covered may be more important to address for producers and processors. Products covered falls in Region I for producers, with an average importance score of 3.74 and an average satisfaction score of nearly three-quarters of a point lower at 3.00, and in Region II for processors (4.26 importance, 4.0 satisfaction). Average importance and satisfaction scores were identical for both distributors (4.0) and retailers (4.33) for products covered, placing this item in Region III for both of these supply chain links (Figures 2–5).

Four producers, two processors, and one retailer we also expressed interest in organic market data sources, including MN, covering a wider variety of organic products. A mid-sized vegetable producer felt confident that MN was not useful for their operation, which sells their produce through direct channels like farmers markets and restaurants. When asked what barriers they encountered when trying to access organic market data, they responded that they do not even look for this type of data and expressed a lack of confidence that they would be able to find it and/or that it would meet their needs:

> I don't really go looking for it because I don't know where I would find it. Whenever I've looked at the sort of official, USDA or whatever it is, it's always sort of commodity stuff, you know? Whereas we've got restauranty [specialty variety] things. So they don't list prices for the kinds of things that we sell [like pointed cabbage]. (Interview 17)

This farmer differentiates their products from commodity produce and states that the difference makes USDA data largely unusable for them since the products they grow and sell are mostly not listed in USDA data. This proved largely true later in the interview, when this producer spent some time reviewing MN reports and narrating some of the issues they found as they reviewed the reports:

> Interviewee: We grow pointed cabbage. So this is Atlanta, Atlanta, Atlanta [Georgia], I guess it's alphabetical so. … Page two … San Francisco, here we go! And then the most recent date they have is the 10th of January. [The interview took place in late April.]
>
> Interviewer: So not recent enough to be useful for you.
>
> Interviewee: No, no. And then it doesn't specify which cabbage. Oh, sorry. Variety. Round green, round green, round green, red, red, red, savoy. Whoopee. So we do grow the savoy. And then it gives you low and high price. There's not much difference. It doesn't tell you the weight. Oh, no it does, sorry. Thirty pounds. And then a Danish cabbage, whatever that is. I don't know. But our [pointed] cabbage isn't there. (Interview 17)

Their main point was that data for the specific varieties of specialty crops they grow are not available. Their narration of their experience also indicates other aspects of the data that are not useful for them or are confusing, showing the cognitive load it takes for producers unfamiliar with the data to navigate the MN interface. After a largely counterintuitive search that took several minutes for this producer, they ultimately concluded that their variety of cabbage was not included and the data were therefore not useful for them. This highlights some of the points of dissatisfaction in using the MN organic data that are available. The data organization is not intuitive and product sizes are specific to commodity markets rather than what might be found in other sales channels which many smaller organic producers work in.

Discussion

While we find only limited direct reliance on MN among the organic agrifood sector, the data likely remain impactful through indirect use (Wolf et al., 2001). We find that California's organic industry primarily relies on informal sources of organic

market information. Ultimately, we cannot determine the extent to which this reliance represents a broader dissemination of MN organic data because we did not explore the origin of data shared across value chain links. However, one main informal source is distributors: 17% of farmers, 29% of processors, 41% of distributors, and 21% of retailers we surveyed use organic price and volume information from (other) distributors, making distributors the most important source for farmers and processors. And 19% of distributors regularly rely on MN organic market data. Thus, at least some of the distributor information that is used by 20 to 30% of respondents within the other links of the value chain is likely influenced by or originated as MN organic data. Indeed, distributors typically act as the mediators of supply and demand—and thus the entities setting prices— within intermediated market channels. This means the influence of MN organic data, indirectly through distributors is more widespread than it appears in our findings about direct use. Future research on organic market data use should more thoroughly consider this indirect impact and determine ways to track it.

Importantly, we find consistent interest among producers, processors, distributors, and retailers in increased organic market data presented in visual formats with trend explanations. This somewhat contradicts existing research demonstrating the use of informal information sources (Beethem et al., 2023; Hoffman et al., 2015; Lubell et al., 2014; Wolf et al., 2001), but those studies focused on current agricultural information use practices, did not specifically ask research participants about their ideal information sources, and did not focus specifically on price and volume data, which are relatively easily represented via trend analysis. Specifically focusing questions in our surveys on an ideal organic market information source, and our interview questions on what other information would be helpful for participants' businesses, reveal a persistent interest in formal data sources that could help organizations assess long-term trends in the organic marketplace. Including additional analysis and explanation of organic data trends in formal publicly available organic market data sources like MN would make them more useable for industry actors and help maintain a fairer market for farmers and smaller operations. We also suggest increasing the accessibility of existing MN organic data. For example, developing and promoting an easier item-based search process may help industry actors use existing data more easily, especially smaller operations with limited capacity and time. This search process could function by entering a single commodity item and obtaining an overview of the data available for that item through MN.

Data accuracy also emerged in our importance-satisfaction analysis as a primary area where MN should strive to reach more actors in the organic agrifood industry and enhance their decision-making. Our interviews identified data gaps and inconsistent reporting as key issues with MN organic data that likely cause the lower average satisfaction rating for accuracy. Where possible, MN should address these gaps and inconsistencies, even if they largely reflect the thinness of organic commodity markets. More broadly, the short turnaround, typically within a day, in MN report production as compared to other USDA reports may limit data quality. In this context, data presentation adjustments could help bolster trust in organic MN data; specifically, the root causes of data gaps should be explained in close proximity to the data presentation. And including clearer explanation of terms used throughout MN, and overviews of the data collection process, would build trust in existing resources among industry actors.

Finally, our findings demonstrate a consistent need for the inclusion of additional products, especially specialty crops, in MN organic price and volume data. Because organic commodities consistently present in traditional markets are already included in MN, AMS has begun to address this need by collecting information at more organic-focused markets, such as farmers markets (USDA AMS, 2024). Coverage of organic-focused markets should continue to expand to better serve the organic industry. Because data relevance (i.e., the presence of relevant products) may be the most critical component of a data source for users (Home et al. 2017, p. 151), increasing the products covered will be critical for expanding relevance and use of MN organic data.

Overall, survey and interview respondents are interested in the type of data that MN provides:

price and volume data for organic products. These data are particularly important for distributors, who have a crucial price-setting role in the organic market and may disseminate this data more broadly throughout the industry. Our research also reveals one specific area where MN organic data is working well for California's organic agrifood industry: MN's automation abilities, which facilitate pulling raw data rapidly. This suggests the effectiveness of recent efforts to improve automation options, like the introduction of the MyMarketNews API (USDA AMS, 2019).

Limitations

Our research respondents represent a subgroup of organic agrifood stakeholders across the U.S., mostly smaller-scale operations focused on specialty crops. However, our farmer sample is largely representative of California organic farmers in terms of size and crops produced: excluding non-responses, 25% of farmers in our sample had less than US$10,000 in sales in 2024 and 44% mainly grow fruits and/or nuts (Table 4). Twenty percent of California organic farmers had less than US$10,000 in sales in 2021 compared to 11% nationally, and 63% of California organic farmers grow fruits and/or nuts compared to 21% nationally (USDA NASS, 2022, 2025). The lack of publicly available data on other organic businesses makes it difficult to assess the representativeness of the rest of our sample. However, the ongoing corporate consolidation of food retail and organic handling suggests that these supply chain links are disproportionately occupied by larger operations (Howard, 2009, 2021; Zeballos, 2025). Our study may, therefore, focus on voices of organic processors, distributors, and retailers with less leverage to lobby for changes to USDA data or practices. As such, we hope that this research serves as an important addition to other work in this area.

Conclusion

In an era when agricultural information is increasingly becoming privatized (Beethem et al., 2023; Prokopy et al., 2015; Wolf, 1998, 2006), the need for and reliance on public agricultural information persists (Beethem et al., 2023; Karali et al., 2019; McKenzie & Darby, 2017; Wolf, 2006; Wolf et al., 2001), especially in organic and/or sustainable agrifood where corporate incentives for collecting data may be diminished (Beethem et al., 2023; Hoffman et al., 2015; Prokopy et al., 2015; Warner, 2006). The USDA Agricultural Marketing Service Market News (MN) has helped level imbalances in agricultural price information for more than 100 years (Lesser, 1993; McCallister, 1950; USDA, 2015). We have explored how their organic market information could be improved to better support organic producers, processors, distributors, and retailers. Results from surveys and interviews suggest that actors in California's organic agrifood industry largely rely on market information from informal sources, but are interested in more formal visualizations, especially with trend information, of data on organic prices and volumes like that produced by MN. This demonstrates the continued need for public investment in agricultural knowledge generation, even in an environment where market information may be disseminated more broadly through informal networks.

Improving the interface, accuracy, and coverage of the MN organic data would all enhance their utility for the agrifood industry. Implementing a simpler item-based search process, clearer explanations of terms, and overviews of data collection processes would improve the existing MN data interface. Developing more visualizations of organic commodity data would also help the data interface remain relevant and useful, as would personalized or tailored data access points. We recommend that AMS continues expanding coverage of organic-focused markets and provides clearer explanation of gaps in existing organic price and volume data.

AMS funding should be increased to support these improvements and help maintain a robust public source of organic market data that could be especially beneficial for organic farmers and smaller-scale operations. Opposition from political leaders seeking to reduce federal government functionality—ongoing defunding of government statistical agencies has already decreased availability of robust public data on many topics (Beethem et al., 2023; Bowen et al., 2025; Orszag, 2025)—does

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Table 4. Descriptives of California Organic Agrifood Businesses by Value Chain Link

	Farmers (*N* = 152)	Processors (*N* = 34)	Distributors (*N* = 27)	Retailers (*N* = 14)
Size	Num. Acres Farmed: Mean: 452 Median: 16	Num. Facilities: Only 1: 18 (53%) 2–5: 3 (9%) No response: 13 (38%)	Num. Warehouses: Only 1: 12 (44%) 2–5: 5 (19%) No Response: 10 (37%)	Num. Retail Stores: Only 1: 9 (64%) More than 1: 3 (21%) No response: 2 (14%)
Gross Sales Last Year	Less than $10k: 30 (20%) $10k–$99k: 40 (26%) $100k–$999k: 31 (20%) $1mil. or more: 19 (13%) No response: 32 (21%)	Less than $100k: 3 (9%) $100k–$999k: 6 (18%) $1mil. –$49mil.: 10 (29%) $50mil. or more: 3 (9%) No response: 12 (35%)	Less than $100k: 0 $100k–$999k: 4 (15%) $1mil. –$9mil.: 7 (26%) $10mil. or more: 3 (11%) No response: 13 (48%)	Less than $999k: 1 (7%) $1mil. –$9mil.: 4 (29%) $10mil. –$49mil.: 5 (36%) $50mil. or more: 2 (14%) No response: 2 (14%)
Number of Managers	Mean: 2.5 Median: 2	Mean: 22 Median: 7	Mean: 14 Median: 8	Mean: 34 Median: 15
Main Organic Products	Fruit/Nuts: 36 (24%) Vegetables: 14 (9%) Grains/Pulses: 3 (2%) Flower/Nursery: 7 (5%) Cropland (not otherwise specified): 14 (9%) Rangeland: 7 (5%) Not specified: 71 (47%)	Fruit/Nuts: 3 (9%) Vegetables: 3 (9%) Grains/Pulses: 4 (12%) Meat products: 4 (12%) Other: 4 (12%) No response: 13 (38%)	Fruit: 3 (11%) Vegetables: 8 (30%) Grains/Pulses: 1 (4%) Meat products: 4 (15%) Value-added: 1 (4%) Other: 4 (15%) Not specified: 9 (33%)	Fruit/Nuts: 5 (36%) Vegetables: 6 (43%) Grains/Pulses: 5 (36%) Dairy/Eggs: 5 (36%) Meat products: 3 (21%) Flower/Nursery: 3 (21%) Value-added: 1 (7%) Other: 2 (14%) No response: 1 (7%)
Majority (50% or more) Ownership	Veterans: 2 (1%) Beginning farmers: 12 (8%) People of color: 10 (7%) Women: 30 (20%) Combination: 28 (18%) None of these: 23 (15%) No response: 46 (30%)	Veterans: 0 People of color: 4 (12%) Women: 4 (12%) Combination: 3 (9%) None of these: 6 (18%) No response: 16 (47%)	Veterans: 0 People of color: 5 (19%) Women: 2 (7%) Combination: 2 (7%) None of these: 1 (4%) No response: 17 (63%)	Veterans: 0 People of color: 1 (7%) Women: 3 (21%) Combination: 2 (14%) None of these: 2 (14%) No response: 6 (43%)

Source: Organic Data Initiative Gap Analysis Surveys (2024)

not diminish the need for continued improvements to MN organic data. Agricultural information privatization has created information imbalances that disadvantage smaller operations (Beethem et al., 2023; Jiang et al., 2020; Wolf, 2006), and concentrated market power in the U.S. food system has already pushed many medium- and smaller-scale operations out of the market entirely (Clapp, 2021, 2025; Frerick, 2024; Howard, 2021; Mitchell, 2024). Freely available agricultural data sources like MN help support equitable access to market information because many farmers and smaller-scale operations cannot afford private market data sources. Improved MN organic pricing data will help farmers and small operations ensure they receive fair prices for their products as the organic market continues to grow. It will also support improved organic crop insurance options, which often require robust pricing data, and more consistent information on organic premiums may encourage more U.S. farmers to meet the growing consumer demand for organic products currently being met through imports (Damewood, 2025).[4] The more useful MN organic data are for smaller-scale operations, the more they support balanced organic market information and, therefore, a stable and equitable organic agrifood market.



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How gender norms shape opportunities for building resilience to climate change in low- and middle-income countries

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Abstract

This study examines how gender norms shape opportunities for women to build resilience within agrifood systems in low- and middle-income countries (LMICs). Amid rising pressures from climate change, population growth, and resource depletion, enhancing resilience among vulnerable populations is critical. In recognition of the gaps in understanding individual-level resilience, particularly related to power and agency, this article presents data from a systematic literature review from 82 articles published between 2016 and 2022. The review analyzes how gender norms and intersectionality influence women's resilience in LMICs'

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- Anne M. Rietveld: Conceptualization; Methodology; Literature review; Formal analysis; Data curation; Writing—review and editing; Visualization; Supervision; Project Administration
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agrifood systems and women's placement along absorptive, adaptive, transformative, and inability-to-cope "resilience pathways."

Findings reveal that gender norms limit women's agency by restricting decision-making, asset control, voice in community processes, and access to profitable value chain activities. Intersectional factors such as age and disability can compound these constraints. Many women occupy absorptive pathways, meaning they deal reactively to shocks. However, women with greater agency have the potential to develop adaptive or transformative capacities, meaning that they exert a level of control over change processes. Downward movement between pathways can be worsened by factors including interventions, that aim to integrate farmers into agricultural markets, which do not take gender norms and dynamics into account. Collective action, social networks, gender-transformative interventions, and gender-intentional land reforms enable women to climb to higher resilience pathways.

Our study emphasizes the importance of addressing gendered power dynamics and norms to foster inclusive resilience. The study recommends gender-transformative approaches that enhance women's agency, incorporate intersectionality, and engage men as allies. Our Economic Resilience Pathways framework offers a valuable tool for empirical research and intervention design to support women's resilience in agrifood systems.

Keywords
resilience, climate change, gender norms, agrifood systems, women's agency, women, analytic framework, gender transformative change

Introduction

Globally, farmers and other agrifood system actors face increasing pressures from compounding crises and stressors including climate change, population growth, demographic shifts, biodiversity loss, market disruptions, and depletion of the natural resources on which food production systems depend (Swilling, 2020). These pressures make resilience-building critical, especially among already vulnerable populations. Resilience, in the context of socio-ecological systems, describes the capacity of social groups to manage stresses, shocks, and disturbances that result from social, political, and environmental change without incurring significant alteration or collapse of the system (Speranza et al., 2014; Anderies et al., 2013; Folke, 2006). Strengthening socio-economic resilience requires expanding a system's capacity to maintain, or improve, basic structures and ways of functioning essential for people to live, and continue to live (Speranza et al., 2014). Individuals, groups, and communities' ability to bounce back from these disturbances, to self-organize in response to challenges, and to learn from and respond to feedback loops is key to resilience (Ostrom et al., 2009). Measures to improve resilience can help people to recover in ways that reduce vulnerability to future stressors. When targeted at the most vulnerable, these measures also facilitate inclusive growth (USAID, 2012).

In the context of agrifood systems, building resilience involves strengthening the ability of farmers, farmer organizations, and other relevant actors (such as advisory services, government, development partners, women's groups and youth organizations, and private-sector players), to withstand disturbances and to self-organize to rebuild stronger systems. This requires "expanding economic opportunities, education, environmental sustainability, diverse livelihoods, and nutrition and health services, while also identifying and reducing risks" (Bryan et al., 2023, p. 240). Resilience-building interventions aim to assist actors across various scales in the wider agrifood system, to cope with and recover from shocks (Rietveld et al., 2023a).

The Importance of Power, Agency, and Norms to Develop "Resilience Pathways"

Theories around resilience generally focus on the ability of high-level systems to respond to and recover from shocks. Less theoretical work has been done to define factors contributing to resilience at the *individual* level. Because resilience is typically framed as the ability of *systems* to respond to and recover from shocks, to self-organize, and to transform, resilience frameworks often leave aside issues of power and agency for individuals within the system (Béné et al., 2014; Coulthard, 2012). The relevance of these concepts to *resilience*, particularly in the context of gender, is clear: the ability

of individuals to adapt and transform their circumstances and the wider systems surrounding them requires *agency:* the power to make decisions and act on them. The ability to exercise such power tends to be highly gendered.

In this study, we develop a resilience framework focused on the individual level, with relevance for the household, community, and agrifood system level. We draw upon a large body of research which shows that women and men—even when living in the same households—frequently have different abilities to achieve, and benefit from, resilience. To achieve our objective, we explore research which illustrates how power, agency, norms and diversity of choice shape the choices women have (Bohle et al., 2009; Lade et al., 2020; Rietveld et al., 2023a). Gender is an ever-present part of people's experience of themselves and others. It is a key frame for the enacting of social relations (Cislaghi & Heise, 2020). Gender norms, a subset of social norms, work to define acceptable and appropriate actions for women, men, boys, and girls in a given group at a given time (Garcia et al., 2021; Cislaghi &Heise, 2020; Cialdini & Trost, 1998). Some norms are so fully naturalized that they lie below the level of conscious awareness (Bourdieu, 1977; Farnworth et al., 2017). The concept of intersectionality is important. Gender norms restricting or facilitating a woman's pathways to action may be magnified or otherwise altered by her ethnicity, socio-economic class, religion, marital status, caste, disability, and other aspects of her identity (Crenshaw, 1991).

In this paper, we examine how gender norms shape the ability of women in agrifood systems to move onto specific "resilience pathways." In the context of this article, a resilience pathway means a way forward using a bundle of actions geared towards strengthening resilience. We expect that women will have one or more pathways for action available that they could potentially move onto (Lade et al., 2020). Through analysing the diversity of potential pathways, we focus on women's ability to adapt and transform their circumstances in agrifood systems as the key aspect of their capacity for resilience, and we consider the role of power and agency in this process. Power dynamics are some of the most important external forces shaping which actions are accessible for different actors. Individuals who lack power frequently experience weak access to resources, including knowledge and social networks, and thus encounter a smaller diversity of pathways for action in response to change or disturbance (Freed et al., 2025; Lade et al., 2020).

In our article, we distinguish three capacities that influence resilience to crises and shocks: absorptive, adaptive, and transformative capacities for resilience (Béné et al., 2014; Folke, 2006; Folke et al., 2010; Walker et al., 2004). We also discuss a fourth option defined by insufficient resilience capacities, resulting in a likely inability to cope with crisis. Each capacity is defined below.

First, absorptive capacity describes the ability of individuals, households, or communities to cope with the impacts of climate change on their livelihoods within their immediate means but without being able to prevent a deterioration in wellbeing (Béné et al., 2014). Associated actions are usually short-lived, reactive, and focused on survival. Example responses to shocks and disturbances that draw on absorptive capacity include taking on debt, selling assets, or reducing food consumption.

Second, individuals, households, or communities may develop adaptive capacity. Adaptive capacity describes the ability to mitigate risks by preparing for, coping with, and recovering from losses associated with a hazard (Kelly & Adger, 2000; Pelling, 2011). Adaptive capacity thus involves having the means to forecast and manage future risks and to put anticipatory measures in place to prepare for further shocks. Strategies might include diversifying livelihood activities—for instance, changing livestock and crop portfolios, moving into off-farm work, and engaging in climate-smart farming activities to minimize the impact—and mitigate the risk—of climate change over the medium to longer term (USAID, 2012).

Third, transformative capacity refers to a situation in which incremental adjustments—for whatever reason—no longer suffice (Walker et al., 2004). People actively participate in changing their institutional environment as well as their own daily routines. They break with 'business as usual' and contribute to the redesign of existing systems. For this, individuals need to work with the support of

family members, the wider community, and higher-level actors such as farmer cooperatives and private-sector actors. Often this means banding together with others to collectively shift the wider food system for instance through establishing multistakeholder platforms, changing policy, etc. At the household level, participants may shift decision-making in the household towards more mutuality, for instance by changing the gender division of labor (Rietveld et al., 2023a). Transformative capacity is about finding ways to enlarge these opportunities so women and men can exercise their agency more effectively and more ambitiously (Freed et al., 2025; Rietveld et al., 2023a).

Finally, some individuals, households, and communities experience an inability to cope. This describes an insufficiency of the three capacities for resilience described above. Individuals and people in households and communities then broadly lack the means to cope with shocks and disturbances. Of course, at some point individuals, households, and communities may be able to recover their ability to cope, for example with the help of humanitarian assistance.

The first three capacities parallel the three components of socio-ecological systems resilience: the ability to persist, to learn and change, and fundamentally transform as necessary (Anderies et al., 2013; Folke, 2006; Walker et al., 2004). These three capacities are broadly hierarchical, in that transformative capacity generally reflects greater pathway diversity than adaptive capacity, and adaptive capacity reflects more diversity than absorptive capacity. Movement between pathways is possible; women might climb to higher pathways as their capacities grow, but can also fall into lower pathways, or to an "inability to cope" state, if their capacities are weakened or the severity and/or frequency of shocks increases.

We use our literature review to explore three research questions: (1) How do gender norms and intersectionality influence women's placement in different resilience pathways? (2) What kinds of forces cause individuals to shift between pathways? and (3) What consequences arise from shifting between pathways?

Methodology

We conducted a systematic literature review in 2022, using Web of Science (WoS) (https://clarivate.com) to help us identify relevant literature. We cross-referenced the search terms in Table 1 with 'gender' and 'women.' Four additional selection criteria were (i) geographical focus on LMIC, (ii) agri-food system focus, (iii) analysis of primary data, (iv) English language articles, and (v) published in or after 2016. An initial 142 articles published between 2016 and 2022 were thus selected. After screening abstracts of these articles, we discarded 34 articles because they did not sufficiently meet the selection criteria. We read the 108 remaining articles, leading us to discard another 26 articles, mostly because their findings and discussion on the topic of interest for this article was too limited or superficial. This resulted in a final list of 82 articles. We then engaged in thorough reading and summarizing of every selected article to create detailed annotated bibliographies (Farnworth et al., 2024; Voss et al., 2024). Rather than predefine analytic headings, we made notes using the annotated bibliography until a sense of the main topic areas emerged. As synthesizing continued, we added new headings and changed old ones as necessary.

An overview of the geographic locations of the 82 articles reviewed is presented in Table 2.

Most articles focused on Africa (48 + 1 on Sub-Saharan Africa as a continent), followed by South Asia (9), Pacific (7), East and Southeast Asia (8 + 1 comparative study with Tanzania), Latin America (6), and Global (4). Within Africa, South-

Table 1. Search Terms for Web of Science Literature Review

Gender	
Women	
Economic resilience	Vulnerability; resilience climate change; resilience agriculture; climate change; sensitivity shocks.

ern Africa dominated with 17 articles, followed by East Africa with 15 articles. Eleven articles covered countries in West Africa. North Africa and the Horn account for the fewest articles (4). To help counteract the dominance of articles in the review on SSA and crops we made a particular effort to draw out findings from literature discussing other countries and non-crop value chains.

In this article, we augment our analysis of the 82 core articles by drawing on wider literature to help develop the Introduction and deepen the Discussion.

Findings

Our literature review illustrates the impacts of harmful gender norms on women's agency and economic resilience. The first part of our findings provides examples of key gender norms that limit women's pathways to action in the face of sudden or drawn-out systemic shocks or stressors. Although we disaggregate gender norms to help analyze the literature, we note that gender norms do not operate in isolation. They combine and reinforce each other synergistically (Rietveld et al., 2023b; Serote et al., 2021). The second part of the findings discusses how women can move between resilience pathways.

How Harmful Gender Norms Affect Women's Capacities for Resilience

The focus in this section is upon the operation of harmful gender norms assessed at the household level with respect to decision-making and control over assets. We also explore the privileging of men's voices in community decision-making bodies, in institutions, and women's marginalization in value chains. The study then explores interactions between gender, Intersectionality, and other social norms.

Men's control over decision-making at household level

In locations where men exercise strong normative control over decision-making (Organization for Economic Co-operation and Development [OECD], 2021), women can find it hard to build the capacities they need to develop strategies for resilience. The potential diversity of pathways available to women in LMICs tends to be limited by

Table 2. Overview of Countries Covered in Reviewed Articles

Global	West Africa	East Africa	Southern Africa	North & Horn	Pacific	Latin America & Caribbean	East-Southeast Asia	South Asia
Global	Benin	Kenya	Eswatini Lesotho	Egypt	Fiji	Colombia	Cambodia	India
Sub-Saharan Africa	Burkina Faso Mali Niger	Madagascar	Botswana	Ethiopia	Pacific Islands	Cuba	Indonesia	Nepal
	Cameroon	Tanzania	KwaZulu Natal	Somalia	Papua New Guinea	Guatemala	Myanmar	Pakistan
	Gambia		Malawi		Samoa		Philippines	South Asia
	Ghana		South Africa		Solomon Islands		Vietnam	
	Niger		Zambia		Western Indian Ocean			
	Togo		Zimbabwe					

their restricted decision-making authority. A South African study, for example, revealed gender norms that prioritize male farmers 'exclusive rights' to make decisions regarding how to adapt to climate change on their own and their wives' plots. Women were unable to draw on their own learning to formulate actions suited to their specific plots, thereby potentially facing loss of harvests and income as climate challenges mount (Molua & Ayuk, 2021). In one part of Cameroon, women struggle with voicelessness because their fathers and brothers dominate decision-making. Women cannot protest even if their brother takes their land—and crop—in the middle of the growing season (Azong et al., 2018). Similar normative situations elsewhere in Cameroon makes it extremely difficult for women farmers to respond to the increased temperatures and rainfall variations they are experiencing (Mbiafeu et al., 2024).

Men's control of assets at household level

Another widely held gender norm constructs men as the primary manager of land and nonland assets (OECD, 2021; Sen, 1987). For instance, the above-mentioned case regarding women's weak decision-making authority in Cameroon is partly underpinned and exacerbated by their weak land rights. Husbands frequently reject women's efforts to access, use, and make decisions about how to use land and land-based resources. This has the effect of undermining the ability of women farmers to develop strategies for resilience (Molua & Ayuk, 2021). Women frequently experience lower access to and control over nonland productive resources. For instance, a global study finds that women lack sufficient labor, cash, and equipment to adopt terracing, bunding, and check dams to help manage water (Zhang et al., 2021). A second study finds that women-headed households across southern Africa are less likely to adopt climate-smart technologies and practices due to their weak access to land, lower levels of formal education, and poor access to information on improved technologies (Makate et al., 2017). In Zambia, many women are locked into low-input forms of farming that inhibit them from taking up climate-smart practices and crops. They have limited access to cattle and manure and so find it hard to improve soil fertility. Women's low incomes also make it difficult to pay for market-based agricultural inputs and labor (Estrada-Carmona et al., 2020). Inequalities in terms of decision-making over land and assets can thus force women to move onto lower-level resilience pathways, leaving their spouses to occupy higher level pathways.

Men's privileged voices at community level

Community norms in Colombia do not explicitly prevent women from attending community meetings. However, women's voices are often not heard due to men's dominance of decision-making at household level. This is compounded by gender norms that privilege men's voices in community meetings—in this case, specifically with respect to managing and benefiting from large livestock. Even if women are present at community meetings, they find it hard to speak and ensure they are listened to. Their weak voice is compounded by the fact they have limited time to participate effectively in community-level decision-making processes since women are expected to devote considerable time to household and care work (Rios et al., 2022).

The relative volume of men's voices in many communities is strengthened by the tendency of agrifood system actors to consider men as key actors in agrifood systems. For instance, the fisheries literature reviewed for this study indicates that actors at all levels hold gender norms which privilege men, rather than women, as 'real' fishers (Branch & Kleiber, 2015). This assumption drives research predominantly into the types of fisheries, and the tasks, associated with men, such as boat-based, gear-driven, and finfish fishing in capture fisheries. In comparison, there is relatively little research conducted on women's work in fisheries, such as shellfish, onshore, and nearshore fishing, and the numerous tasks women conduct in capture fisheries (Gopal et al., 2020). The sidelining of women in fisheries research contributes to significant gaps in our understanding of women's roles, responsibilities, and benefits in that sector. In turn, this lack of insight can translate into a lack of institutional support for developing women's resilience to change (Cavole et al., 2025).

Lack of institutional gender responsiveness

Across different LMICs, the propensity of many external development partners and community bodies to consider men key actors in agrifood systems contributes to women's exclusion from processes that might expand their resilience capacities. In Uttar Pradesh in India, for example, local governing bodies did not inform women community members about a watershed management project that was to be implemented by external actors in their community. Men rather than women community members agreed how water was to be allocated. Women therefore played no role in determining the scope of the project and were unable to secure benefits. The study found that women's exclusion was unsurprising because in this area women are never invited to any type of community meeting, and no attempts were made to adjust gender norms to facilitate their participation as part of project design (Padmaja et al., 2020).

Furthermore, a lack of institutional gender responsiveness preceding or following climatic disasters such as floods and droughts can significantly hamper women's resilience. In Bangladesh, for instance, existing gender-biased legislation combined with community-level gender norms stymie women's ability to adapt and recover from disaster. Inheritance laws and difficulties accessing the legal system mean that women tend to lose access to their husband's or father's properties (land and other resources) if the latter are killed in disasters (Patel et al., 2019).

Institutions can also challenge gender norms, although this may not be adequate to change deeply embedded norms. For example, in Kenya, a fully revised Constitution (Republic of Kenya, 2010) expected to address gender inequality in the land tenure system by equalizing land rights. However, although women are aware of their legal rights to land, they often do not pursue land titles because they are enmeshed within complex extended familial relationships with parents, spouses, and parents-in-law (Po & Hickey, 2018). Women work hard to maintain relational mechanisms to access land, through sharing money and resources with their husband to show deference, and through building trust and reciprocity with parents-in-law to protect their access should they become widows or divorced. Challenging the normative framework that men hold assets could harm these complex reciprocal relationships (Po & Hickey, 2018). In instances like these, internal or external efforts toward systemic change do not necessarily lead to significant changes in gender norms, at least not in the short- to midterm, even if such change was the espoused intention of an intervention.

Women's marginalization from profitable activities

Gender norms at the household and community level affect women's abilities to take on higher-level, more profitable segments of value chains (such as processing, distribution, and retail). Gender norms at the organizational level limit women primarily to the primary producer node, with fewer women engaged in input supply, for example. It can be very difficult for women to move up the chain to occupy new more profitable nodes. Purcell et al. (2021) summarize studies of capture fisheries across LMIC which indicate that women's lower financial gains can be explained through several practices: women fishers are often restricted to low-value elements of the fishing chain, including gleaning, processing, selling, and fishing in intertidal areas; women do not have access to fishing boats; and women processors higher up in the chain are frequently quoted higher prices for fish by sellers. Overall, women fishers and processors work with lower numbers of fish and have lower incomes. Women are also more likely than men to be responsible for providing fish for household consumption, reducing their potential incomes still further (Purcell et al., 2021).

Intersectionality and social norms

Other aspects of women's identities (e.g., their age, caste, wealth, ability), in combination with their gender, can contribute to unique, intersecting forms of oppression that limit individual and group capacity for achieving resilience. In Somalia, for example, women and men living with disabilities are widely ignored in community-level decision-making about resources, which in turn hampers their efforts to create strategies to build their individual and household-level resilience (Lwanga-Ntale & Owino, 2020). In Cambodia, people living

with disabilities, particularly women, are frequently marginalized in daily life and are disproportionately affected by climate disasters. Their ability to seek alternative livelihoods to agriculture, when this is negatively affected by climate disasters, is very limited due to discriminatory processes in other potential livelihood sectors (Gartrell et al., 2020). In Eswatini, age and gender intersect to differentially affect the ability of boy- and girl-headed households to secure economically resilient agricultural livelihoods. Girl-headed households are offered relatively high levels of community support because the community is familiar with women *de facto* leading households and juggling housework and care tasks alongside agricultural tasks. However, boy-headed households are less resilient because boys are expected to show independence, to "man up." As a consequence, they are weakly supported by community members and by teachers (Mkhatshwa, 2017).

Furthermore, gender norms can play out differently for women according to the types of social capital they enjoy. In Ghana, women and men with lower political standing are less likely to leave land fallow (unused for cultivation for a period of time). Fallowing restores soil health, but poorly connected farmers risk having their improved land appropriated by more powerful community members. This discourages marginalized farmers from investing in fallowing (Goldstein & Udry, 2008, as cited in Zhang et al., 2021). In Zimbabwe, land reforms have broadly discriminated against women. However, women with higher socio-economic and political status have benefited more than poorer, lower-status women from land reform and government-subsidized farming implements (Muchacha & Mushenje, 2019).

Although social support networks are a key path to building resilience, the dynamics of these networks are themselves shaped by gender norms. Women's and men's support networks tend to differ greatly, in part because norms limit cross-gender social relationships in many contexts. In the fishing industry in Zanzibar, Tanzania, nonfinancial support networks are vital for establishing resilience by facilitating the achievement of food security and survival on narrow margins. Yet women fishers and traders participate in fewer and weaker social networks than men who have more extensive networks. Women traders tend to sell small low-value species to the local market, whereas men traders sell large fish to the tourism industry and to exporters. Men traders benefit more often than women traders from beneficial support relationships with fishers. They receive fish for home consumption, deferred payment schedules, and discounts. Women traders tend to support other women traders, and men traders support other men traders, with mixed-gender support networks being rare (Drury O'Neill et al., 2018). A second study from mainland Tanzanian shows that women in fishing communities engage in social networks that offer women members who are facing hardship support through material resources. Overall, though, men-headed fisher households are more resilient to the impacts of climate change because they have a wider range of assets (Yanda et al., 2021).

Movement Between Resilience Pathways

Shifting to, or staying on, lower-level resilience pathways
The examples described above illustrate how gender norms contribute toward situating women on certain resilience pathways. Norms that privilege men in terms of decision-making, resource control, voice, and engagement in productive economic activities frequently limit women to absorptive resilience pathways, where their responses to shocks are aimed at coping in the immediate or near future. Although their responses may aim to maintain well-being at preshock levels, overall women may experience a slow deterioration in well-being because absorptive resilience strategies often impose costs that can be hard to recover from: they might eat less, take children out of school, or sell assets (Bryan et al., 2018; Rietveld et al., 2023a).

Conversely, women who are less constrained by harmful gender norms, perhaps due to aspects of their intersectional identity which may convey power, specific circumstances, or the relative weakness of harmful gender norms in their context, might enjoy greater capacity for adaptive resilience. In this pathway, individuals can take charge of their livelihood over the longer term by mitigating risks and preparing for a recovery from shock-induced

losses. In Bangladesh, women have developed a range of measures to manage serious weather events, for instance by burying assets like ploughs and fishing nets to safeguard them when floods happen. Women also make portable mud stoves which are stored for potential use when disaster strikes, and they support disabled family members by building elevated platforms to help them survive floods (Dankelman et al., 2008, as cited in Patel et al., 2019).

It seems critical that women have adequate agency to put anticipatory measures such as climate-smart farming activities in place. In Ghana, "direct women cocoa farmers"—women cocoa farmers who operate their own cocoa land (inherited, purchased, or sharecropped)—experience high levels of decision-making autonomy regardless of marital status. This increases their resilience to shocks and disturbances because they can diversify into profitable off-farm opportunities to generate income. Married couples collaborate with and support each other on their respective farms, leading to "purposefulness and future orientation" among both women and men. Conversely, "indirect women cocoa farmers" labor on their spouse's land and experience low levels of decision-making power. Their low resource base means they typically try to diversify by selling low-value crop products into already saturated markets. Direct women cocoa farmers are thus far more resilient in the face of weather and climate change than indirect women cocoa farmers (Friedman et al., 2019).

There are many reasons women might fall to lower pathways, potentially to the point of facing an "inability to cope." Some of the reasons for downward shifts are personal, such as sudden illness, disability, loss of family members, or loss of assets. Major disasters such as floods, or outbreaks of violence can also contribute toward downward shifts (Farnworth et al., 2025). Here, we focus on one specific circumstance that emerged from the literature as a driver of women's loss of resilience: gender-blind interventions that aim at integrating women into agricultural markets.

Large-scale land acquisitions (LSLAs), enacted by governments and private-sector companies, have led to deepening concern over the past decade due to their often adverse impacts on local populations (Barajas et al., 2024). LSLAs often target communal lands or lands with weak formal documentation, leading to farmers and other land users (herders, users of non-timber forest products, etc.) being unable to assert their rights to land and its products. In some cases, local populations are completely moved off the land or expected to work on plantations established by the new landowner. In Cambodia, for example, the Land Law (2001) enables the government to lease land to companies for up to 99 years (Anti, 2021), and similar policies exist in many countries around the world.

LSLAs can seriously compromise women's potential to develop their capacities for resilience because company-led agreements to work with local communities (for example, over employment in plantations or to establish continued limited access rights) frequently target men rather than women at the community level. This can disrupt the mutuality of women's and men's rights, responsibilities, and entitlements that have developed over generations. In the Iringa Region, Tanzania, the New Forests Company (NFC)—a private company—developed an LSLA. This has provoked various kinds of land-grabbing of the remaining land within affected communities (grabbing of commons, grabbing between households and lineages, and grabbing of household land between husband and wife, brothers, and sisters). The NFC also instituted rules around which areas can be cultivated. Previously, communities were adapting to climate change by developing and modifying (over the past 50 years) common pool resource management instruments, as well as creating new markets for non-timber forest products and fruit trees. These activities are particularly important for women's resilience to climate change because women have lower access to alternative income-generation opportunities than men. However, grabbing of common land, and the prohibition by the NFC of planting in the fertile valley bottoms, means women can no longer plant beans, a key food security and cash crop. This is resulting in hunger in families. Women also no longer have access to specific species of grass growing on common land for making baskets and mats. Finally, a lack of transparency around compensation measures offered to men by the NFC for loss of

income meant that women lost negotiating power with their spouses. They are now more reliant on their spouses, have higher workloads, less income, and less food security (Gmür, 2020).

Shifting to higher resilience pathways

Our literature review highlights many ways that women can shift to higher resilience pathways, including gradual (unplanned) evolution of their roles, institutional changes such as gender-responsive land reform, gender-transformative interventions, and women-led innovation processes. Perhaps most significantly, women's increased resilience is boosted through collective action and the development of informal and formal social ties. These strengthen women's power with each other (Wong et al., 2019).

The slow-moving, unplanned weakening of entrenched gender norms can facilitate women's shift to higher resilience pathways. In some cases, this weakening emerges from livelihood diversification, migration, and the resulting flexibility of roles that men and women occupy in agri-food systems. For instance, in parts of Ghana, male outmigration is contributing toward women's increased role in intrahousehold decision-making. Their voice is strengthened by women's contribution to household income through their off-farm trade activities (Wrigley-Asante et al., 2017).

Planned efforts to shift harmful gender norms can assist women to gain access to climate and other information and help them to translate this information into planned actions inside and outside agriculture. Working to ensure previous harmful gender norms and strict decision-making responsibilities become more fluid can support women's own efforts to develop their *power within*, and their *power to act* (Ambler et al., 2017; Anderson et al., 2017; Lecoutere et al., 2016). Externally introduced gender-transformative methodologies, provided they can be taken over and adapted by local communities, have strong potential for allowing people to develop their own transformative resilience capacity (Bryan et al., 2022; Rietveld et al., 2023a). For example, the introduction of an empowerment methodology in Malawi called Gender Action Learning Systems (GALS) in maize-based systems contributed to the ability of women and men at household and farmer group levels to build resilience to climate change. GALS households, compared to controls, began to dissolve the gender division of labor in farm tasks, and they removed the designation of women's and men's crops. This facilitated women's ability to benefit financially from formerly men's cash crops like tobacco and maize upon which they had previously worked without remuneration. The study demonstrated causal links between jointness and improved yields. Women who had hitherto almost never taken up leadership roles found the confidence to stand for election. This led to women being highly represented among farmer group leaders (Farnworth et al., 2018). In Cuba, the introduction of a gender-transformative methodology, PIALA, directly confronted male-dominated institutional power structures through acknowledging and strengthening women's knowledge, expertise, and capacity to innovate. PIALA worked to develop and promote women as leaders and decision-makers in relation to agricultural innovation. As a consequence, previously male-led agricultural and knowledge systems became more gender-equitable. Women and men both benefited, and women's previously poor economic resilience to climate change was improved (Benitez et al., 2020).

Although gender-equitable land reforms are not always fully successful in empowering women (as noted in the discussion of constitutional reform in Kenya, above), reforms putting land ownership and management into women's hands can strengthen their ability to decide whether to adopt climate-smart and other practices. In Rwanda, women-headed households invested in bunds, terraces, and check dams following land registration (Ali et al., 2014). In Ethiopia, women-headed households made similar investments and also planted trees (Quisumbing & Kumar, 2014).

Strengthening agency through social capital or "power with"

Collective movements, including women's movements, can be extremely powerful instigators of change (Rodríguez & Varrotti, 2023). Women's cooperatives, such as dairy cooperatives in India, can support female members to build a greater pathway diversity (Agarwal, 2020; Ravichandran et

al., 2021). For example, in Papua New Guinea, climate-smart information services provided through extension services, national weather services, and media are almost entirely addressed to men. Women therefore find it difficult to access climate and weather forecasts and are less able to understand and implement climate-smart agricultural practices. However, women compensate through engaging in close informal learning interactions with each other based on a "sharing" model. These networks are fostered in church groups, families, and among friends, and are considerably more important for women than for men (Friedman et al., 2019). In Fiji, indigenous Fijian (iTaukei) women deploy their skills, knowledge, and unique local and traditional experience to increase the resilience of the community. They engage in strong social networks, including through church, to share their knowledge of gleaning freshwater and coastal animals, and skills such as sewing, quilting, and other crafts to help diversify livelihoods (Singh et al., 2022). In northern Benin, women broadly experience low agency and yet are primarily responsible for maintaining the agricultural system due to male outmigration. Their strong sense of group identity is a key defining dimension of the anticipatory adaptive capacity required to build resilience to climate change in the study site (Dah-gbeto & Villamor, 2016).

Similarly, in Kenya, many women farmers lack the natural, financial, and physical capitals available to men to augment their capacity to adapt. However, women build collective indigenous knowledge of weather, crops, and farming and share this knowledge in women's groups and community organizations. Women are now integrating crop and livestock production much more intentionally than in the past. This is improving food security and sovereignty, and women are becoming producers and practitioners of indigenous climate knowledge. Even so, the continued prevalence of gender norms that restrict their access to capital does limit their ability to scale their achievements and become fully resilient (Liru et al., 2021).

Impacts of shifting pathways

It is worth noting that changes in resilience pathways can have unanticipated negative outcomes. Illness, including mental illnesses, can result when people fall out of their resilience pathways, particularly there is a lack of gender-responsive support. For example, in Fiji, climate-induced loss of crops and damage to infrastructure has contributed to psychological distress, particularly among men because they are denied the ability to fulfill their normative breadwinner role. However, it is most often women who must contend with men's frustration and anger, and who must lead efforts to rebuild livelihoods (Singh et al., 2022). In Eswatini, men are close to burnout by having to perform their role of breadwinner in times of drought. Women, meanwhile, are locked into their domestic roles and are not included in initiatives to raise awareness about droughts, limiting their ability to work collaboratively with their spouses to handle challenges together (Myeni & Wentink, 2021).

Sometimes, women's attempts to expand their agency and shift into higher resilience pathways results in significant backlash. For instance, in Darjeeling, India, "fempreneurs" (female entrepreneurs) began to grow certified organic and FairTrade tea. At the beginning of their entry into tea, their income generation was construed as supporting their household and care roles. However, the success of their ventures resulted in them being increasingly perceived as entrepreneurs at home and in the community. This perception caused increasingly bitter backlash within their own households and their broader community. When fempreneurs joined self-help groups to take out loans to expand their businesses, their reputations were severely threatened because they appeared to challenge the norm that men are breadwinners (Sen et al., 2018). Similarly, successful entrepreneurial women in Kenya who achieve economic empowerment through financial independence are considered to lead to the disintegration of family unity in some locations (Po & Hickey, 2018). Indeed, in some cases, women's movement into higher resilience pathways incurs gender-based violence. In Eswatini, gender-based violence is worsening due to gendered competition over scarce resources (Kamara et al., 2020). In Zambia, declines in rural household income ascribable to drought exacerbate various forms of gender-based violence. Girls, particularly from vulnerable households, are sent to

other rural communities to work as domestic help. Some girls are being forced into early marriages, with parents using the bride wealth (dowry) to ameliorate their financial situation. Some women exchange or sell sex to support themselves and their families (Rosen et al., 2022). Elsewhere, women migrating from Bangladesh and Nepal to try to generate new livelihoods are vulnerable to trafficking (Patel et al., 2019).

Discussion

The findings suggest that harmful gender norms play a strong role in perpetuating unequal and inequitable development. They challenge women's ability to achieve individual resilience and to contribute toward household- and community-level resilience by limiting their pathways to action in response to stressors and disturbances. Intersectional identities shape how individuals experience these norms and can lead to compounded constraints for women. Inbuilt gender biases leave men with the primary responsibility of managing the damaging outcomes of shocks upon their livelihoods, families and communities in an ever more challenging environment.

Our review of how gender norms shape women's resilience shows the powerful effects of norms on power and agency, which limit their available pathways to action in responding to crises. The most powerful forces that seem to enable women to climb to higher resilience pathways include collective action and social movements, and gender-transformative approaches.

Our focus on resilience in this study has several advantages. First, in practice, resilience usefully extends the timeframe in which responses to climate change and other stressors are considered, as it emphasizes long-term processes and transformation potentials rather than immediate responses to crises (Bryan et al., 2023). Second, it allows for more holistic assessment of how intersecting shocks and stressors affect a system, rather than evaluating the vulnerability or capacity to adapt to an isolated shock or stressor (Béné et al., 2014). Finally, the focus of resilience interventions upon the capacity of individuals and collectives to self-organize and transform draws attention to the agency of actors in the system to create better systems (Walker et al., 2004). For this reason, resilience has substantial importance to discussions of gendered agrifood systems.

It is important to note that restrictive gender norms do not conclusively determine individuals' fate. We see clear evidence of women building their resilience, and even reaching the transformative resilience pathway, through collective action, support from gender-transformative interventions, and other means. Personality traits can influence individual outcomes when external factors like social norms are experienced relatively equally; women's aspirations and motivations vary and can help determine their individual resilience pathways (Freed et al., 2025).

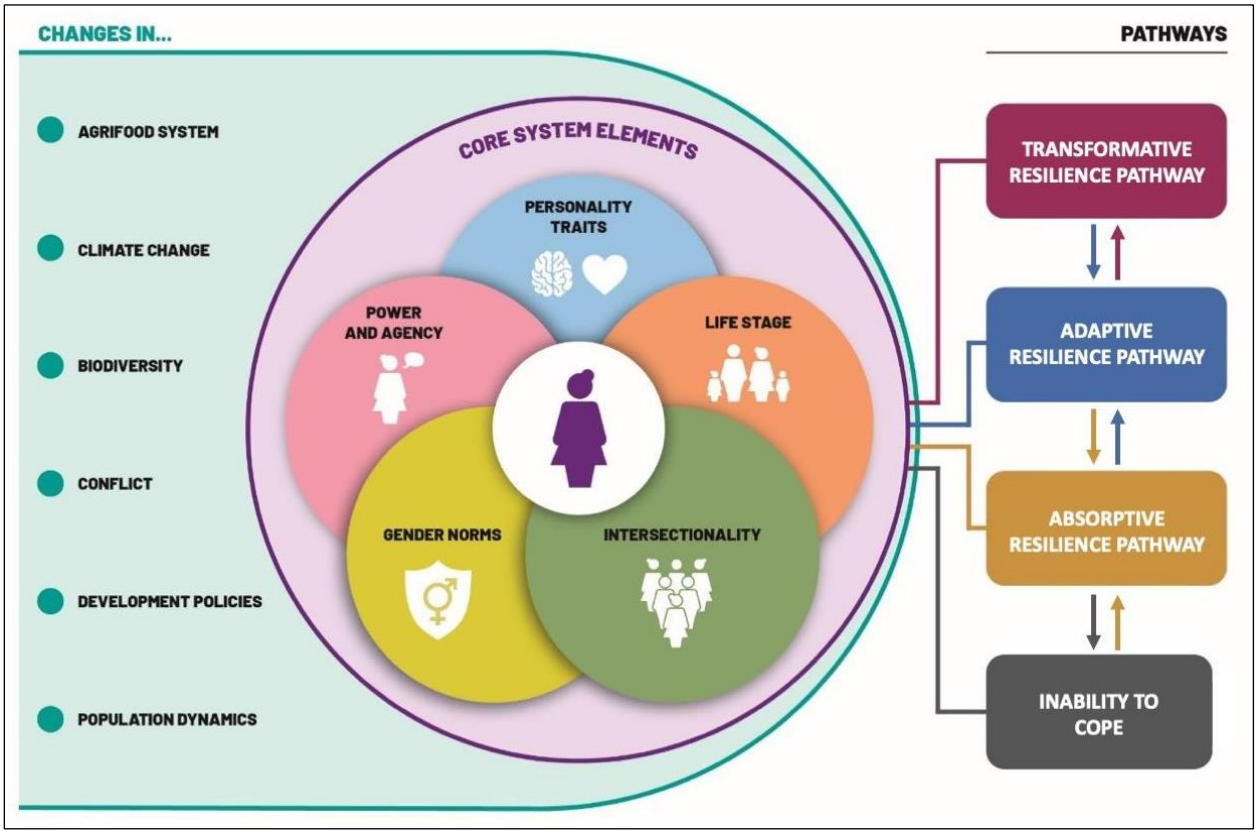
Recommendations

We recognize limitations to our study. Our data speak to interactions between gender norms and capacities for resilience, including individual personality traits, in specific locations. This limits our ability to provide detailed recommendations for strengthening capacities for resilience in new locations. To ameliorate this restriction, we propose the Economic Resilience Pathways conceptual framework (Figure 1) as a conceptual scaffolding that agrifood system actors can use to plan further empirical research into women's resilience, with the opportunity to create tailored recommendations for specific situations (Rietveld et al., 2023a).

The Economic Resilience Pathways framework first identifies some of the key systematic forces of change that bear upon an agrifood system (Figure 1, left side). Second, the center of Figure 1 highlights five potential core elements that this study has found to affect women's (and men's) agency in agrifood systems: gender norms, power and agency, personality traits, life stage, and intersectionality. These elements are proposed as critical focus areas for further research on resilience and gender. For example, the interactions between the various life stages that women undergo (such as youth, marriage, parenting young children) with gender norms could be studied in the context of the broader environment shaping and bounding the lives and livelihoods of the people living in a particular system.

The outcome of these interactions could then be mapped onto a specific type of resilience pathway

Figure 1. Economic Resilience Pathways Conceptual Framework



Adapted from Rietveld et al. (2023a).

and support measures could be devised to help maintain women's ability to stay on that pathway. As part of this, gender transformative approaches developed and implemented at all scales are likely to play a critical role in building women's economic resilience. Multifaceted interventions are needed to strengthen women's individual and collective agency through, for instance, simultaneously increasing women's income generation potential, personal control over their income, and capacity for collective action. These efforts can be complemented by training events and interventions that elevate women's knowledge and position them as decision-makers in their communities. Engaging men in this process will be essential, as supporters and as beneficiaries of processes that promote women's and men's equality. In all this, paying attention to intersectional identities is critical, as well as ensuring women's own capacity- and agency-building efforts are centered and supported in resilience-building efforts.

Reflections

In some ways, writing this article has been surprising. As is common with many authors, we wrote this article in an iterative manner over several months. Earlier drafts allocated the findings more or less equally to each form of resilience and to inability to cope. However, upon reflection on each subsequent draft, we felt it necessary to allocate more findings to lower-level pathways and inability to cope. This is despite the fact that the focus of this article is not upon humanitarian relief in catastrophe situations. Furthermore, the findings suggest there is considerable blurring between inability to cope and absorptive resilience. This is partly because gender norms seem to be particularly rigid in both scenarios, and women slide easily between the two pathways. A large proportion of the studies suggests that women teeter on the brink of being unable to cope due to restrictive gender norms. They are at the very

margins of disaster in their attempts to manage their livelihoods in the face of system change. Although women attempt to exercise their agency in responding to disturbances and stressors, the scope of their ability to change the situation is often limited.

It is self-evident that systemic normative change cannot be achieved by virtue of women's agency alone due to the size and complexity of agrifood systems. However, it is precisely here that women could be so much better served by development partners. Institutional actors persistently frame men as primary knowledge holders and decision-makers in the household and community, and they structure their interactions accordingly (Farnworth et al., 2015; Rietveld et al., 2023a). Institutions—ministries of agriculture and fisheries, multilateral and bilateral development partners, research partners, and others—need to embrace and expand gender-responsive and gender-transformative programming as part of their planning for systemic change interventions.

Conclusion

In identifying how gender norms shape women's resilience, this study provides useful guidance to practitioners and a conceptual framework for further research on gendered experiences in agrifood systems. Our review of how gender norms shape women's resilience shows the powerful effect of norms on power and agency, which limits women's available pathways to action in responding to crises. The most powerful forces that seem to enable women to climb to higher resilience pathways include collective action and social movements, gender-intentional land reform, gender-transformative interventions, and women-led innovation processes. Practitioners working within agrifood systems can clearly build on these tools to support resilience-building through gender-transformative interventions, supporting women to achieve "power with," making space for innovation, and promoting the systems-level changes (including policy changes) needed to expand women's agency.



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Potential, precarity and persistence: What British Columbia's Food Hub Network tells us about resilient food systems

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Abstract

Food systems are increasingly complex and face threats from interconnected shocks with cascading effects. There is a need for strategies that increase food system resilience, including food hubs—a type of alternative food network that aims to enhance food system resilience through closer connections between producers and consumers. However, there is a knowledge gap between theory

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Disclosures

Lindsay Harris was contracted by the Kamloops Food Policy Council (KFPC) as the food policy implementation lead from 2020 to 2025, and in this role she supported the initiation and implementation of The Stir food hub. She was previously a PhD student researcher (2015–2021) and KFPC board member (2018–2020). She is a co-owner of Tapestry Collective Co-op, which was contracted by the BC Ministry of Agriculture and Food from January 2023 to March 2025 to facilitate the BC Food Hub Community of Practice.

Damon Chouinard has been contracted by the Central Kootenay Food Policy Council (also known as the Kootenay Food Council) to serve as their executive director since 2023. The council consists of members from across the Central Kootenays and includes stakeholders from Ministry and non-Ministry funded food hubs, local government, and industry. CKFPC is not a food hub, although it operates as a regional organization that interconnects various organizations and hubs through network-building activities and projects.

and practice related to the impact of alternative food networks that necessitates further study. In the Canadian province of British Columbia (BC), the emergence of the BC Food Hub Network and its atypical definition of food hubs provided a natural experiment through which to explore the roles food hubs play within regional food systems and their relationships to greater food system resilience. This paper explores how food hubs emerge with both potential and precarity, unpacking the role their aspirational potential plays in food system resilience, how the precarity of the hubs themselves can stand in the way of their success, and how their persistence is itself an expression of resilience. Our findings reveal that the role of food hubs in resilient food systems is partial, precarious, and contingent. Food hubs are not yet powerful actors within the market system, but they persist and hold aspirational potential. There is an irony inherent in this as food hubs emerge to address gaps that result from food systems not being resilient, while the food hubs themselves are not resilient and are highly precarious. This research illustrates the interplay of potential, precarity, and persistence that shapes and embodies the ongoing pursuit of food system resilience.

Keywords
food hubs, alternative food networks, resilience, food systems, Canada

Introduction

Food systems are increasingly complex and globalized, facing greater threats and vulnerabilities from a range of interconnected economic, climactic, environmental, social, and political shocks that have cascading effects through food systems at multiple scales (Davis et al., 2021). The result is an increasing need for strategies that can increase food system resilience the capacity of systems to "provide sufficient, appropriate, and accessible food, while sustaining the livelihoods of those who produce it, even in the face of unforeseen disturbances" (Lowitt et al., 2025, p. 147).

It is within this context that we have seen the rise of alternative food networks (AFNs) (Tregear, 2011), a broad term describing networks of place-based actors and organizations aiming to develop shorter, more localized, and value-driven supply chains while contributing to building more resilient food systems (Renting et al., 2003; Tregear, 2011; Zoll et al., 2024). The reorganization of food systems proposed by AFNs challenges the dominant, mainstream food system (Busch, 2018), often emerging in concert with shocks, as exemplified during the COVID-19 pandemic (Stoll et al., 2021).

However, questions have been raised in the literature surrounding the longevity, stability, and performance of AFNs, and the need for further study (Brislen, 2018; Renting et al., 2003; Zoll et al., 2024). Studies have explored various aspects of different AFNs, with cases illustrating both their persistence and their precarity (Brislen, 2018; Hoey et al., 2018; Stahlbrand, 2017), but gaps remain. The current body of knowledge on food systems resilience is small, with a large gap between theory and practice (Béné, 2020; Stoll et al., 2021).

Food hubs are an established type of AFN that aim to enhance food system resilience through closer connections between producers and consumers, albeit with inconsistencies in where and how they occur (Levkoe et al., 2018; Lowitt et al., 2025; Matson & Thayer, 2013). In 2018, the Canadian Province of British Columbia (BC) initiated the BC Food Hub Network, with the explicit goal of fostering growth and innovation in food processing, packing, and marketing (Government of British Columbia, 2018). This program funded feasibility studies and the initiation of 14 food hubs, as well as supporting a provincial community of practice (Government of British Columbia, 2024a). The emergence of the BC Food Hub Network and the Province's atypical definition and parameters of food hubs, alongside the emergence of other food hubs across the province, provided a natural experiment through which to explore the roles food hubs play within regional food systems in BC and their relationships to regional food system resilience.

Using the case study of the BC Food Hub Network, the purpose of this paper is to explore how food hubs as AFNs emerge in regional food systems, unpacking the role food hub potential plays in regional food system resilience and how the precarity of the hubs can stand in the way of

success, and how their persistence is itself an expression of resilience. This paper begins with a summary of the current bodies of literature relevant to this research, followed by a section describing our research methods. We then present and discuss our findings, concluding with key considerations for change.

Food Hubs and Resilient Food Systems

Food hubs are increasingly being implemented by communities and regions seeking to create more resilient food systems. Examples of food hubs and corresponding studies can be found across jurisdictions, including across the U.S. (Fischer et al., 2015; Shariatmadary et al., 2023), the Canadian province of Ontario (Stroink & Nelson, 2013), and European countries like Italy and the United Kingdom (Carrieri de Souza et al., 2023; Guzman & Reynolds, 2019).

Across the literature there are many definitions that describe food hubs and the roles they play. While the purpose and structure of any single food hub is highly contextual, there are common characteristics that appear throughout the literature. One of the most often cited is that food hubs aim to provide and manage the aggregation, distribution, and marketing of locally produced products (Fischer et al., 2013; Perrett & Jackson, 2015). This characteristic is important, as it enables food hubs to move beyond the direct-to-consumer focus of many AFNs and into supply chain services (LeBlanc et al., 2014). Next is the focus on grassroots-led (bottom-up) organizations and an emphasis on values based food systems that are "socially just, economically robust, and ecologically sound" (Blay-Palmer et al., 2013, p. 524). Last is that food hubs are organizations that sit between consumers and small to medium sized producers who typically lack the capacity to meet the requirements of larger scale buyers (Feldstein & Barham, 2017; Guzman & Reynolds, 2019; Hoey et al., 2018).

Despite the above commonalities, there is substantial variation in the structure, focus, and context of food hubs (LeBlanc et al., 2014), as reflected in the 'food hub continuum' put forward by Levkoe et al. (2018). From a food system resilience perspective, there are many opportunities where food hub-led actions can be taken to reduce vulnerabilities to shocks and enhance capacity to cope, including investments in supporting infrastructure (e.g., storage), food processing strategies, and increasing cohesion among supply chain actors (Davis et al., 2021). Food hubs can serve as prefigurative spaces that demonstrate alternatives to the dominant food system, taking or supporting a range of differing pathways to affect change (Levkoe et al., 2018; Rosol et al., 2022). However, past studies illustrate challenges food hubs face in balancing the goals related to social justice, economy, and environment (Blay-Palmer et al., 2013; Hoey et al., 2018), and some hubs are forced to operate in ways that can run contrary to these aims (Perrett & Jackson, 2015).

There are also common barriers that all food hubs face, including competition with the dominant corporate and industrialized food system, hurdles building regional collaboration, and reliance on external funding, further complicated by funder expectations (Levkoe et al., 2018). Despite the range of food hubs and activities seen across the literature, there is an inherent tension as researchers and practitioners tend to default to viability and success as defined by business schools (Brislen, 2018). This is reflected across the literature as, despite successes of food hubs, they are often characterized by their vulnerability and financial unsustainability (Guzman & Reynolds, 2019; LeBlanc et al., 2014). This article further explores the link between the precarity of these organizations, their ability to contribute to systems resilience, and their persistent emergence despite their precarity.

We position our discussion within a framework that identifies the concept of resilience as an outcome and a process. Sutton et al. (2023) observed that the concept of regional economic resilience is no longer a 'fuzzy concept' and is increasingly well-developed in the literature. In their conceptual framework, resilience is a dynamic, multifaceted process that enables regional economies to absorb, adapt to, and recover from economic shocks (Sutton et al. 2023). Resilience has five key dimensions: preparation, vulnerability, resistance, response, and recoverability (Sutton et al. 2023). Following this framework, we orient our exploration of food hubs contribution to resilient food systems and the resilience of food hubs them-

selves as a multi-stage phenomenon rather than a static outcome. This process-oriented approach reframes resilience as dynamic, context-dependent, and unfolding over time.

Food Hubs in British Columbia

British Columbia (BC) is the most westerly province in Canada, with a land mass of 920,686 square km (355,479 square miles)—larger than France and Germany combined—and a population of 5,000,879 (Statistics Canada, 2022). The majority of the population lives in the southwest corner of the province, in the regions surrounding the provincial capital (Victoria) and Greater Vancouver. In terms of size and remoteness, much of BC is comparable to the American state of Alaska. BC's food system is diverse, including a range of crops and livestock as well as ocean fisheries, supplying food both domestically and internationally (Work BC, 2023). As industries, agriculture and fisheries are directly responsible for over 25,000 jobs in BC, primarily in the southwest and Okanagan regions (Work BC, 2023).

In 2017, the provincial Minister of Agriculture and Food was tasked with increasing the use of BC grown and processed foods in government facilities, while working with regional producers to grow local production and expand market access at home and abroad (Office of the Premier, 2017). The following year, the BC Food Hub Network was announced "to support the processing, packaging, and marketing of BC food products, and build links between local food processors and new technologies" (Government of British Columbia, 2018, "Feed BC," para. 4). The network was to include a food innovation center and regional food hub nodes throughout the province.

The focus and parameters of the BC Food Hub Network set them apart in the literature. Food hubs are defined by the BC Ministry of Agriculture and Food (the Ministry) as "shared-use food and beverage processing facilities that offer food and agriculture businesses access to commercial processing space, equipment, expertise and resources to support business development and growth" (Government of British Columbia, 2024b, para. 1). Although this definition is more narrowly focused on commercial processing in comparison to food hubs as broadly defined above, an important note is that food hubs in the BC Food Hub Network (the Network) are not precluded from working outside of this definition to offer resources and services based on regional needs. However, equally important to note is that these additional functions were not considered fundable activities. The Ministry funded feasibility studies in 16 communities across the province and provided implementation funding for 14 food hubs (Government of British Columbia, 2024a).

In 2023, the Ministry initiated the BC Food Hub Community of Practice (COP) with the goal of supporting the growth and success of food hubs. The COP was "designed to develop, expand, and support inclusive regional ecosystems by focusing on the operational and developmental needs of the food hubs" (Ministry of Agriculture and Food, 2022, "3.3 Scope," para. 1). Interestingly, the COP included Ministry funded food hubs as well as other emergent or operational food hubs from across BC. Over 60 BC hubs were invited to the COP, including those operating as private businesses and those operated by nonprofit organizations that secured funding through other avenues.

In the context of how food hubs have emerged and re-emerged in the province over time, the case study of British Columbia brings some unique aspects to the exploration of food hubs. Notably, this research explores the unique context set by the Province's atypical definition of food hubs as applied to a network of provincially funded food hubs alongside the diversity of hubs in the COP. Additionally, a case study approach provided an opportunity to explore if the gap between academia and practice noted in the literature persists in practice.

Methods

This research is part of a larger North American study on how AFNs respond in the face of change, the role they play in resilient food systems, and identifying factors and conditions that enable shock tolerance (Loring, 2022). Within this broader project, our BC case study aimed to explore the roles that food hubs in BC play in their regional food systems and their relationships to regional food system resilience.

A mixed-methods case study approach was used to facilitate an in-depth exploration of a complex and dynamic phenomenon that evolved in real time over the two-year duration of the project (Berg, 2021; Yin, 2018). A multidimensional inquiry was enabled through the integration of data sources (Miles et al., 2014), and a community-based research approach (also called participatory action research) was used to ensure that the research was grounded in place (Halseth et al., 2016). Research team members were embedded in different locations in the BC Food Hub Network, as members of the COP, and participating as active members in local food systems organizations. All team members were able to draw on their place- and network-specific knowledge, while leveraging discussions with other team members to guard against bias.

Data Collection

The research team participated in monthly COP meetings for its two-year duration, with data collection guided by a standardized protocol. This allowed us to understand the evolving structure and function of the COP and its member food hubs. The research team regularly validated observations through report-backs and discussions.

Two funded BC Food Hub Network food hubs were selected for further analysis, representing two different regions: The Stir in Kamloops (Thompson Okanagan Regional Hub, urban centre with surrounding rural region) and the Kootenay Farms Food Hub Innovation Centre (Kootenay Farms) in Creston (Kootenay Regional Hub, rural community in a region with no urban influence). Three rounds of semi-structured interviews were conducted, with topic guides focused on understanding the current state of the food hub, desired outcomes, challenges, needs, and connections to the resilience of the surrounding regional food system. Round one was an initial exploratory interview with key individuals associated with food hub formation and management. Round two interviews targeted food hub users, potential users, and other key regional stakeholders. Round three occurred a year after round one, revisiting key individuals associated with the hubs and discussing the hubs' evolution. A total of 35 interviews were completed over a two-year period (2023–2024), 13 specific to The Stir, 18 specific to Kootenay Farms, and four with overarching organizations relevant to both cases. Data collection was approved through the Selkirk College Research Ethics Board (#2003-007), ensuring informed consent among COP participants and interviewees.

Key documents relating to the BC Food Hub Network, community of practice, and the two selected food hubs were collected and reviewed. Additionally, historical documents on the emergence of food hubs in BC were reviewed and assembled into a timeline, providing context to the initiation and evolution of the Ministry's Food Hub Network. The research team also attended numerous food systems–related events, enabling opportunities to further explore the relationship of food hubs within broader regional food systems. The research team met regularly for the duration of the project, discussing and sharing observations of patterns and our evolving understanding, with meeting notes captured on video and automatically transcribed for reference.

Data Analysis

Interview data were coded through a multistep coding process. An initial round of coding took place in year one (2023), using NVivo qualitative analysis software. Two team members independently reviewed round one interviews, independently capturing emergent themes, which were subsequently discussed and an aligned list of emergent themes was created. In year two, three team members were tasked with reviewing all interviews within the frame of four key questions:

- What roles do food hubs play within regional food systems?
- How do food hub roles match the needs of regional food systems?
- What region-specific conditions impact the ability of food hubs to be resilient and sustainable?
- What impact have times of stress, crisis, and/or major disturbances had on regional food systems through the lens of food hubs?

As part of this review, notes were made on emergent and cross-cutting themes. Notes were also made on the commonalities and differences of the two selected food hubs with each other and in comparison to the notes taken from the COP meetings.

Multiple consensus-based meetings were held to discuss individual findings, comparing the lists of emergent themes and distilling our observations into a set of key findings and related implications. These discussions were supplemented by team meeting notes and observations from events. Presentations at multiple events served as an opportunity to validate and refine findings.

Results

The following section presents research results, divided into two overarching sections. The first is what we have learned from the current roles of BC Food Hubs. The second explores the challenges BC Food Hubs face to becoming sustainable.

Current Roles of BC Food Hubs

Food hubs in BC serve a wide range of roles in their regional food systems. Among the 60 organizations invited to the COP, we identified three types of food hubs based on function. Commercial single-purpose organizations (48%) primarily functioned as commercial kitchens, while mixed models (26%) blended commercial kitchen space with other community-serving functions. The remaining 26% were a range of food-related organizations with an interest in developing a food hub.

Based on COP observation as well as web searches, the most common roles across all participants were providing shared infrastructure and supporting food businesses. Shared infrastructure included physical spaces for food processing (e.g., commercial kitchen) and space for events, retail, storage, or office space. Infrastructure included access to shared equipment such as commercial dehydrators or labeling machines. Beyond providing the space and equipment to enable processing, food hubs also offered business development services, enabling small-scale business owners to move through incubation and scale-up. Food hub clients were able to receive formal and informal mentorship and guidance in navigating a complex landscape of food safety regulations. Food hubs also supported clients by reducing barriers to entry and upfront business start-up costs through access to space and equipment, creating economies of scale, product testing and research, and opportunities for sharing knowledge among food entrepreneurs.

We also observed other roles in practice across various food hubs in the provincial Network and COP. Several hubs were actively playing roles in community development and food security, providing a platform for relationship building and collaboration, and increasing community access to local foods. Examples included food hubs that supported initiatives such as food waste recovery or back yard fruit tree gleaning programs, school meal programs, or emergency meal services either directly or through partnerships. Some food hubs also played roles in aggregation and distribution, supporting clients by increasing their access to retail markets or facilitating institutional buying.

These identified roles exemplify many of the themes seen across the literature, namely that food hubs incorporate a variety of activities and focuses along a continuum (Levkoe et al., 2018). The consistency with the diversity of roles across food hubs in other jurisdictions outside BC is particularly interesting given the contrast with the uniquely targeted definition and restricted funding introduced by the Ministry.

From the data, we also identified a range of place-based community and regional needs, acknowledging the unique context of each community and region determines what is needed from each hub specifically. These included roles already provided by hubs—namely, shared infrastructure and business-specific supports. These also included aspirational roles where few hubs were currently working.

Potential: The Aspirational Roles of BC Food Hubs

A key theme from our findings is that food hubs in BC act as sites of potential, aspiring to broaden their scope of activities and take on new roles to meet identified needs. In part, the aspirational nature of food hubs is due to the early-stage nature

of many hubs in the Network and COP. However, even those more established food hubs had an aspirational orientation, either through discussing desired activities or taking steps to implement new ones. We identified four common aspirational roles that were interrelated and ranged in tangibility. These roles included improving value chains, expanding access to local food, disaster response, and building resilient food systems.

Among these aspirational roles, improving value chains was the most widely shared one that many food hubs have already begun working on. These activities include aggregation and distribution activities at food hubs and efforts to make food hubs key nodes within regional transportation and logistics networks. Food hubs may also act as sites of value-added processing and storage, as well as extension activities. Further, we also observed that hubs desired to expand market opportunities for producers and processors, including retail and institutional markets like schools and hospitals. These concrete goals regarding improved market opportunities were interrelated with the more nebulous and often less defined desire to expand local food access.

The push for higher levels of regional self-sufficiency around food was closely tied to the desire for a more resilient local and regional food system. Recent disasters and supply chain disruptions have underscored food system vulnerabilities. As a result, we observed food hubs increasingly recognizing their potential to pivot and serve as an important community asset during times of crisis. While disaster response and preparedness activities were an aspirational role, most food hubs had not yet taken concrete steps towards implementation. The path forward for food hubs to do so is not straightforward, given that emergencies by their nature have many unknown variables. There is also a lack of precedence within existing formal response protocols regarding the use of food hubs as response infrastructure. Despite the challenges, we heard examples of food hub use during times of crises. Examples included the use of the Kweseltken Kitchen (a mobile food processing trailer launched in partnership with The Stir) to feed evacuees and firefighters in Kamloops during the 2021 wildfire season and the use of New Denver's Fireweed Hub as a gathering place and support service during the 2024 wildfire season. These provide other food hubs with examples that can be learned from and built upon to move towards this potential.

Across our data, we continually observed food hubs talking about what they "will do" – both in the sense of what they intend to implement as they move through the stages of launch and early growth, and also in the sense of pivoting when desired activities have failed or not materialized. Food hubs were frequently viewed both internally and externally as much more expansive in potential than in their current state, and as flexible projects that could adapt to meet emergent needs. As one interviewee described:

> The bare bones of it is that it's a shared commercial kitchen. But it's just more expansive than that. It's like an emergent entity that is constantly shifting and evolving to just be positioned to act when we need it to act. To be a resource when we need it to be a resource. To be a community hub, when we need it to be a community hub. It is a complex network of relationships that is a true community resource. It is infrastructure that the community owns. And then it can be whatever we want it to be.

What Prevents Food Hubs from Reaching their Aspirations?

Food hubs face several challenges that hinder their ability to fully realize the potential they aspire to. As discussed above, there are a number of place-based needs and priorities that food hubs can address for their communities. However, the narrow mandate of food hubs defined by the Ministry created a new policy silo in an already siloed food policy landscape. This creates a complex and challenging landscape for food hubs to navigate, despite the broad range of local needs that cut across policy silos, such as those within and between agriculture, health, and economic development. Similarly, the complexity of multiple and overlapping jurisdictional boundaries can impact the ability of food hubs to respond to local needs within, or even to define their service area.

Across our data, financial sustainability was the most significant barrier food hubs faced. This barrier was consistent across hubs, although the influence of scale, location, and other factors shaped place-specific nuances. When the Ministry initiated the COP, the financial sustainability of food hubs in the Network was a driving concern, with a number of Ministry-funded hubs experiencing delays in construction or launch, others experiencing little or no progress towards financial sustainability, and one discontinuing operations (Government of British Columbia, 2024a). Following the launch of the COP, the Ministry issued multiple subsequent requests for proposals focused on the financial sustainability of Network food hubs, including the creation of a long term sustainability plan to support Ministry-funded hubs (Ministry of Agriculture and Food, 2023), evaluating and updating hub business plans (Ministry of Agriculture and Food, 2024), and re-organizing and managing the BC Food Hub Network to support long term viability of the Ministry-funded hubs (Ministry of Agriculture and Food, 2025). Notably, throughout this process of investing in the financial sustainability of the Network, the Ministry emphasized that operational funding to the existing Ministry-funded hubs was not being considered, despite COP discussions and interviews reflecting a near-universal gap between the costs of food hub operation and available income.

One interviewee reflected on their hub's financial viability and the impending need for further financial bridging, sharing, "I'm really torn because if I was to sit here, honestly, and say, how long is this food hub going to be here? Two more years. You know, unless we keep getting some grants or some stabilization funding."

We observed the question of financial sustainability as we tracked stages of food hub development over the two years of the COP. When comparing year one to year two, the largest decreases were to those hubs in the initiation stage and those hubs in the early growth stage. While there were increases in hubs that are sustaining, there was also an increased number with an unknown status, and a minimum of three hubs which were discontinued, including one of the Ministry-funded hubs.

What counts as sustaining was a topic of much discussion. While we acknowledge the two-year timeframe of our study limits our ability to comment definitively on whether any hubs became financially sustainable, our observations centred around the nuanced definition of sustaining and how it manifested in different ways at the level of participating hubs. We initially defined sustaining as "steady income streams, supporting clients' business growth. Responding to emerging needs as needed," a definition drawn from nonpublic guiding materials provided to and discussed at the COP by the Ministry. However, it became clear in year two of the COP that very few, if any, food hubs in BC would consistently meet this definition. That said, it was equally clear that while not meeting this original definition, several hubs had moved beyond the stages of early growth—building out clients, products, and services, and securing revenue—albeit to a level that lacks consistency, an issue for sustainability. Revisiting the characteristics, we evolved our definition of sustaining to food hubs that are stable in their structure and their capacity, adaptable in their income streams, and meeting some of the existing and emerging needs of their surrounding region. While these hubs may not yet be profitable, and may never be, they demonstrate the capacity to adapt and support continued operations.

Precarity: Understanding BC Food Hub's Challenges to Becoming Sustainable

Even with our revised definition of sustaining, we found that food hubs were predominantly precarious operations—characterized by uncertain financial capacity as well as changing functions. We identified two significant pressures that are driving how food hubs adapt and respond as they seek to become sustainable. First, they are responding to what is needed locally: the priorities and needs emerging within their communities and surrounding regions. Second, they are responding to the obligations that sustain their operations: generating revenue, meeting funder priorities, and designing services around what funding is available. While there is overlap between the two pressures, these are not the same thing.

As identified above, there is a discrepancy between what it costs to operate a food hub facility

and what food hubs can generate in revenue, particularly in rural areas where the potential user base is smaller and unpredictable as businesses move through the stages of incubation. If food hubs were to set user fees high enough to fully cover operating costs, they would likely price out the small-scale, emerging food businesses they aim to support. As one interviewee shared: "It's hard to charge what we need to charge to people to keep it going. And then the onus falls on these small businesses that are just trying to scrape by, you know?"

We observed hubs making efforts to reach financial sustainability by broadening their scope. The targeted, focused definition of a food hub implemented by the Ministry pushed hubs toward commercial kitchen rental revenues as their sole or primary revenue source. However, food hubs across the COP shared the recognition that the commercial kitchen rentals were not sufficient to reach sustainability, and that the hubs need further diverse sources of revenue to survive. Various revenue generation activities were considered, with examples ranging from food retailing (online stores, pop-up vendor events, curated food boxes) to business services (food photography, product development and testing, office rentals), to consulting services.

Despite the above ideas of revenue generation, food hubs also frequently relied on grants to offset the discrepancy created by shortfalls in revenue. However, grant funding can shape how food hubs operate and behave. Grant funding is generally short-term and project-specific, rather than long-term and operational. This can restrict hubs from acting in a manner that is strategic and considers the long-term. Additionally, competition for limited grants pits hubs against one another, reducing opportunities for collaboration. In many cases, local needs may not align with available grant funding, which can lead hubs to shift or expand their scope to meet funder priorities. Scope expansions can take food hubs beyond the limits of their financial and human capacity, and lead them in an unnecessary direction, potentially further away from fulfilling local needs. Funding impacts what food hubs can achieve, forcing hubs to make choices based on what is the most financially viable, rather than what may be the most efficient, or the best fit for the community.

We observed a deep tension within the underlying vision for BC's food hubs. Certain actors see food hubs primarily as a vehicle for economic development. This is consistent with the Ministry's initial vision, as the stated vision for the BC Food Hub Network is that it will be "Leading the world in food and beverage processing and innovation" (Government of British Columbia, 2021, "Vision"). Furthermore, the stated mission was that the Network is "Helping BC's food and beverage businesses grow, innovate and commercialize" (Government of British Columbia, 2021, "Mission"), including a desire to see small and medium-sized processors scale to reach export markets. There was a clear expectation that because food hubs were able to generate revenues through commercial kitchen rentals to business clients, they should become self-sustaining operations following the significant upfront investment by the Ministry—an expectation that was not executed.

Other actors held strongly to the position that food hubs are primarily vehicles to address community needs (e.g., food security, support for producers), providing a valuable public service worth ongoing operational investment. While the BC Food Hub Network is unique in its focus on commercial food processing, this tension echoes the hybridity observed in food hubs in the US, in which "food hubs are not driven primarily by social mission *or* monetary incentives, but rather those two dimensions of food hub activities are inseparable and co-productive of each other" (Brislen 2019, p. 196).

These tensions were reflected in our observations of the COP, in conversations, and in interviews with hub managers and users. As one interviewee said, "That's what a taxpayer-funded thing should be focused on, is like, providing service to the community. Not because you've made the best business case you possibly could for the project itself." Another interviewee commented on the tension inherent in supporting entrepreneurs while running your own enterprise, noting, "Being able to charge rent at a rate that helps the businesses who are renting the space or the groups that are renting the space, while also helping keep the

[Food hub name] itself up and running is a challenge."

Some interviewees even questioned the purpose and effectiveness of the hubs, highlighting the inefficiencies of nonmarket initiatives. As observed by one interviewee, "Ah, well to be direct, the non-funded ones tend to have a stronger business model and, and go into it a little bit more market savvy, I guess for lack of a better way to put it, are more prepared to, have put together something that is a model that is stronger."

Taken together, these observations point to an inherent issue that comes from expecting market competitiveness from initiatives that have arisen as alternatives to the market, to address nonmarket needs that are fundamental to community thriving and resilience. Many food hub actors inhabit this contradictory space, criticizing the hubs' lack of financial sustainability while also investing immense creative efforts to keep them afloat. One interviewee shared: "I'm compassionate, I'm passionate. And I'm determined. But it's a tough gig. Like, you know, really, if you were looking at this as an independent business, you'd be selling everything closing the doors and walking out."

Discussion

The following section discusses the above results, moving beyond the current state of and challenges facing food hubs, to discuss their value as sites of potential, their persistence over time, and connection to resilient food systems.

The Value of Food Hubs as Sites of Potential

BC food hubs, as well as food hubs in other jurisdictions and AFNs more generally, are confronted with navigating local needs for more resilient food systems and delivering a spectrum of activities to address those needs, often with insufficient resources. Our findings reflect food hubs as particularly apt examples of the tensions observed in the literature between the transformative potentials of AFNs and their co-optation by dominant market-based food regimes (Harris, 2021). The essential challenge of food hubs is to "grapple with the complexity of how to simultaneously engage in market and non-market economic activities in meaningful and transformative ways" (Brislen, 2018, p. 198). Using BC as a case study allowed us to observe in real time how a cohort of similarly initiated hubs engage with that challenge. Our observations of the different responses across the cohort reinforce the position that there are no simple binaries between alternative and conventional food networks; rather, the food hubs reflect what Tilzey (2018) refers to as gradations of resistance.

In this study, some hubs fell into an activist, prefigurative orientation, while others are oriented toward providing pragmatic alternatives within existing market systems. For example, the role of the Kamloops Food Policy Council (KFPC) as an organization with a prefigurative orientation was reflected in our interviews, as well as documentation of the values and expansive vision that formed the underpinnings of The Stir dating back to the formation of the KFPC in 1995 and organizing efforts in the years preceding (Harris, 2021). With its vision to build a local food system that is "regenerative, sovereign, and just," the KFPC is invested in collective organizing towards initiatives that "represent the collectivized desires for possible futures, and in fact have enrolled many new people and partners into those passionate interests" (Harris, 2021, p. 142).

In contrast, the food hub in Creston was primarily working as part of the existing market system, as it is integrated with established agricultural producers in the region. The origins of what became the Kootenay Farms Food Hub Innovation Centre was initiated from Creston Valley's Economic Action Strategy, where agriculture is one of the five pillars. There was an explicit direction to explore opportunities for "collective marketing, processing and distribution for CV-KL agricultural operators" (Economic Action Partnership, 2018, p. 57), including exploring a food hub. As a result, the food hub initially focused on achieving economic development goals by providing these producers with the equipment and resources to diversify or scale.

In both cases, however, the hubs resist simple binaries and are rooted in "complex networks of actors with multiple beliefs and motivations" (Tregear 2011, p. 423). Both hubs are navigating the complexities of engaging in market and non-market activities in their local contexts. Bonanno and Wolf describe the "localization of resistance"

as the "tendency to focus on local efforts to produce new ways of food provisioning" (2018, p. 217) that becomes a way to entrench the domination of corporate food systems, by downplaying or ignoring the connection between local efforts and the surrounding system. While these hubs, like other AFNs, cannot transcend market relations, there remains much space for potential.

Our observations of the COP point to food hubs as sites where multiple and diverse community champions can come together to articulate and negotiate different (and sometimes contradictory) goals, and work to bring those aims into reality. Likewise, there is significant value in clustering these hubs within a cohort, as the COP provided space where hubs can encounter the different approaches and negotiations taking place in peer organizations. In doing so, it becomes more difficult for individual hubs to ignore the broader structural issues facing local food systems, and they are continually confronted with the diversity of approaches and aims taken by their peers.

Food hubs have the potential to be important assets, locally and provincially, but they must overcome a complex and multifaceted set of barriers before they can meet this potential. Nonetheless, we argue there is value in food hubs as a repository of potential; their continual orientation to creating alternative futures is an important aspect of resilience. Leaning into the solidarity of the network of food hubs while resisting fragmentation across different approaches may prevent them from undermining their effectiveness.

Persistence: The Emergence and Re-emergence of BC Food Hubs

There is an irony inherent in food hubs, and AFNs more broadly, emerging to address gaps that result from systems not being resilient and aiming to enhance resilience in systems, while the food hubs themselves are not resilient and are highly precarious. Given this, it is interesting to explore not just how and why food hubs emerge, but why they emerge so *persistently* despite their precarity. In the case of the BC Food Hub Network, its implementation was driven by government-led desires for increased commercialization in the food processing sector in conversation with diverse local desires to meet community needs. However, our study revealed the development of food hubs independent of funding or direction from the BC Government, as well as evidence that some hubs were not the first iteration of a food hub or related initiatives in their communities. Instead, they emerge, persistently, in cycles of resurgence, a result of compelling, place-based needs.

For example, in the case of The Stir, the implementation of the food hub was preceded by numerous related initiatives over 25 years of community organizing, including a Good Food Box (a collective buying initiative) in 1997, the Kamloops Organic Food Co-operative Association in 1998, Heartland Foods (a producer cooperative) in 2007, and Popcycle (a social enterprise creating products from gleaned fruit) in 2017 (Harris, 2021). While none of these precursors was identical to the more recent iteration of The Stir, they reflect community members' understanding of the deep, recurring community needs and their commitment to meeting those needs. The desire to build a facility with commercial kitchens, dry and cold storage, and aggregation and distribution capabilities had emerged through a grassroots collective impact process facilitated by the KFPC in 2018, prior to the Ministry announcing its food hub initiative (Pletsch & McLean, 2019). Although the Ministry's focus solely on commercial kitchens did not map exactly onto the community needs, the opportunity was still welcomed by participants with the hope that it could be leveraged into meeting additional needs as the hub was implemented.

In the case of Creston, the food hub was preceded locally by partnerships and activities aimed at supporting and enhancing the food and farm sector. This included the founding of a nonprofit organization (Fields Forward), which piloted a mobile juice press program as well as an online ordering platform (Farm Food Drink et al., 2018)—both of which no longer exist in their original format, but which provided foundations for the current food hub. Additionally, due to the size and physical geography of the Kootenay region, multiple food hubs or similar activities have started and continue to exist in the region (Farm Food Drink et al., 2018). These initiatives have emerged consistently over years, responding to place-

specific needs. And while many have been unsuccessful, the continued emergence or evolution—like what occurred in Creston—illustrates persistent local needs.

We observed and heard anecdotes of these cycles of resurgence in other cases as well. For example, in BC's Comox Valley, the Ministry funded a food hub feasibility study in 2021 exploring the opportunity for a shared-use food and beverage processing facility (Warren, 2021), not dissimilar to a shared-use commercial kitchen study completed in the Comox Valley in 1999 (Campbell River Employment Foundations Society, 1999). While Comox Valley did not receive Ministry funding for a hub, the Lush Valley Food Action Society initiated the creation of a commercial kitchen in the region with support from another funder (Island Coastal Economic Trust, 2023). More broadly in BC, there is a history of local and provincial action related to food systems dating back to the 1970s in response to social, political, and economic change (Levkoe et al., 2012).

Our participatory research produced four recommendations to the Network and COP, aimed specifically at practitioners within food hubs, including (a) explore diverse pathways to financial sustainability; (b) expand potential roles at the right pace; (c) prioritize collaboration; and (d) be based in place. While these recommendations are ultimately well-meaning, we acknowledge the way they feed into the narrative that if food hubs cannot succeed, or become financially sustainable within dominant market logics, that failure is the food hub's fault. This narrative neglects to recognize the inherent struggle that food hubs face, the complexities of limits in human and financial capacity, policy barriers, and place-based and, in many cases, rural challenges. This narrative also risks positioning those few food hubs that do become self-sustaining as exceptional actors whose success is attributed to their unique circumstances or champions, which can overlook factors like the impact of restrictive funding and the local value of services without a viable business case. Instead, we point to the importance of the struggle itself as an essential component of resilience in hubs and their local food systems. In doing so, we follow Levkoe and Wakefield's (2011) analysis of The Stop Community Food Centre, which similarly resists the urge to position the organization as an "exceptional actor" and concludes that "what makes The Stop CFC an exciting model for food system transformation is the way that it has struggled, within a particular context, to work to transform the food system" (pp. 264–265). These findings reflect the ongoing and persistent gap between academia and practice noted in the literature, highlighting a need for better connections between research and practice, the importance of linking policy with on-the-ground realities, and sharing research that speaks directly to the needs of practitioners.

The persistence of food hubs emerges in the space where needs, aspirations, and capacity overlap. Hubs are persistent precisely because the local needs that drive them are persistent. Local and global food systems fail to provide resilient outcomes to communities. Just because food hubs are not always self-sustaining does not mean the community needs that drove food hubs go away. There is something essential to note about this cycle of failure and repetition. AFNs often struggle to survive, yet they continue to resurface, likely the needs that bring them into existence are strong and unwavering, yet also at direct odds with the dominant food system.

Resilience and Persistence

Given the potential, precarity, and persistence of the hubs in the BC Food Hub Network, what can we conclude about their contribution to the resilience of regional food systems?

The BC Food Hub Network shows that resilience is partial, precarious, and contingent. Food hubs are not yet powerful actors in the market system, but they persist and hold aspirational potential. Their resilience is not guaranteed; rather, it is actively being negotiated as a process not a static outcome.

Resilience is by nature a multidimensional concept. One interview participant described it as:

> To me [resilience], it means anti-fragile, and it means the ability to bounce back from impact, and that means a bunch of things, in the sense of being resilient here, [it] means that we have the human networks in place, but also the agri-

> cultural systems that can handle more challenge and there's response mechanisms in place for improving and building upon things. So when I think about a resilient regional food system, I think about a system that is collaborative, involved in conversation, has the ability to be flexible and adaptive and is also not overly externalized, like we can only be so resilient right now, because the reality is, is that we, you know, our food system is externalized for the most part.

As this participant affirms, resilience is not a binary trait (i.e., resilient or not), but a developing set of capacities that food hubs are actively trying to build. In particular, the quote's emphasis on building systems that are collaborative, flexible, and not overly externalized frames food hubs as expressions of resilience in motion—not because they control or resist the market system, but because they make a regional food system more capable of evolving, responding, and caring under pressure.

Returning to Sutton et al.'s five dimensions of resilience (preparation, vulnerability, resistance, response, and recoverability), food hubs could be understood as critical infrastructure and organizational actors that operate across all stages of resilience (2023). Their potential contribution is not only in supporting recovery after shocks but also in shaping adaptive capacities and long-term transformations in regional food systems. This lens of resilience as a multidimensional process supports researchers and practitioners invested in navigating the contradictions inherent in alternatives that are perennially co-opted by the dominant market food system or caught in repeated cycles of failure and resurgence. This is illustrated in the following quote from a member of our research team who has also been embedded as a member of one of the case study food hubs:

> The actual market share of alternative networks is like, this is so tiny compared to the global food system. But I am thinking about adding in more resilience, redundancy, diversity and power into whatever alternative food system we're creating. Like, yeah, it's in parallel to a bigger system. But … are the decisions that we're making in the parallel structure that we're building things that could give us real power in a disaster? Like having a huge kitchen like this? If there's another massive wildfire evacuation, having a shared kitchen like this is a huge asset. That's community. I can pivot immediately. We're like, kick all the businesses out. Get people in there cooking food, to give to evacuees. Yeah, it's still operating in that super tiny market share, alternative food network, doesn't have an appreciable impact on the corporate monopoly, whatever. But it is an asset. And it could evolve and pivot and change and grow and develop as it needs to. And like, every time you add an asset like that, you're growing in your power and your resilience.

This quote reflects a process-oriented perspective on resilience by emphasizing how food hubs build the capacity to anticipate, adapt, reconfigure, and support communities in moments of disruption, regardless of their scale in the larger system. It supports the idea, emerging in the resilience literature and mapped by Sutton et al. (2023), that resilience is not just about recovery, but about the ongoing cultivation of assets, relationships, and practices that enable systems to respond and transform over time. It provides an embodied, on-the-ground expression of the broader argument in this article, namely, that food hubs illustrate resilience. This resilience is observed everyday practices, capacities, and decisions that make adaptation and care possible in times of disruption, rather than simply measurable outcomes. The case of the BC Food Hub Network illustrates how food hubs are hopeful and vulnerable nodes in regional food systems. They represent a complex interplay of potential, precarity, and persistence that not only shapes but also embodies the ongoing pursuit of food system resilience.

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"Rabbit farming is easy": Perspectives from rabbit farmers in Kabale, Uganda

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Abstract

In 2012, Kigezi Healthcare Foundation (KIHEFO) in southwest Uganda launched the Rabbit Farming Project to empower families and communities to overcome poverty and improve nutrition through small-scale rabbit farming. This qualitative study describes participant perspectives of rabbit farming and the Rabbit Farming Project in Kabale, Uganda. Researchers conducted semi-structured interviews with 46 rabbit farmers. Themes that emerged included the ease of rabbit farming; nutrition, income, and agricultural benefits; housing and animal health and safety barriers; the commercial impact of COVID-19; KIHEFO support; and infrastructure, resources, and guidance recom-

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mendations. Rabbit farming was central to survival and participants described the ease of rabbit farming as a key factor even while not all were aware of the role of KIHEFO in facilitating regional rabbit farming. The COVID-19 pandemic negatively affected commercial farmers, while subsistence farmers thrived. We found that rabbit farming provides local and sustainable income-generation and nutritional benefits, but it requires resources to build community capacity. Evidence from this research can be applied to similar communities across the globe to promote food security, poverty relief, and empowerment for vulnerable communities through rabbit farming.

Keywords
rabbit farming, nutrition, empowerment, income generation, Uganda, food security, sustainable agriculture, COVID-19, pandemic

Background

Uganda is classified as a low-income country affected by widespread poverty with a fast-growing population (Bernstein & Wiesmann, 2019) of 45.9 million (World Food Programme, 2023). Despite some of the highest rates of poverty reduction in recent decades, 59.8% of people in Uganda lived in extreme poverty and serious undernourishment as of 2024 (Hasell et al., 2025), and Uganda remains among the poorest countries in the world (World Bank, n.d.-a). Finding ways to decrease poverty and promote food security is critical. The purpose of this study, conducted in Kabale, is to describe the perspectives of rabbit farmers in the Kigezi region of Uganda about rabbit farming as a form of accessible food production and community empowerment that addresses poverty and hunger.

Agriculture is vital to the Ugandan economy. Eighty-five percent of Ugandans live in rural communities that rely on agriculture for food and income while 24% of households work in subsistence farming (Uganda Bureau of Statistics, 2021). Leading causes of poverty in Uganda include limited availability of social safety net programs, lack of skilled labor due to high dependency on agricultural work, lack of agricultural infrastructure (e.g., storage and transportation), and reduced agricultural productivity due to inconsistent weather patterns and poor household health (Adenle, 2018;

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Conflicts of Interest Disclosure
The authors have declared that they have no competing or potential conflicts of interest. Although four research assistants and two co-authors are associated with or employed by Kigezi Healthcare Foundation (KIHEFO), the remaining researchers and co-authors are not associated or employed by the organization and offer balance to any conflict of interest. This is covered in the methods section of the paper, and we offer positionality statements at the end of this article to further clarify our relationship to the data.

Ethics Approval
Approvals were sought and received from the West Chester University of Pennsylvania institutional review board (IRB) and the Mbarara University Research and Ethics Committee/IRB prior to conducting recruitment and data collection activities.

Consent to Participate
Participants were screened for eligibility, and prior to participating, provided written and verbal consent.

Heifer International, 2021; Saridakis et al., 2021).

In the Kabale district located in the Kigezi region in southwest Uganda, many suffer from the direct impacts of poverty. In the Kigezi region, 49% are multidimensionally poor across diverse indicators (United Nations International Children's Emergency Fund, 2020) and the poverty level was reported at 27.7% around the time of this study (Economic Development Policy and Research Department, 2023). Poverty has a direct impact on access to nutritious foods and resources for households, food insecurity, vulnerability to disease, and work productivity levels such as agricultural production (Andersson & Gabrielsson, 2012; Siddiqui et al., 2020). Uganda produces more food than what is required for the population, yet poverty still limits people's access to nutritious diets (World Food Programme, 2021).

Food insecurity is a serious problem in Uganda, and moderate and severe food insecurity indexes were reported at 48% and 11% around 2022 and during the time of data collection for this study (World Bank, n.d.-b). By 2025, Uganda's Global Hunger Index score reflected a continuing concern, scoring in the serious category at 20.2 (The Global Hunger Index, 2025). Diets in Uganda typically consist of relatively low diversity and low micronutrient-rich foods (Bernstein & Wiesmann, 2019), and researchers have identified widespread inadequate intake of vitamin A, vitamin B-12, iron, zinc, and calcium—micronutrients for which foods of animal origin are good sources (Harvey et al., 2010; Madhavan-Nambiar et al., 2015). Much of Uganda's food security depends on subsistence farming, and the Kigezi region experiences unpredictable temperatures and rainfall fluctuations that can lead to decreases in agricultural production, food security, nutrition, and household income (Economic Development Policy and Research Department, 2023; Tumushabe & Bariyo, 2019). The Ugandan government documented insufficient caloric or nutrient intake in the Kigezi region doubling from 26% of households in 2016/2017 to 54% in 2019/2020 and near the time of this study (Uganda Bureau of Statistics, 2021).

Farming can also impact community empowerment (Ndyomugyenyi & Otiengino, 2013). For instance, the inclusion of both women and adolescents in rabbit farming as an accessible form of food production and income is a gateway to community benefits in income and food security which in turn can increase empowerment (Oseni & Lukefahr, 2014). Diversity in farmers can be crucial to community productivity (Andersson & Gabrielsson, 2012). While women in Uganda contribute significantly to agriculture, women also face lower employment rates (Uganda Bureau of Statistics, 2021). In Uganda, only 58% of women have achieved adequate empowerment scores in areas that include control over use of income, workload, access to credit, and decisions regarding credit (Sell & Minot, 2018). Having control over resources can be a catalyst for equitable empowerment that can in turn impact productivity, resource use, and household well-being, particularly for women and children (Akter et al., 2020; Sell & Minot, 2018).

An approach to reduce poverty, enhance food security, and increase empowerment in Uganda is rabbit farming (also known as cuniculture), the agricultural practice of breeding and raising rabbits for their meat, fur, wool, and other products. Other valuable products include rabbit urine used by farmers as a pesticide to repel insects and pests, and manure, rich in nutrients and nitrogen, used as soil fertilizer for crop growth (AgriTalk, 2025). Rabbit farming is sustainable and affordable for those living in poverty as rabbits can be raised on local feed, grow and reproduce quickly, adapt to many ecosystems unlike other livestock, and require a small space to grow and relatively low investment (Mutsami & Karl, 2020; Ndyomugyenyi & Otiengino, 2013). In addition, rabbit meat is nutritious with more protein and less fat compared to chicken, cows, or goats (Ndyomugyenyi & Otiengino, 2013). Other successful projects in the surrounding countries of Kenya, Sudan, and Tanzania, report rabbit farming as a sustainable source of nutrition and income for rural farmers (Lukefahr, 1998; Ndyomugyenyi & Otiengino, 2013). Commercialization of rabbit farming can further promote the welfare of farmers and is associated with decreased multidimensional poverty (Gbegbelegbe et al., 2018; Saradakis et al., 2021), increased household income, increased employment opportunity, and an increase in food security and nutrition (Mutsami & Karl, 2020). A study in

Kenya found that when controlling for other factors, commercialization of rabbit farming can reduce the probability of poverty by 13% (Mutsami & Karl, 2020). Overall, projects that develop capacity in small-scale agriculture promote increased food security, collective action, and agricultural sustainability (Devaki et al., 2021; Mutsami & Karl, 2020; Ndyomugyenyi & Otiengino, 2013).

In southwest Uganda, the Kigezi Healthcare Foundation (KIHEFO), a non-profit organization dedicated to local community development, introduced the Rabbit Farming Project in 2012. The goal of the project is to empower families through small-scale rabbit farming to generate household income and decrease poverty while improving nutrition. Participants in the project receive three rabbits, one male and two females, and eventually give three rabbits to another family when their rabbits multiply to more than twenty, creating a revolving community fund. New breeds of rabbits are introduced by KIHEFO to prevent inbreeding, and the first family to receive rabbits in each community is known as a host family or mini-breeding center. Since the project's inception, no studies have documented the experiences of participants. The objective of this research was to describe the perspectives of rabbit farmers and participants in the Rabbit Farming Project in Kabale, Uganda to fill in gaps in knowledge about rabbit farming as a source of community empowerment that promotes food security and poverty relief. This information can be used to improve rabbit farming in the Kigezi region and to scale the project to other impoverished regions that experience low food security in Uganda and globally.

Methods

Researchers used a qualitative descriptive research design with semi-structured interviews and thematic analysis (Bengtsson, 2016) of transcribed interview texts to understand participants' perspectives on rabbit farming and the Rabbit Farming Project. This study followed the Consolidated Criteria for Reporting Qualitative Research (Tong et al., 2007).

Setting, Sample, and Recruitment

The research project was conducted in Kabale, a rural and low-income area in Uganda's southwestern subregion of Kigezi and the site of the KIHEFO Rabbit Farming Project. The predominant local language in Kabale is Rukiga. Following Palinkas et al. (2015), we used two complimentary sampling strategies: purposeful random sampling and convenience sampling. For purposeful random sampling, we first identified participants based on predefined criteria and then randomly selected from a list of KIHEFO-registered rabbit farmers. Eligibility criteria included Kabale residents, having at least five years of experience in rabbit farming, and being 18 years or older. To complement this approach and enhance participant recruitment, convenience sampling was also used to recruit additional participants from accessible locations within Kabale, including clinics, churches, community centers, and households.

Purposeful random sampling was used to increase credibility of findings by drawing in participants directly involved in the Rabbit Farming Project, while convenience sampling enabled the inclusion of accessible rabbit farmers who may not have participated in the KIHEFO project but met the study criteria (Palinkas et al., 2015).

The final sample size was determined using data saturation, continuing recruitment and analysis until no new themes emerged from the coded transcripts, consistent with prior qualitative studies of similar populations (Cherwon et al., 2020; Di Martino, 2018). This iterative process resulted in a total of 46 participants, a sample size that aligns with established norms for in-depth interview-based qualitative research (Palinkas et al., 2015).

Participants were recruited by four trained KIHEFO research assistants (two female and two male) who are natives of Uganda, fluent in Rukiga and English, and trained in qualitative research methodology. The familiarity of the research assistants with the community increased trust in research relationships and allowed for a participatory mode of research and verification of findings (Creswell & Creswell, 2018). Researchers screened participants for eligibility and obtained their verbal and written consent prior to participating. All participants received an 18,565 Ugandan shillings (USD $5) gift card incentive for participation.

Data Collection

Researchers collected data from participants through 60-minute face-to-face interviews conducted at locations conducive for the participants between January – June 2022. A semi-structured interview guide with open-ended questions and probes and a consent form were developed by researchers in English and professionally translated to Rukiga, and interviews were conducted in Rukiga. Questions were informed by earlier research about rabbit farming in East Africa (Johnson et al., 2024). Interviews included questions about why the participant started rabbit farming, benefits, barriers encountered, the role of KIHEFO in their rabbit farming, and recommendations to improve rabbit farming. Further questions asked about rabbit farming history and perspectives, rabbit farming roles, rabbit use, and the impact of the COVID-19 pandemic on rabbit farming. After providing written and verbal consent, participants completed a brief facilitator-administered socio-demographic survey before each interview. Interviews were audio-recorded, transcribed verbatim, and translated to English.

Data Analysis

The transcribed texts were thematically analyzed by three trained data coders, one with expertise and previous experience in coding, between April – December 2022 using NVivo 12 qualitative data analysis software. Researchers used open coding to characterize themes related to interview questions followed by pattern coding to merge similar themes (Miles, Huberman & Saldaña, 2014). A codebook was developed and analysts refined the initial emergent codes until saturation was reached. Coders met bi-weekly to discuss the analysis process and refine the codebook, and criteria from the checklist of methods to establish intercoder reliability for qualitative research were followed (Cofie et al., 2022).

Diverse methods were used to establish trustworthiness and integrity in the research methods. For trustworthiness, all authors provide a positionality statement and reflected on their relationship to the material, and quotes from participants were used that represented the themes (Bengtsson, 2016; Creswell & Creswell, 2018). Analyst triangulation involved three analysts in coding who returned to the text and met to discuss coding frequently, and peer debriefing of the coding process and codebook was conducted by researchers who did not run analysis (Cofie et al., 2022; Creswell & Creswell, 2018; Miles, Huberman & Saldaña, 2014). To address any potential bias by researchers employed by KIHEFO, multiple researchers outside of the organization planned, wrote, and reviewed the project and coded the data. Data source triangulation for perspectives from people with diverse backgrounds and participants and non-participants of the Rabbit Farming Project were used for more comprehensive findings and to ensure rigor in the results (Noble & Smith, 2015). To address transferability and applicability, researchers engaged the "authentic narrative" form of thick description using block and line quotes that gives voice to the experiences, perspectives, motivations, and intentions of participants (Younas et al., 2023).

Ethical Considerations

Approval was received from the West Chester University of Pennsylvania Institutional Review Board (IRB) and the Mbarara University Research and Ethics Committee/IRB before recruitment and data collection. The risks of participating in this study were minimal and further minimized by providing a consent form at a sixth grade reading level in both English and Rukiga and emphasizing that participation was voluntary and confidential.

Results

The average age of the participants was 40.8 years and 74% identified as male. Subsistence agricultural farming was reported as the main source of income for 52% of participants, 87% reported selling their rabbits, and 93% reported rabbit consumption. The participants earned a yearly average income of 349,000 Ugandan Shillings (USD $95.98), equivalent to the salary of a primary school teacher at the time (Table A).

Themes

Themes that emerged from the semi-structured interviews included: the ease of rabbit farming; nutrition, income, and agriculture benefits; housing

and animal health and safety barriers; COVID-19 commercial impact; KIHEFO support and infrastructure, resources and guidance recommendations.

Ease of Rabbit Farming

Most participants described the ease of rabbit farming in terms of raising, feeding, eating, and selling. A participant stated, "Rabbit farming is easy" (47 years, male) and another explained, "Rabbits are manageable in terms of feeding and eating. That's how I can compare them. If you get a visitor, it is very easy to slaughter a rabbit [compared to] a goat" (26 years, male). One participant revealed how "rabbits are not hard to maintain and do not require a lot of labor" (32 years, male), while another described, "Even when you have a problem it is very easy to sell [rabbits] and sort your issue like that" (36 years, male).

Comparing rabbit farming to other types of livestock farming, a participant explained, "Feeding rabbits is much easier compared to feeding goats since rabbits are stationary at home but for goats, someone must go grazing with them in an open space. It is very tiresome chasing the goats" (60 years, male). Another shared: "I think rabbit keeping is better than the other projects because rabbits produce a lot and after selling you can get money quickly. Also, it requires less land compared to others" (67 years, male). Rabbit feed could be obtained locally "from the neighborhood" (30 years, female) and was more accessible to people with different abilities because,

> They do not run to distant places like other animals. Therefore, if someone is somehow disabled, he or she can simply move on a walking stick to the nearby plantation or garden and gather some weeds for the rabbits to feed on (30 years, female).

Nutrition, Income, and Agricultural Benefits

Participants shared that rabbits were a source of income and nutrition, and rabbit farming a source of empowerment central to their survival and lifestyle. This empowerment was important to women with one participant stating, "It also helps women not to be so dependent on men's money all the time" (50 years, female). Diverse other benefits were identified by participants such as reliable access to food and income, nutritional value, fertilizer and pesticide production for other crops, the reproduction rate of rabbits, and not "traveling to buy" meat if you have a visitor (50 years, female).

Animal Health and Safety and Housing Barriers

Participants also identified animal health and safety as well as housing barriers in raising rabbits. Animal health barriers included premature death of rabbits, diseases leading to death or affecting their household income, and lack of training in rearing rabbits. One participant indicated "the biggest challenge is getting sickly all the time because they are attacked by diseases so much, yet we have no medicine" (40 years, male). This was expressed frequently related to local breeds that were perceived to be less resistant to local diseases. One respondent shared how a more resilient breed would increase interest in rabbit farming,

> Like now we have local breeds, if they give us a better breed that is resistant to diseases, it can motivate others to start. Because if there's a new crop, for example in the village, by the end of the season you will find everyone has it. So that's how it is. There's need for a new breed (40 years, female).

Participants also noted safety as a concern and that exposure of rabbits to the vagaries of nature due to poor housing, loss to predators such as dogs, and theft were problems. The need for proper housing of rabbits for rabbit growth and health was critical. But availability and affordability of materials to construct rabbit housing, and training for proper construction were identified by participants as barriers. Theft of rabbits by other members of the community revealed the depth of poverty and hunger, especially during the COVID-19 pandemic when food availability worsened, further highlighting the need for accessible food production to promote food security. Better housing, more training to promote the health and safety of rabbits and introducing more resilient breeds of rabbits were viewed by the farmers as important.

COVID-19 Commercial Impact

Most of the rabbit farmers mentioned minimal effects from the COVID-19 pandemic as they had added support from children and family members.

> I was not all that affected because by then I just had very few which I would not wish to sell. And even the few that I had were properly taken care of by my children who had halted schooling due to the lockdown as a result of the pandemic (45 years, female).

Many subsistence rabbit farmers experienced a positive impact from COVID-19 with increased time for other agricultural activities and one participant shared that, "we had time for our animals" (59 years, male).

Although few in number, commercial rabbit farmers experienced a significant burden during COVID-19 when restrictions limited their access to markets and income. Travel restrictions were limiting and one farmer stated, "The corona period affected me so much because I could not travel easily to Kabale town to sell [my rabbits] because of the various roadblocks and curfews" (27 years, female). Another participant complained about income loss, "I could not move since the President had banned cars from moving freely. I [experienced] great losses because the rabbits were eating nonstop without yielding any money" (57 years, male). Some rabbit farmers pivoted to sell other rabbit by-products instead, "Well COVID-19 affected us so much because the restaurants we were selling the rabbits to were closed so we were only selling manure" (47 years, male).

KIHEFO Support, Infrastructure, Resources, and Guidance

As a community organization, KIHEFO initiated rabbit farming across Kabale. Although only 17% of participants were introduced to rabbit farming by KIHEFO, many of those participants described how KIHEFO provided infrastructure, community support, material and physical resources, and training and education important to success. Others were unaware of the organization but were interested in KIHEFO's various resources and offered recommendations to improve rabbit farming.

Respondents familiar with KIHEFO mentioned how the organization gave support in the form of training, setting up accessible banking infrastructure, other resources, and building community infrastructure to increase capacity and promote success. To start, KIHEFO supplied families in need with rabbits and instructed them to share one male and two females from the offspring they raised. KIHEFO provided education by sharing "booklets with information about rabbit farming" (26 years, male) to promote success. One farmer stated, "KIHEFO trains us if we are not taking very good care of the rabbits" (52 years, male) and offers advice for best outcomes. Because farmers can be important sources of information and social support for each other, KIHEFO organized gathering places for farmers:

> Yes, it also arranges some meetings with farmers in which they are taught to care and raise rabbits. We, for instance, are local rabbit farmers who in most cases rear rabbits locally but they [KIHEFO] train us on how to raise better breeds which can earn us more money compared to the local breeds (32 years, male).

KIHEFO also constructed accessible financial infrastructure integrated into the project. One participant described how, "They opened a bank for us, and we are able to save and borrow money" (32 years, male). This support was important to facilitate the use of rabbit farming to assist community members in building wealth, alleviating poverty, and helping when members experienced difficult circumstances. The bank came in the form of a community-supported SACCO or Savings and Credit Cooperative Organization. As a cooperative, the bank offered more than monetary exchange or products and according to one participant, "when farmers need money, they just take live rabbits there and they are given money. They also deposit the money on the farmers' account which helps them to save" (32 years, male). Farmers with a savings account with the SACCO could also get an insured loan when they needed it.

The opportunity to save money with a reliable bank was important. One participant stated, "KIHEFO also started for us a saving scheme"

giving out "passbooks" for members (67 years, male).

All participants offered advice about how to further help rabbit farmers in the community. This included better breeds and markets, training and education, and technical support and advocacy for the farmers. One farmer familiar with KIHEFO stated the need for, "better breeds compared to what we have here, only local ones. The breed they give us is big" (67 years, male). Finding optimal breeds for commercial purposes and for feeding the family was emphasized, along with technical support in finding feed to maintain the health and growth of rabbits. One participant wanted, "better breeds that grow big in size" and "male rabbits so that they multiply quickly" for sale and home consumption, and said, "We also require feed options apart from grass. We only give grass because that's what we have" (50 years, female). Some saw the value in having larger breeds to sell at the market but pointed out a need for a market that will pay a higher price to better benefit from those breeds, "Ours, even a big one, weighs 4- kilograms and the price can't go beyond 12,000. So, we need market." (39 years, male).

Recommendations highlighted by most participants included training and materials to build better housing, education and access to medicine, and knowledge on feeds. According to one participant, resources such as iron sheets and wire mesh for housing and medication could "improve on the quality of their rabbits" making them more marketable (29 years, female).

Many participants also recommended trainings from KIHEFO on the benefits and best practices in rabbit farming with one participant stating how this "can encourage them to start and keep on, instead of starting on their own which can limit the results" (67 years, male).

Beyond this, participants envisioned KIHEFO playing a continuing role in advocacy for rabbit farming. Many perceived KIHEFO as critical to rabbit farmer survival in the community: "They should be active and support farmers, visit them and advise on how to improve" (49 years, male). Participants saw how organizations like KIHEFO could help rabbit farmers to improve their skill in farming and "continue sensitizing people as well as providing technical support to improve rabbit farming outcomes" (45 years, female). These recommendations for more infrastructure, resources, and guidance connect clearly to the benefits and barriers described in the collective narratives of farmer participants.

Discussion

This research documents perspectives of rabbit farmers in Kabale, Uganda, and that rabbit farming was central to participants' survival and lifestyle as a source of income and nutrition. Rabbit farming involved families, and although only 25% were women farmers, rabbit farming was perceived as empowering, promoting income independence as highlighted by one female. Most participants described the accessibility of rabbit farming: raising, feeding, eating, and selling rabbits was easy. There were several benefits of rabbit farming including rabbits reproducing quickly, nutrition, income, and fertilizer and pesticide production. But several barriers were also described including premature death of rabbits, theft, diseases, and lack of proper housing, resources, and training.

Participants familiar with KIHEFO described KIHEFO as a resource for community infrastructure and support in rabbit farming. This included material and physical resources, training, and education important to success. Considering KIHEFO's model of requesting that participants give away three rabbits to other families, it is not surprising that some participants were not familiar with the organization as the original provider of rabbits which speaks to the potential success of the shared rabbit model. A future study mapping the Rabbit Farming Project in the Kigezi region will provide more details on the reach and influence of the project.

The local community work of KIHEFO with the rabbit project is particularly important in the support of sustainable agriculture that addresses global hunger and poverty. Data from this research highlight how the variety of interventions that accompanied rabbit farming addressed the contingencies of poverty and food insecurity. Infrastructure, such as the community-supported SACCO bank established by KIHEFO, addresses Target 1.4 of the United Nations Sustainable Develop-

ment Goals (SDGs) to eradicate poverty by promoting equitable access to economic resources such as microfinancing (UN SDGs, 2015a). For subsistence farmers, having access to a bank that accepts farm products such as rabbits in exchange for money can make a difference in alleviating poverty (Dushime et al., 2022; Moyo & Gasva, 2022). It works in tandem with SDG Target 2.3 for zero hunger by supporting small-scale, traditional and marginalized farmers including women, family farmers and Indigenous People, "through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities" (UN SDGs, 2015b). Small-scale, low-input agriculture that is accessible to people with low income, such as rabbit farming, also shows potential in addressing global poverty in the face of climate change (Mutsami & Karl, 2020; Oseni & Lukefar, 2014; Sarkar et al., 2020). As highlighted by participants, the accessibility of low-input rabbit farming is also in the ease in which rabbits are cultivated. Microfinancing, start-up funding for rabbit farmers, along with guidance in the farming process, create an ecological approach to addressing poverty and food security that builds infrastructure, capacity, and stable agricultural production and income to sustain community well-being (Devereux, 2016).

The nutrition benefits of rabbit farming are well documented, and consumption of rabbit meat can help improve health and well-being and reduce disease risk (Dalle Zotte & Szendro, 2011). The nutritional benefits of rabbit farming were evidenced in this research project in comments by rabbit farmers about the reliability of nutrition and income.

Still, farmers experienced various barriers that made successful farming difficult. Barriers to rabbit farming described by participants highlight a need for additional support and resources particularly in rabbit disease prevention and rabbit housing, to ensure the survival and successful rearing of rabbits. Other projects in Uganda and beyond show that establishing Community Animal Health Workers can support farmer success toward this end (Bugeza et al., 2017; Van Troos et al., 2018).

Subsistence rabbit farmers in this research study remained productive during the COVID-19 pandemic as they had additional support from their families to manage their rabbit farming activities. Commercial rabbit farmers faced challenges due to the lock-down procedures which hindered travel to markets to sell their rabbit meat. A study conducted in the Philippines on rabbit breeders and meat producers amidst COVID-19 found that the production of rabbits was also successful as families were home and could tend to the farm (Abarcar, 2022). The study also found that rabbit farming was helpful during the COVID-19 pandemic as it allowed farmers and their children to overcome stress, providing them with a healthy coping mechanism (Abarcar, 2022).

Conclusion

Evidence from this study demonstrates that rabbit farming can contribute to community empowerment to address poverty and food security. From the perspectives of rabbit farmers in Kabale, Uganda, rabbit farming was a sustainable source of nutrition and income, and empowered farmers and their families to support themselves, even during the COVID-19 pandemic. Community-based organizations like KIHEFO offer potential in promoting rabbit farming projects that build agricultural infrastructure and promote community empowerment while addressing poverty and food security. The benefits of raising rabbits instead of traditional livestock (e.g., goats, chickens), consumption of rabbit meat for its nutritional value, the additional income generated allowing children (particularly female) to attend school, and the ensuing long-term impact on empowerment of women are some of the areas that are ripe for future research. The nutrition, income, accessibility, and empowerment benefits of rabbit farming suggest scaling up the project in Kabale or introduction of this community-rooted practice in other similar global communities could have a positive impact on food security and poverty-relief.

Limitations of this study include that the sample was from a specific region in Uganda while other areas may present diverse contexts not experienced by our participants. Although generalizability may be somewhat limited, the results have transferability and applicability to other studies of communities with similar characteristics

and needs and can inform general research about rabbit farming to relieve poverty and promote community empowerment and food security across the globe.

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The authors would like to thank the rabbit farmers who participated in the study.

Positionality Statements
Chiwoneso B. Tinago: I am a professor of public health who leads initiatives to address structural and environmental determinants of global health using community-based participatory approaches. I identify as a Black Shona woman with roots in Southern Africa. I was introduced to rabbit farming through KIHEFO, traveling to Uganda to learn more. My identity and insights from these visits informed my contributions to this work.

Geoffrey Anguyo: My interaction with rabbit farmers for over 10 years might have influenced my position on this study. Co-authors in this study do not have any experience with rabbit farmers. Their perspective is adequate to override my position.

Madison Scalleat: I am a public health professional with a background in community health and school administration. I identify as a working-class, Caucasian American, non–Person of Color (POC). My work with underserved communities and individuals who experience food insecurity influenced my perspective in this work.

Naya Weeks: I am a public health professional with a background in community health. As a mixed-race African American and Puerto Rican woman, I have lived in underserved communities with limited access to nutritious foods. This shaped my perspective in this work.

Kamugisha Arnold: I am an African man raised in a rural community who has witnessed the struggles of small-scale farmers with low income. My training in public health and program management provided me with a lens to analyze systemic challenges. In this study, as data collection coordinator I was an insider who understands the rural context, yet an outsider to rabbit farming. I continuously reflected on how my background helped build rapport with participants, while my training guided the methodology, ensuring authentic and rigorously structured results.

Gopal Sankaran: I am an Asian male from India and a professor of public health. My training as an MD (board certified in integrated maternal and child health care), public health practitioner (with a maternal and child health focus), and experience with communities in low- and middle-income countries (LMICs) have sensitized me to global inequities. I continue to work toward making our world a just place for all.

Kimberly E. Johnson: I am an associate professor of nutrition and social scientist. I identify as a European American, non-POC with lower socioeconomic roots and have experienced low food security. This influenced my contribution to this work.

Zeinab Baba: I am an associate professor of public health sciences with training in epidemiology. I identify as a first-generation American of African descent, a woman of color, and a Muslim. I have experienced discrimination related to my gender, race, and religion. These influenced my desire to address inequities.

Patricia Davidson: Davidson is a nutrition professor identifying with the Iberian Diaspora and as a non-POC and second-generation American. Familial experience of educational, social, and professional discrimination shaped her commitment to healthcare equity, advocating for vulnerable populations in nutrition and diabetes care.

Whitney Katirai: I am a professor of public health sciences with a background in health behavior and the social determinants of health. I identify as a European American and a non–POC. My experiences in international and rural communities shaped my approach to this work.

Author Contribution Roles
GA, CBT, and GS conceptualized the research idea. CBT, AK and GA coordinated recruitment,

project training, and data collection. CBT, GA, MS, NW, KJ, ZB, PD, and WK developed data collection tools. CBT, MS, and NW conducted data analysis. GS, KJ, PD, and WK conducted peer debriefing. ZB analyzed sociodemographic data. All authors contributed to the drafting of the manuscript and share responsibility for the final version of the work submitted and published.

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Appendix

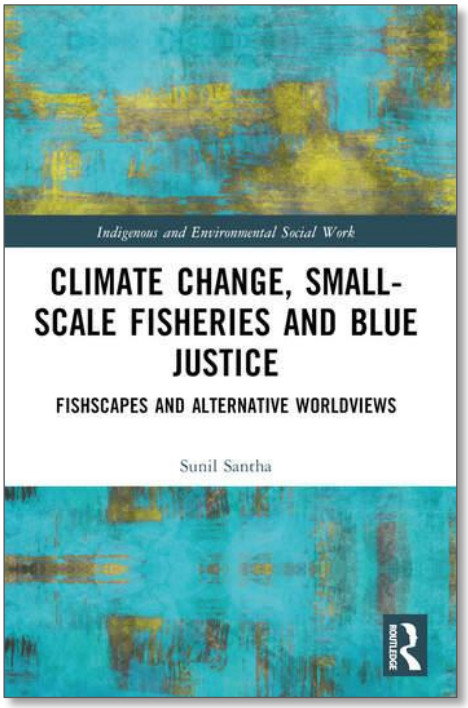
Table A. Sociodemographic Characteristics of Rabbit Farmers (*N* = 46)

Question	*N* (%) / Mean (*SD*)
Age (mean ± sd)	40.8 ± 13.0
Adults living in household (mean ± sd)	2.7 ± 1.5
Children (under 18) living in household (mean ± sd)	2.1 ± 1.6
Income from rabbit farming (in shillings) (mean ± sd)	349,000 ± 545,640
How long have you been rabbit farming (in months)? (mean ± sd)	60.5 ± 61.7
How many rabbits have you sold in the past 12 months? (mean ± sd)	39.2 ± 73.3
How many rabbits do you currently own? (mean ± sd)	20.1 ± 14.4
Gender	
Male	34 (74%)
Female	12 (26%)
Marital status	
Never married	5 (11%)
Married monogamous	36 (78%)
Marries polygamous	1 (2%)
Divorced or separated	3 (7%)
Widowed	1 (2%)
Education	
None	7 (15%)
Primary (Grade 1-7)	21 (46%)
High school (Year 1-4)	15 (33%)
High school (Year 5-6)	2 (4%)
Some College/University	1 (2%)
Main source of income	
Dependent on partner and/or family	1 (2%)
Formally employed	2 (4%)
Subsistence agricultural farmer	24 (52%)
Subsistence livestock farmer	2 (4%)
Rabbit Farmer	16 (35%)
Other	1 (2%)
Who introduced you to rabbit farming?	
KIHEFO	8 (17%)
Family	12 (26%)
Friend	18 (39%)
Other	8 (17%)
Do you sell rabbits that you farm?	
Yes	40 (87%)
No	6 (13%)
Do you eat rabbit meat?	
Yes	43 (93%)
No	3 (7%)

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The patchwork of blue justice: A review of *Climate Change, Small-Scale Fisheries, and Blue Justice*

Book review by
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Review of *Climate Change, Small-Scale Fisheries, and Blue Justice: Fishscapes and Alternative Worldviews*, by Sunil Santha. (2023). Published by Routledgeg. Available as hardcover, paperback, and eBook; 192 pages. Publisher's website: https://www.routledge.com/Climate-Change-Small-Scale-Fisheries-and-Blue-Justice-Fishscapes-and-Alternative-Worldviews/Santha/p/book/9781032450896

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In *Climate Change, Small-Scale Fisheries, and Blue Justice,* author Sunil Santha crafts a poetic and powerful narrative grounded in the 'patchy epistemologies' of small-scale Fishers across India and the Indian Ocean region (in this review, I capitalize 'Fish,' 'Fishers,' and 'Nature' in alignment with Santha's style). While these Fishers constitute the majority of the global fisheries workforce and play a critical role in sustaining coastal food security, they are marginally represented in policy and governance. Weaving together case studies, ethnographic accounts, and theoretical insights, Santha illustrates how their eco-social worlds are being reshaped under an increasingly globalizing food system and warming climate. This book critiques reductive climate solutions and sustainable intensification narratives while offering alternative, justice-oriented frameworks that center on the situated knowledge and lived experiences of small-scale Fishers.

Santha begins the book by establishing an analytical framework that integrates both posthumanist theory and political economy. Moving beyond human-centric ethnography, this book delves into

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several case studies featuring species such as the Bombay duck, Hilsa, shrimps, and sardines. These accounts situate Fish and Fishers in a "more-than-human" world, emphasizing their mutual entanglements as both navigate the intersecting pressures of industrial fishing and climate impacts. This posthumanist lens is complemented by Santha's use of Jason Moore's (2000, 2010, 2015, 2021) concept of the *commodity frontier*, which describes capitalism's expansion into previously uncommodified spaces and the resulting 'cheapening' of Nature reconstructing landscapes and livelihoods. Together, these frameworks challenge dominant views of Nature as external, passive, and governable, instead revealing how environmental, social, and economic forces are deeply interdependent.

Santha's analytical lens proves to be particularly powerful in his exploration of historical modernization projects and present-day climate adaptation approaches. One such example is the use of sand mining for shoreline reclamation efforts, which converts dynamic ecosystems into material inputs. While framed as solutions to coastal erosion, these interventions exemplify Moore's commodity frontier logic. Projects that employ sand-mining practices have paradoxically intensified the vulnerability of coastal communities to cyclones, displacing thousands of families and disrupting Fish habitats. These newly developed landforms are seldom returned to their traditional stewards; instead, they serve as platforms for tourism or real-estate expansion.

This commodification of Nature—whereby beings and habitats are positioned as capital—is in direct opposition to the 'world-making' of the Indigenous, traditional, and rural communities featured throughout this book. The central sections of this book delve into these relational knowledge systems through Santha's fieldwork across communities, such as Kerala, Gopdihi village, Ramnagar, and the Koli people of Mumbai. In Kerala, for instance, Fishers have numerous proverbs that pass down and communicate weather patterns or seasonal shifts, such as the *Kolu*, or monsoon storms. These proverbs have been developed over generations of Fishers co-existing alongside their non-human neighbors; however, these relational ties are shifting under variable environmental and market pressures that destabilize the landscapes on which these traditional knowledge systems are built. Santha's contributions extend beyond mere descriptions of this knowledge, as he vividly depicts how local ethics of reciprocity and community well-being are sharply contrasted against the pressures of commodity frontiers.

The contrast is particularly glaring in Santha's discussion of the Indo-Norwegian fisheries projects of the 1950s, which exemplifies how technological innovations and top-down modernization agendas have reconfigured both the material practices of Fishers and their traditional knowledge and cultural values. Santha best illustrates this dynamic through the subsidized introduction of synthetic gillnets. This innovation allowed Fishers to capitalize on larger landings and increase their individual agency, but what began as a technological improvement soon became a reshaping of eco-social relations. Santha quotes a Fisher who notes that, as other Fishers adopted gillnets and monopolized stocks, his adherence to traditional net weaving led to his family's starvation (p. 34). By situating these accounts within broader systemic processes, Santha demonstrates how globalized food systems reshape societies, diets, and ecosystems. Tracing these historical trajectories points to how current Blue Revolution initiatives mirror earlier modernization efforts that prioritize productivity over equity and environmental health.

From this retrospective analysis, Santha forms the basis for his critique of sustainable intensification and climate adaptation strategies in the book's final chapters. His review of the United Nations Sustainable Development Goals reveals how trade-offs disproportionately burden Fishers and perpetuate land and ocean grabbing practices under the guise of conservation. Drawing on critical studies of sustainable development, he contends that these frameworks adopt technical, reductive measures of environmental value, and he challenges human-centered approaches to environmental governance, arguing that the complexity of defining and governing the Ocean often obscures Fishers' situated knowledge.

This discourse raises essential questions about who defines what practices are "sustainable" and whose interests these definitions serve. These ten-

sions are especially pronounced in emerging sustainability initiatives in global seafood markets. The growing emphasis on eco-certifications and traceability systems in the Global North is increasingly shaping policy and practice, particularly in export-oriented regions of the Global South. As these third-party sustainable governance systems expand, they risk becoming new forms of exclusion if small-scale Fishers are not meaningfully included in their design. Similar to the organic movement in the United States, such systems may reinforce existing inequalities by inadvertently privileging actors with the resources to comply at a larger scale of production. From Santha's perspective, these certifications could be understood as extensions of the commodity frontier, transforming sustainability itself into a marketable attribute while marginalizing those it claims to support. Multistakeholder governance has the potential to offer a more inclusive alternative, yet its transformative success depends on whether small-scale Fishers are substantively involved in shaping definitions and regulatory practices.

Over the course of eight chapters, Santha effectively oscillates between microscale relationships and macroscale critiques, consistently returning to embodied knowledge to ground his evaluations of policy and governance. The structure of the book—composed of fragmented case studies and species-specific narratives—mirrors the 'patchy epistemologies' it seeks to represent. While this can at times disrupt the narrative flow of the book, it effectively reflects the uneven and diverse experiences of systemic and climate pressures. This structural style strengthens the book's argument by grounding the specificity of place, species, and practice in the context of a global food system.

Santha's methodology enacts a truly transdisciplinary approach, bridging ecological science, political economy, and cultural anthropology to examine the intersecting dimensions of Fishers' eco-social worlds and prompting readers to rethink dominant approaches to sustainability. This exploration of relationality, equity, and multiple ways of knowing resonates strongly with agroecological principles, making this text particularly valuable for graduate-level students, scholars, and practitioners focused on smallholder production systems and advancing more just and ecologically grounded food systems transformations.

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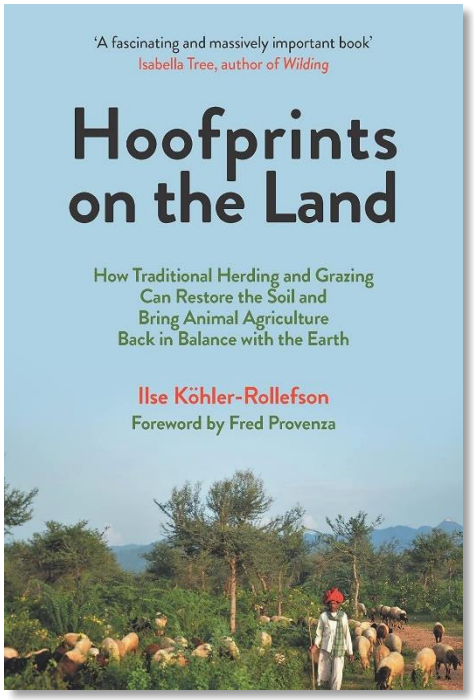
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The pastoral arrangement: How herders, animals, and soil sustain each other

Book review by
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Review of *Hoofprints on the Land: How Traditional Herders and Grazing Animals Hold the Key to Restoring the World's Grasslands*, by Ilse Köhler-Rollefson. (2023). Published by Chelsea Green Publishing UK. Available as paperback and Kindle; 288 pages. Publisher's website: https://www.chelseagreen.com/product/hoofprints-on-the-land/

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In *Hoofprints on the Land*, Ilse Köhler-Rollefson presents a persuasive and carefully researched argument that traditional pastoral herders are among the most important stewards of the world's ecologically significant landscapes. She demonstrates how pastoralists maintain seasonal grazing rhythms that have developed through generations of close observation and adaptation. At a time when scientific and policy discussions often focus on technology, efficiency, and optimization, this book encourages readers to consider a different mindset. Köhler-Rollefson argues that traditional pastoral practices do not conflict with sustainability and can instead support locally grounded, ecologically sound livestock systems.

Köhler-Rollefson writes with both scientific rigor and lived experience. Originally trained as a veterinarian, she shifted into archaeozoology after early fieldwork in the Middle East. She then spent decades living among the Raika camel herders of

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Rajasthan in India, gaining intimate insight into pastoral livelihoods. As co-founder of the League for Pastoral Peoples, she brings not only academic expertise but also long-term engagement with herding communities. This combination of training and immersion gives her writing a balance that feels both informed and grounded.

The book is organized into two major sections. The first explores pastoral peoples themselves. Köhler-Rollefson describes who pastoralists are, how their knowledge systems function, and what is lost when they are displaced from communal lands. She explains how these communities protect cultural traditions, unique livestock genetics, and ecosystems that depend on mobility. One of her central points is that indigenous livestock breeds possess traits that allow them to thrive under harsh environmental conditions. These traits include heat tolerance, disease resistance, and the ability to utilize sparse forage. Modern development programs often replace these breeds with high-input commercial animals that require feed, water, and infrastructure that drylands cannot support. While high-input breeds may deliver impressive performance under ideal conditions, the costs associated with maintaining them can outweigh the benefits.

An insightful example of community-driven knowledge appears in her discussion of *Pathe Pathshala*, or the concept of a "university on the move." During a conversation with a veterinarian from Odisha, she highlights the limitations of top-down technological interventions. The veterinarian notes that technologies promoted by outsiders often fail because they are expensive, inaccessible, or irrelevant to local contexts, highlighting that people should be the focus rather than the technologies themselves. *Pathe Pathshala* builds on local knowledge and emphasizes practices that are meaningful and successful in the community. This example reinforces the book's central argument that pastoral knowledge is not outdated but finely tuned to local environments.

The second half of the book focuses on ecological and environmental research. Here, Köhler-Rollefson introduces the concept of the pastoral footprint, which refers to the ways in which coordinated herd movement improves soil health. She explains that the hooves of grazing animals break up soil crusts, increase aeration, and distribute nutrients through manure and urine. She draws on ecological research to show how grassland plants and grazing animals co-evolved in a mutually beneficial relationship. When animals move seasonally at appropriate densities, the result can be improved soil structure, increased biodiversity, and enhanced water and nutrient cycling. Köhler-Rollefson takes care to differentiate this form of managed mobility from uncontrolled overgrazing, which is a valid concern in poorly managed systems. She acknowledges the scientific debates surrounding holistic planned grazing and notes that outcomes vary depending on rainfall, soil type, vegetation, and stocking rates.

The book's geographic range is one of its strongest elements. Köhler-Rollefson moves from the Thar Desert of Rajasthan to the pastures of East Africa, from the steppes of Central Asia to the highland transhumance traditions of the European Alps. Each region supports her broader point that pastoral mobility is a sophisticated and adaptive strategy. It is not an absence of management but a form of land stewardship that modern agricultural development has often ignored or misunderstood. Her message is clear: Local adaptation is essential and sustainable.

One of the most compelling discussions in the book concerns the relationship between pastoralism and food sovereignty. Köhler-Rollefson argues that access to migratory corridors is not only a land use issue but also a matter of food security. When herders lose mobility, they also lose the ability to produce the milk, meat, fiber, and manure that support local economies and household nutrition. She critiques development frameworks that focus on easily measured commodities rather than the subsistence-level provisioning that pastoralists provide. This critique has implications for how researchers measure and model food production, particularly in dryland areas. Promising developments, such as the collaboration between Kenya's State Department for Livestock Production and the International Livestock Research Institute to map migratory routes, water sources, grazing areas, and markets, relate directly to the book's themes (Onyango,

2025). This work supports pastoral livelihoods and demonstrates that wider recognition of pastoral systems is emerging in both the global North and South.

Although the ecological argument in the book is comprehensive, Köhler-Rollefson does not explore gender inequities in livestock ownership and decision-making in depth. Additionally, her optimism about policy reform may feel aspirational in regions where land control and migration rights are deeply contested. While she provides thoughtful recommendations for legal recognition of migratory corridors and for revising subsidy structures, the political challenges involved are substantial.

Hoofprints on the Land successfully reframes the debate about sustainable livestock systems. Conversations about feeding a growing global population often focus on new technologies and increased efficiency. Köhler-Rollefson suggests that an important part of the solution already exists within the accumulated knowledge of pastoral communities. These communities have adapted to challenging landscapes for countless generations, and their practices offer insights into how humans can work with, rather than against, ecological processes.

This book is highly recommended for academics, farmers, policymakers, and anyone engaged in food system research. It reminds readers that caring for soil, land, livestock, and local culture are intertwined responsibilities. Köhler-Rollefson captures this idea powerfully when she writes that livestock connect humans to the earth, and that a world without them would be not only ecologically impoverished but also diminished in terms of human identity.

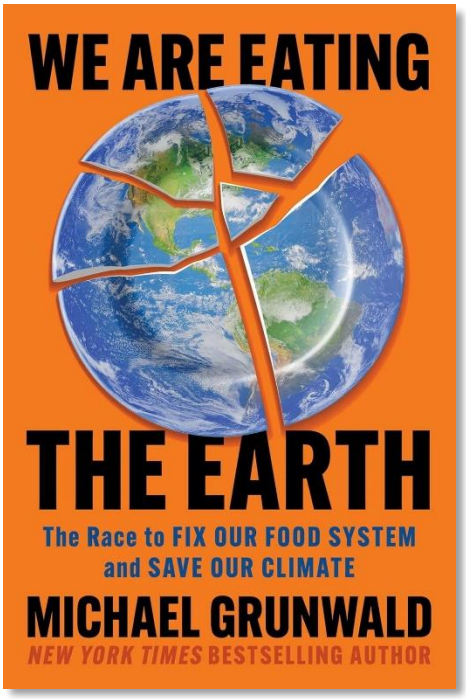
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Food production and the limits of sustainability

Book review by
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Review of *We Are Eating the Earth: The Race to Fix Our Food System and Save Our Climate*, by Michael Grunwald. (2025). Published by Simon and Schuster. Available as hardcover, paperback, eBook, and audiobook; 384 pages. Publisher's website: https://www.simonandschuster.com/books/We-Are-Eating-the-Earth/Michael-Grunwald/9781982160074

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Michael Grunwald's book *We Are Eating the Earth: The Race to Fix Our Food System and Save Our Climate* delves into the ugly world of food production and its detrimental impact on the environment. The book explores the different technologies that have been invented to address the problems caused by the need to produce more food. Grunwald follows the life and the research of a former environmental lawyer, Tim Searchinger. It is through the extensive work of Searchinger that Grunwald was compelled to pen this book. Some of the key themes that stem from this reading are the ethicality of science in pushing certain ideas as being environmentally friendly, as well as the clash between experts and environmental advocates and land usage and food production challenges. The reading makes one aware that land use challenges may be far-reaching, in the sense that demand in one area may create land exploitation in a place far from where the demand is.

To address the issue of moving away from fossil fuels in the quest to produce more food, the author explores some of the fuels that have been

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hailed by scientists, law-makers, and newspapers as being the "elixirs" to the fossil fuel problem. He goes into detail about how harmful ethanol production from corn is. He points out that one of the misconceptions about fuel production is that there is "free land" somewhere waiting to be used. Grunwald argues that the conversion of corn to fuel will have many perverse outcomes, some of which include increased deforestation, food shortages, and even greater pollution from using ethanol as a fuel. The second fuel he looks at is biomass. It seems that when biomass was proposed as an alternative fuel, there was a notion that it would not be emitting any harmful gases into the atmosphere, such that the Kyoto protocol agreed to it being left out of carbon accounting. It is evident throughout the book that researchers and economists sometimes manipulate the numbers and research to project an image that they are in favor of.

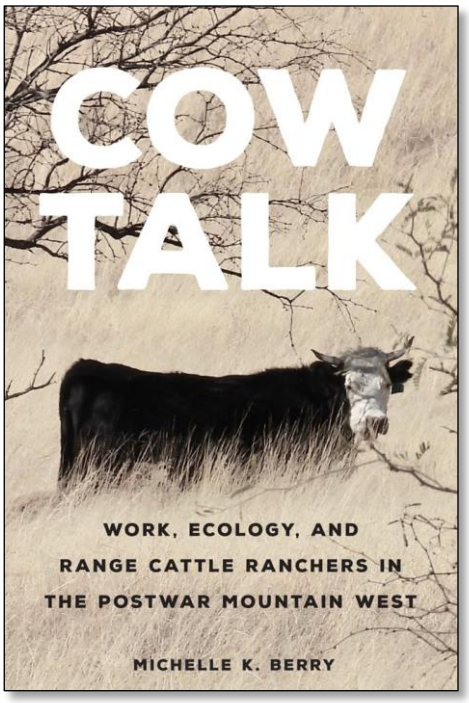
To bring the argument closer to food production, the author also looks at the other alternatives that can serve as substitutes for the food we eat. Grunwald takes us through various inventions, from chickenless eggs to lab-engineered meat. He argues that although these may help in averting climate disaster caused by animal farming, there is still a lot of work to be done to sway people to change their diets. It is also interesting how these technologies are always hailed as being the answers to our climate problems, and yet the inventors do not really want to share their knowledge and are always ready to sue whoever they think is stealing their idea. This makes it very clear that sustainability is important, but it requires significant financial and resource commitments. To elucidate this further, almost all the examples of startup companies that worked with these inventions required millions of dollars, and most of them were based in the U.S. This already points to the jarring difference between the haves and the have -nots in the research and implementation of sustainable inventions or ideas.

Essentially, Grunwald is challenging scientists and researchers—and everybody else who does work in food production—to dig deeper and find better solutions to the impending problem of destroying the earth. Prior to reading this book, I had never really thought much about how my eating habits may be destroying the planet, but this book has made me think deeper about that. This book challenges the notion of groupthink. Tim Searchinger was willing to question some of the solutions that most people were celebrating and touting as the ultimate answers. This teaches us the importance of being able to think beyond what we see, and that sometimes, as we do that, we may be labeled as being negative. Finally, Grunwald expresses that it is everyone's responsibility to ensure that we meet our current demands and leave the world a better place for those yet to be born, which is the core message of sustainable development.

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Work to worldview: Rancher identity and cultural solidarity in *Cow Talk*

Book review by
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Review of *Cow Talk: Work, Ecology, and Range Cattle Ranchers in the Postwar Mountain West*, by Michelle K. Berry. (2023). Published by University of Oklahoma Press. Available as hardcover, paperback, and ePub; 304 pages. Publisher's website: https://www.oupress.com/9780806191782/cow-talk/

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Histories of western ranchers have often treated them primarily as political antagonists of the federal state or as precursors to late-twentieth-century protest movements. *Cow Talk* challenges this framing by asking how ranchers in the postwar Mountain West came to imagine themselves as a cohesive community long before those conflicts crystallized. Berry frames cow talk as a ranching analog to shop talk, emphasizing how occupational language helped forge solidarity among cattle ranchers, a shared occupational vernacular rooted in everyday cattle work.

Ranchers' recurring stories of drought, blizzards, disease, and market collapse form the experiential core of *Cow Talk*. Berry argues that these shared narratives, circulated through association meetings and publications, allowed cow talk to function as a form of cultural glue, enabling ranchers to manage profound postwar changes such as mechanization, scientific management, federal

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regulation, ecological instability, and demographic pressure without fracturing internally. In Berry's telling, cow talk was not merely slang or occupational chatter but a powerful discourse that framed how ranchers understood threats, elevated forms of labor, and justified claims to expertise, authority, and entitlement. By repeatedly narrating shared hardships and triumphs, such as recurring environmental and market crises, ranchers constructed a sense of common fate that muted divisions of class, gender, and race while reinforcing a singular producer identity. While Berry persuasively demonstrates how cow talk forged cultural solidarity, this emphasis invites further scrutiny of how that solidarity depended on the selective suppression of class distinctions between ranch owners and wage laborers, as postwar ranching became increasingly capital-intensive.

What *Cow Talk* sets out to accomplish, then, is twofold. First, Berry aims to recenter the lived experience of ranch work, what she calls "cow work" and "ecological labor," in the history of the modern West. Second, she seeks to explain how cultural practices, rather than overt ideology, laid the groundwork for later, more confrontational rancher politics. From a materialist perspective, cow talk can also be read as an ideological response to mounting economic pressures—one that transformed structural contradictions in postwar ranching into shared cultural narratives rather than sites of open class conflict.

Methodologically, Berry draws on an expansive archive that includes ranchers' letters, association periodicals, cartoons, poems, photographs, field-day reports, meeting minutes, and ephemera, reading these materials not simply as sources of information but as sites of cultural production. Influenced by Benedict Anderson's (1983) concept of imagined communities, she treats cattle growers' associations and their publications as institutions that allowed geographically dispersed ranchers to see themselves as part of a singular "herd." Berry blends environmental history with labor history, gender history, and the history of science and technology, refusing to isolate ecological processes from social ones. Grass, insects, microbes, weather, and cattle bodies matter as much in her analysis as prices, policies, or politics. While Berry compellingly foregrounds discourse and vernacular, the book is less explicit about how shifting relations of production (mechanization, access to capital, and labor displacement) shaped the contours of cow talk itself.

The book succeeds particularly well in demonstrating how work itself generates ideology. Ranchers' ecological labor, managing grass, eradicating invasive plants, combating disease, and coping with climatic volatility, produced both knowledge and anxiety. These experiences fostered a defensive worldview rooted not merely in suspicion of government but in everyday encounters with unpredictable nonhuman forces. Berry's ranchers were pragmatic actors navigating a fraught ecological economy with the tools and assumptions available to them. This nuanced approach usefully complicates polarized debates about ranching and environmentalism.

Gendered labor provides one of the book's most revealing analytical lenses. Berry shows that ranchwomen's work, often invisible and unpaid, was crucial to the reproduction of ranch life, even as public cow talk privileged masculine, outdoor labor with cattle. Women's auxiliary organizations, such as the Cowbelles, offered ranchwomen a sanctioned avenue into the public face of ranching culture, particularly through beef promotion and consumer outreach, though these roles rarely disrupted underlying patriarchal norms. Berry does not overstate ranchwomen's agency, but she convincingly demonstrates their centrality to the survival of ranch culture and usefully challenges masculinist narratives of ranching. However, the relative absence of sustained class analysis raises questions about whether gender becomes the primary explanatory framework at the expense of a fuller account of labor relations in the ranch economy.

If there is a limitation to *Cow Talk*, it is one that the author herself largely acknowledges. By focusing on how unity was constructed, the book necessarily foregrounds the narratives ranchers told about themselves rather than those they suppressed. Indigenous dispossession, racialized labor, and deeper class antagonisms appear mainly as silences or absences within cow talk rather than as fully developed counterhistories. This is less a flaw

than an invitation for future scholarship to build outward from Berry's framework. Berry's decision to prioritize cultural cohesion over structural analysis yields important insights, but it also limits the book's ability to fully account for how labor relations, labor exploitation, and ownership hierarchies conditioned the very possibilities of unity that cow talk made visible.

In terms of significance, *Cow Talk* makes an important intervention in both environmental history and Western history. It fills a chronological and interpretive gap between early twentieth-century grazing politics and the highly visible confrontations of the 1970s and beyond. More broadly, it offers a compelling model for understanding how communities facing environmental precarity and structural change use culture, language, memory, and ritual to generate political power long before that power becomes overtly militant. In an era marked by renewed rural alienation, resource conflict, and debates over expertise, Berry's work resonates well beyond its historical frame.

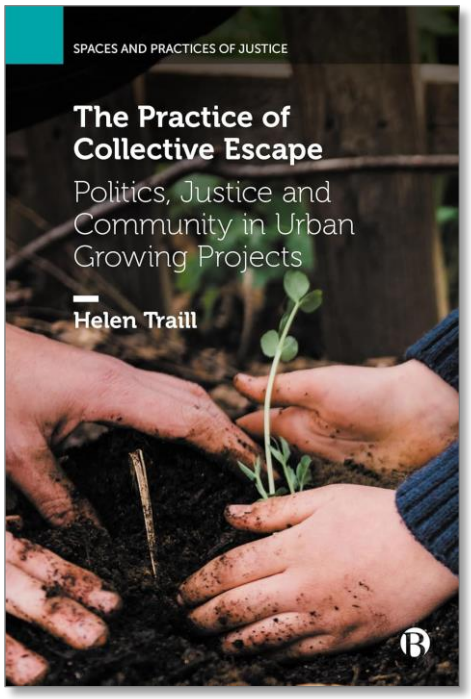
Ultimately, *Cow Talk* is a persuasive and elegant study of how work, ecology, and discourse intertwine. By taking ranchers' words, images, and practices seriously without uncritically endorsing their claims, Berry gives readers a deeper understanding of how a powerful rural constituency came to speak with one voice and why that voice still echoes across the political landscapes of the contemporary West.

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Growing food and radical hope in Glasgow: A review of *The Practice of Collective Escape*



Book review by
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Review of *The Practice of Collective Escape: Politics, Justice and Community in Urban Growing Projects*, by Helen Traill. (2023). Published by Bristol University Press. Available as hardcover, paperback, eBook, and Kindle; 216 pages. Publisher's website: https://bristoluniversitypress.co.uk/the-practice-of-collective-escape

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In the *Practice of Collective Escape: Politics, Justice and Community in Urban Growing Projects*, Helen Traill gives us a personal tour through the social complexities of community growing projects, accompanied by the rich insights of her ethnographic work over six years in Glasgow, Scotland. She follows two community growing sites during the Brexit transition and the COVID-19 pandemic. Her analytical lens weaves the work of authors who have navigated topics of inclusion and exclusion in the Commons, negative and positive freedom, social justice and political activism, and the overall benefits and challenges of urban agriculture projects. The author illustrates her claims with illuminating stories and choice quotes from gardeners and the wider community connected to the case studies. Truly, reading this as a researcher who has spent both a fair amount of time with my hands in the soil in urban growing projects and behind the desk reading about them (studying public health benefits and governance challenges), Traill's book stands apart as an illuminating examination of an infrastructure feature increasingly accepted as a net positive in cities. Yet, these gardens are rarely critically

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looked at as Petri dishes for individual and community transformation, which this book does through examining concepts of inclusion, individual escape, and political activism.

Embedded in the nature of an ethnography is inclusiveness, and Traill strives to enter these spaces with open-ended questions, contextual sensitivity, relational depth, and ample attentiveness, as has been prescribed by Ingold (2014, p. 384), admitting her own inherent bias as an expecting mother and parent throughout her field work. The multiple identities that allow her to seamlessly enter these spaces also give her an excellent vantage point to witness exclusionary practices. Traill presents the idea that despite the known "Glaswegian inflection," "the staunchly held notion of inclusion, the strong vein of social inclusion and a deep suspicion of those in power" (p. 27), the reality is that there may be limits to the type of inclusion practiced and she shares her insights around the social demographic and race boundary work that surfaces in communality. The author's findings suggest that inclusivity is an evolving concept in growing projects, shaped in part by one's preconceived ideas of community and current popular social justice themes (e.g., racism, veganism, and gender disparities). The temporal range of the study as well as the comparison of two growing sites with different founding intentions, landscapes and community structures further strengthens the generalizability of her claims on inclusivity and the central theme of "collective escape."

Traill brings us closer to some of the intricacies of a common paradox found in community growing projects, such as giving up some identity for the greater good, yet allowing space for diversity. She proposes the idea of escaping *into* community, where "community presents a paradoxical kind of freedom" (p. 5), in an age of growing disconnection brought about by the "negative freedom" of capitalism. In these spaces, people can enter and exit conversations easily, connect with nature, be a part of radical and "re-imagined" community rhythms and rituals (such as mealtimes) and feel a communal pull toward service to each other. Traill illustrates how this natural impulse also manifests in the maintenance of green spaces and in the shared hope for radical change and social justice. Through her research at these sites, she claims "to see the everyday resistances, politics and practices of justice of mundane local projects" (p. 89). She demonstrates the ethics that emerge from the positive freedom of "escaping into obligation" of the commons and the "reaffirming interdependence" (p. 92) in these projects through powerful narratives.

The comparative case studies Traill presents in her book also demonstrate that the reality of political activism in growing projects is complicated, irrespective of what motivations people enter these spaces with. One point she raises is that politics takes many forms. For example, some of her study subjects see the act of land use in opposing a capitalist system as political, while others see publicly fighting for a cause, such as veganism or gender rights, as political. Another point she raises is that political inclinations may be fluid and not inherent, arising from a natural consciousness raising that occurs in these growing projects, but highly dependent on their relationships with funding mechanisms, and wider social shifts. Traill highlights a challenge in the study of emergent politics through qualitative research: there is an inherent cultural bias in individuals' perceptions of the concept and implications of "politics" depending on education, income levels, and individual cultural experience. She questions whether a default to "social justice" and "common justice" might be a better frame of reference for research eliciting opinions on politics.

The Practice of Collective Escape is a fascinating deep dive into the social and aspirational dynamics that emerge in communal growing projects. Many previously studied themes in this space are exposed for observed questioning, and many new questions surface, which makes this work useful for researchers in social sciences, sustainable agriculture, and urban planning, among many other areas of study. Traill writes with honesty in her conclusion of her hope for this work of ethnographic research: "If this book has succeeded, it has built on these tensions, demonstrated the interplay between attempts to escape and create something collective and autonomous in the city and the broader structures of opportunities that constrain and facilitate action" (p. 154). In my opinion, this book achieves this and

more. What might take it beyond an illuminating analysis for researchers or enjoyable required reading in graduate school classrooms would be an accessible playbook of recommendations for community stakeholders in urban growing projects and urban planners.

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