frontiers | Frontiers in Sustainable Food Systems

TYPE Systematic Review
PUBLISHED 08 October 2024
DOI 10.3389/fsufs.2024.1450321

OPEN ACCESS

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RECEIVED 17 June 2024
ACCEPTED 25 September 2024
PUBLISHED 08 October 2024

CITATION
Rivera I, Díaz de León D and Pérez-Salazar MDR (2024) Drivers of the food system based on food sovereignty domains: an integrative systematic literature review. *Front. Sustain. Food Syst.* 8:1450321. doi: 10.3389/fsufs.2024.1450321

Drivers of the food system based on food sovereignty domains: an integrative systematic literature review

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Food sovereignty, as defined by the comprehensive definition offered in the 2007 Nyéléni Forum, encompasses essential action lines for transforming a food system based on food sovereignty principles. Understanding how current food system initiatives align with these principles is essential for identifying the necessary processes of change to drive this transformation. This study aimed to consolidate the contributions of advancements in food sovereignty to the existing literature. A systematic literature review was conducted to achieve this, analyzing 250 papers published between 2008 and 2023. The focus was on the research methods employed by the authors, food initiatives within the domains of food sovereignty, and the key drivers of a food system rooted in food sovereignty principles. The findings revealed that approximately 36% of the studies utilized interviews, surveys, and questionnaires for data collection, while 34% concentrated on targeted fieldwork through case studies. Around 19% of the studies involved in-depth interaction with specific groups, and just under 10% employed document analysis methods. The most extensively discussed domain was the use of agroecological management practices for food production, followed by the valuation of traditional knowledge, the promotion of social justice and equity, self-determination through the transformation of economic and political institutions, and the localization of food production and consumption. The food initiatives outlined overarching goals within each domain of food sovereignty, with three common goals identified across these domains: food security and consumption, environmental stewardship, and crisis preparedness. Furthermore, 29 drivers of a food system based on the domains of food sovereignty were identified, encompassing networks and a holistic approach present in all 5 domains. The study also highlights the implications for supporters of food sovereignty within the context of the identified goals of the food initiatives.

KEYWORDS

food sovereignty, drivers, food system, food sovereignty domains, food initiatives

1 Introduction

Viewed through the agroecology perspective, a food system can be seen as applying ecological principles and comprehensive methods for developing and maintaining sustainable agroecosystems. This is supported by Indigenous farming knowledge and incorporates ecological, social, and economic aspects (Stefanovic et al., 2020). Food sovereignty, a concept that challenges the existing power structures that do not prioritize the needs and objectives of local producers and consumers

within food systems, aims to involve citizens directly in transforming the food system (Patel, 2009).

This paper employs the concept of food sovereignty, as conceived by the most comprehensive food sovereignty definition offered yet in the 2007 Nyéléni Forum. This definition broadly encompasses the following scopes (Nyéléni, 2007):

i "the right of peoples to healthy and culturally appropriate food"
ii "food produced through ecologically sound and sustainable methods"
iii "the right to define their own food and agriculture systems"… "rights to use and manage our lands, territories, waters, seeds, livestock and biodiversity"
iv "puts those who produce, distribute and consume food at the heart of food systems and policies"
v "food production, distribution and consumption based on environmental, social and economic sustainability"
vi "prioritizes local and national economies and markets"
vii "promotes transparent trade that guarantees just income to all peoples"
viii "empowers peasant and family farmer-driven agriculture, artisanal fishing, pastoralist-led grazing"
ix "implies new social relations free of oppression and inequality between men and women, peoples, racial groups, social classes and generations"

Accordingly, food sovereignty centers on ensuring access to food for people, promoting sustainable food production using ecological methods, localizing food systems with fair trade relations, giving control of food systems, policies, and access to resources to producers, distributors, and consumers, fostering knowledge, culture, and skills among people, and promoting fair relations and equity among all members of the food community. We have expanded on these areas as essential action lines for transforming a food system based on food sovereignty principles. In line with the areas outlined in the review by Jones et al. (2015), our study focuses on five food sovereignty domains (FSDs): (1) agroecological management practices for food production, (2) localization of food production and consumption, (3) promotion of social justice and equity, (4) valuation of traditional knowledge, (5) self-determination through the transformation of economic and political institutions and structures. To transform a food system based on food sovereignty principles, it is crucial to understand how current food system initiatives develop within the FSDs and identify the critical processes of change to advance this transformation.

We found previous literature reviews regarding the food system from a food sovereignty lens, which have underlined different scopes (see Supplementary Table S1), particularly recognizing the review conducted by Jernigan et al. (2021) as an effort to identify food sovereignty strategies for community capacity building and health; the authors highlight that access to resources, production, trade, food consumption, policy, community involvement, and culture as food sovereignty indicators. Currently, no literature reviews specifically examine food system initiatives and drivers from a transformative perspective involving the reimagining and fundamental redesign of entire food systems through the food sovereignty lens. Therefore, the aim of this study was to summarize how advancements in food sovereignty contribute to the literature on transforming the food system. To this end, a systematic literature review (SLR) was conducted from three research questions (RQs). The RQs are listed in Table 1.

This document is organized as follows: Section 2 covers the methodology used for the systematic review. Guided by the three RQs, Section 3 presents the key findings, while in Section 4 these are discussed. Finally, Section 5 summarizes the conclusions and implications for food sovereignty proponents.

2 Methods

2.1 Conceptual framework

The conceptual framework that guided this study (Figure 1) was adapted from the food system conceptualization within the agroecology lens (Wezel et al., 2019; Stefanovic et al., 2020), the domains of food sovereignty in line with the ones outlined in the review by Jones et al. (2015), and the drivers of food systems definition proposed by Béné et al. (2019). In this framework, agroecology emphasizes a holistic approach to food systems, considering ecological, social, and economic factors. It prioritizes sustainability, an approach to farming that maximizes ecological processes and does not degrade the natural resource base, and the utilization and preservation of Indigenous farming knowledge in agroecosystem design and management. This focus aligns with the concept of food sovereignty, which places the needs and aspirations of local producers and consumers at the center of food systems and questions the current power structures that do not prioritize them (Stefanovic et al., 2020).

This framework operates on the assumption that understanding how current initiatives in the food system are located within five domains of food sovereignty is essential for transforming the food system. AFSD refers to sustainable agroecological-based production systems that promote economic viability, social equity, and cultural diversity while conserving natural resources, enhancing biodiversity and ecosystem services, preventing land degradation, and optimizing natural cycles (Altieri et al., 2012). From the view of agroecological management practices for food production, a farming system incorporates functional biodiversity through practices based on traditional and agroecological scientific knowledge (Kremen et al., 2012). LFSD highlights the need to provide small-scale food producers and low-income non-farming populations more control over the foods they produce and consume (Beriss, 2019) and emphasizes smallholder producers, reliance on the local community, and a shift away from global trade and aggregation (Altieri et al., 2012). PFSD is generally understood as the challenge of addressing the structures and processes that produce and maintain inequality in food and food systems' production, consumption, materiality, and meanings and discusses fair participation and sharing of benefits and risks within

TABLE 1 Research questions.

ID	Question
RQ1	What research methods have the authors used to address food systems within the food sovereignty framework?
RQ2	How are food initiatives developed across the domains of food sovereignty?
RQ3	What are the drivers of a food system based on the domains of food sovereignty?

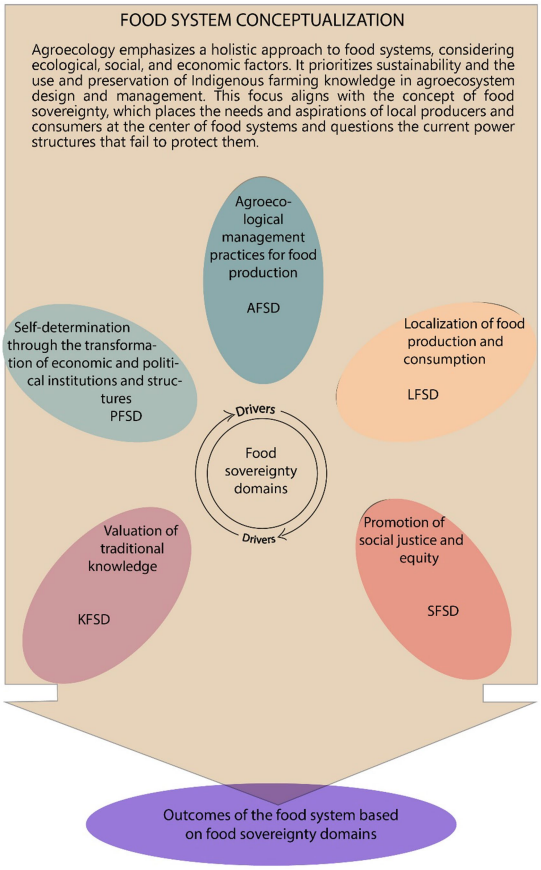

FIGURE 1
Conceptual framework of the food system based on domains of food sovereignty.

food systems (Shostak, 2023). KFSD encompasses local and community empowerment and capacity building to encourage the adoption of resilient expertise and practices based on past experiences and create new knowledge (Spring et al., 2023). It also recognizes traditional knowledge and culturally appropriate processes (Anderson, 2015b). PFSD ensures people can engage with their responsibilities and relationships with resources and food systems through governance systems, protocols, and public policy (Kepkiewicz, 2020). Within this domain, it leverages the capacity of individuals, organizations, and states to self-determine resource management and production or consumption decisions (Giraldo and McCune, 2019).

Through this pathway, in each domain of food sovereignty, drivers emerge as either internal or external processes that have a long-term impact on a food system, leading to lasting changes in its activities and outcomes (Béné et al., 2019).

2.2 Search strategy

This study outlines how advancements in food sovereignty add to the body of knowledge about transforming the food system. It aims to describe how existing food system initiatives align with the domains of food sovereignty and identify the drivers that leverage this transformation.

Our study aims to comprehensively understand the RQs by synthesizing what is already known regarding empirical insights (Van Wee and Banister, 2016). This distinctive synthesis represents the added value of a SLR due to its critical role to provide syntheses of the state of knowledge in a field (Page et al., 2021).

The decision process for inclusion and exclusion of studies is presented according to the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for reporting systematic reviews (Page et al., 2021).

Six research databases were included in the systematic search (Figure 2), namely Scopus, Taylor & Francis, Science Direct, Web of Science Core collection, Wiley Online library, and JSTOR, to collect academic articles and reviews using the search criterion was constructed by combining the operator "and" and the key terms: "food system" and "food sovereignty." We recognize the limitations of the narrow search criteria, which avoids the need for precise definitions of the food system and food sovereignty. However, this may limit the study due to the assumption of a shared understanding of these concepts.

Additional search parameters were that studies were (1) with published status in peer-reviewed journals from January 2008 to December 2023; (2) in the English language; (3) that comprise the key terms in the title, abstract, and keywords. Conference proceedings, book chapters, unpublished manuscripts, and dissertations were excluded. The limitation of our study encompasses the aspects of the search period, selection of search databases, and language selection.

2.3 Screening process

The review team conducted an initial screening by evaluating the titles and abstracts of 716 articles identified from databases (see Supplementary Table S2). After eliminating duplicates, 439 articles remained. Two team members independently reviewed all abstracts. Non-peer review articles, commentary articles, editorial special issue articles, guest editorials, and book chapters were not retrieved, leaving 412 articles for eligibility.

The studies were assessed using specific eligibility criteria to address the research questions. Eligible studies needed to clearly state or explain a transformative initiative within at least one of the domains of food sovereignty: Agroecological management practices for food production food sovereignty domain (AFSD), localization of food production and consumption food sovereignty domain (LFSD), promotion of social justice and equity food sovereignty domain (SFSD), valuation of traditional knowledge food sovereignty domain (KFSD), and self-determination through the transformation of economic and political institutions and structures food sovereignty domain (PFSD). We applied these criteria to the title and abstract. If a study did not meet these criteria, we conducted a full paper reading until reaching a consensus. We conducted a pilot study where the review team evaluated 30 randomly selected papers from the Scopus search, when we realized that we should exclude articles with a historical focus, opinion pieces, and review articles of any kind.

After considering our options, we used the reference management software and researcher network Mendeley®. This decision was based on its feature of private groups, which allows us to tag and annotate research papers collaboratively. The workload was then divided among the team members, with two authors independently reviewing all

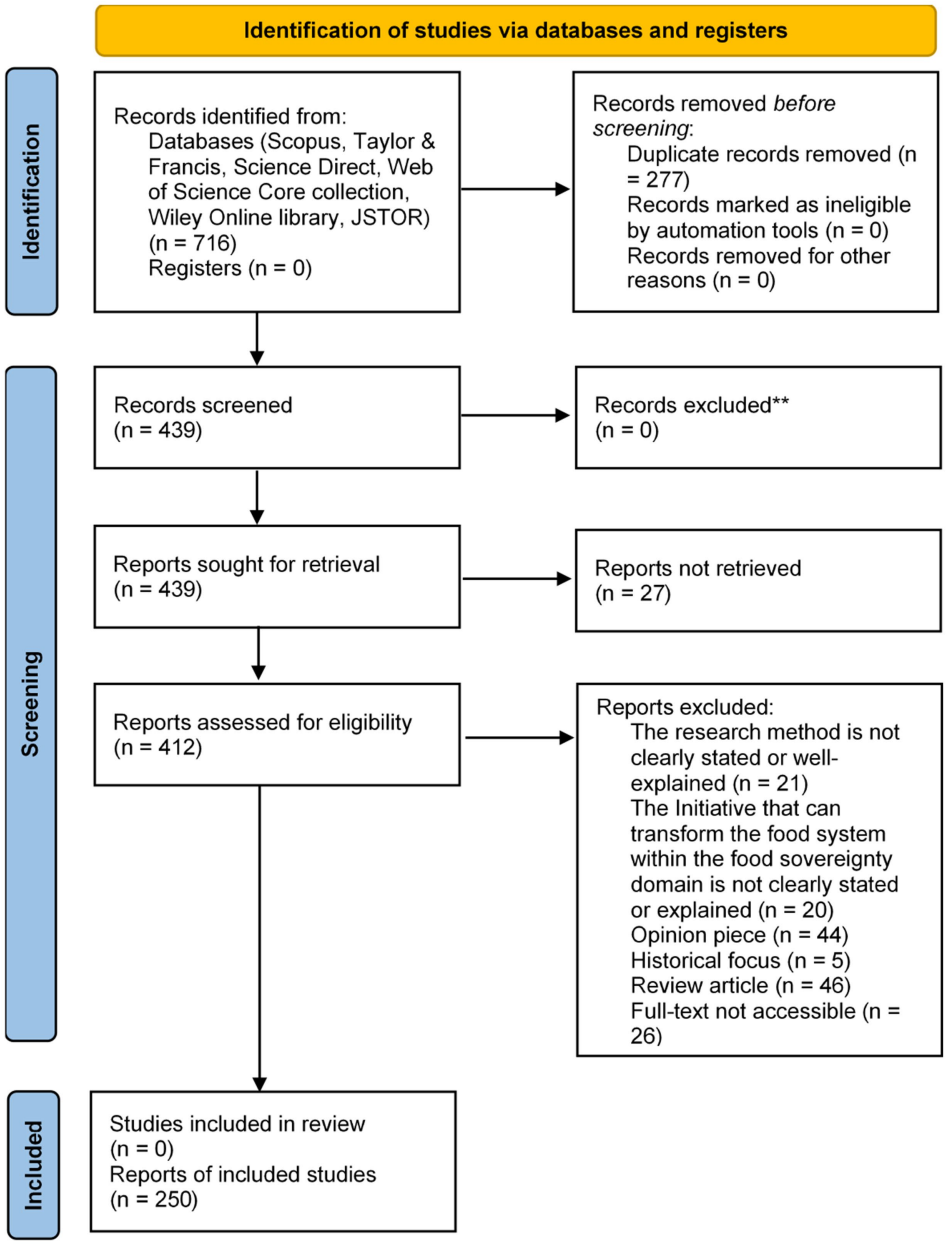

FIGURE 2
PRISMA flow chart of decision process for inclusion and exclusion of studies.

references and the third author reviewing one-third. The process excluded 162 articles (see Supplementary Table S3 for the list), leaving 250 articles included in the review for data analysis (see Supplementary Table S6 for the list).

2.4 Data analysis

Following Tranfield et al. (2003), we used a data-extraction form as a Microsoft Excel® spreadsheet. This spreadsheet contained general study information such as title, author, publication details, coding terms related to the RQs, and notes on any emerging challenges related to the synthesis details. The data extraction was divided between two review team authors named the analysis team. The final sample, comprising 250 papers, was randomly split between the two authors, with 125 papers assigned to each.

The data analysis involved using a qualitative content analysis approach, following the guidelines proposed by Mayring (2015). For each research question, the analysis team accordingly conducted two types of category definition procedures: deductive and inductive. The deductive approach involved developing categories based on theoretical considerations, using theories or theoretical concepts to guide the operationalization process. The inductive approach, on the other hand, involved developing categories directly from the material itself (Mayring, 2015).

For RQ1 and RQ2, we defined a deductive category assignment scheme for qualitative coding, as shown in Table 2. Regarding RQ1, the coding rule specifies that the first-mentioned category, which is

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TABLE 2 Qualitative coding scheme for deductive category assignment (RQ1 and RQ2).

Theme of the RQ	Category	Definition
Research method (RQ1)	Interview	This method provides a deeper understanding of a phenomenon. It is utilized when participants are reluctant to discuss sensitive issues in a group environment.
	Semi-structured interview	This method provides a deeper understanding of a phenomenon. It consists of a predetermined set of open questions to prompt discussion and allow the interviewer to delve further into specific themes or responses.
	Questionnaire	This method refers to eliciting data in situations firmly structured by the researcher.
	Survey	This method comprises selecting an unbiased and representative sample of subjects from a group where the researcher seeks previously specified data.
	Database/document analysis	This method provides critical information about the background and context of research questions and enables a reflective research process.
	Discourse analysis	This method is used to understand the dominant discourse on a particular subject by analyzing spoken or written language and its social meaning to explain how languages are used in practical life settings.
	Case study	This method focuses on a specific issue or topic, is a field survey that targets specific data or is a brief interaction with a particular group.
	Participatory observation	This method collects valid, correctly interpreted, and context-sensitive accounts relating to features of participants' lives in naturally occurring settings.
	Ethnography	Comprehensive and dense description of the interactive process of identifying important repeated variables in society about each other under certain conditions and affecting or producing specific results and outcomes in society.
	Focus group	A rapid, efficient, and budget-friendly approach to gathering information by collaborating with well-organized team members in a socially immersive environment where interaction is key.
	Photovoice	Flexible art methodology involves participants taking photographs, recording their experiences and perspectives on research questions, and participating in interviews.
	Storytelling	A critical narrative approach that frames information so that it is understandable, meaningful, and memorable.
	Talking circle	This method facilitates sharing reflections and experiences as a dialogic approach to generating and gathering knowledge through oral narration.
	Workshop	Method that aims to collectively analyze a specific theme's main characteristics, key challenges, and critical problems.
Food sovereignty domain (RQ2)	Agroecological management practices for food production	Sustainable agroecological-based practices promote economic viability, social equity, and cultural diversity. They also conserve natural resources, enhance biodiversity, prevent land degradation, and optimize natural cycles, enhancing resiliency and productivity.
	Localization of food production and consumption	It emphasizes the importance of smallholder producers, local community reliance, and a shift away from global trade. It highlights the need to give small-scale food producers and low-income non-farming populations more control over their production and consumption.
	Promotion of social justice and equity	Focuses on ensuring fair participation and equitable sharing of benefits within food systems, addressing structures and processes that create and perpetuate inequality in food production and consumption.
	Valuation of traditional knowledge	Empowering local communities by recognizing and adopting resilient traditional knowledge and culturally appropriate processes while creating new expertise.
	Self-determination through the transformation of economic and political institutions and structures	It refers to the ability of individuals, organizations, and governments to make decisions about managing and using resources and food production. Governance systems, protocols, and public policies are utilized to ensure that all stakeholders in the food system can fulfill their responsibilities and manage their interactions effectively.

clearly stated or well-explained in the study, should be coded. If a second-mentioned category is clearly stated or well-explained, it should be coded in the next column of the spreadsheet. When addressing RQ2, the coding rule requires that the method description and study results support the definition of the category with concrete evidence. If this criterion is met for more than one category, the review team will discuss the coding decision based on the relevance of the contribution, with two authors needing to agree against one (see Supplementary Table S4).

For the theme of RQ3, we follow the process for inductive category formation following Mayring (2015). The selection process for category formation is based on a deductive element established within theoretical considerations about the RQ3, the definition of drivers of the food system discussed in Section 2.3. Regarding the formation of the category scheme, a category needed to be created the first time material that fitted the category definition was found. The category label was a term or short sentence that closely represented the material. As a result, when a study fitting the category definition was found, it was checked to see if it fell under an existing category. If it did, it would be included in that category. If it did not, a new category was created. Finally, the review team revised the entire category system to ensure that the logic of categories aligned with RQ3 (see Supplementary Table S5).

3 Results

This study analyzed 250 papers published from January 2008 to December 2023. The average number of publications from 2010 to 2017 was 8; no records were found in 2008 and 2009. Figure 3 shows a steady increase in published studies from 2018 to 2023, indicating growing interest in the RQs posed by this review.

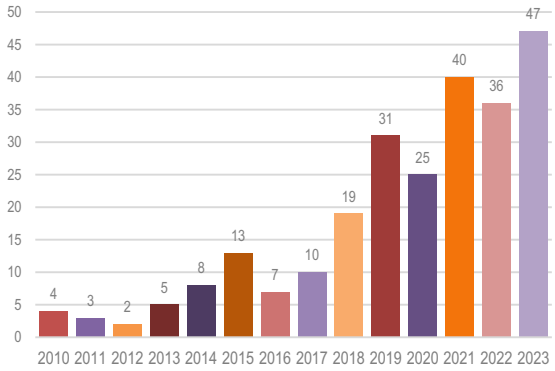

FIGURE 3
Evolution of the number of reviewed studies by year.

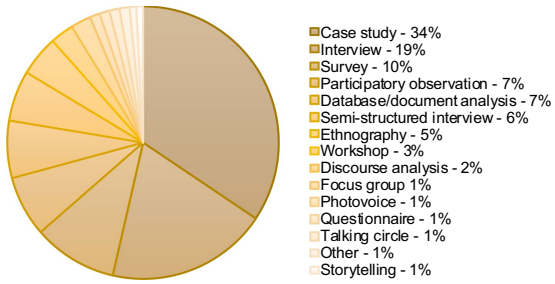

FIGURE 4
Distribution of the reviewed studies papers by the first-mentioned research method.

3.1 Research methods (RQ1)

To answer RQ1, we initially examined the first-mentioned research method clearly stated or well-explained in each study included in the review (Figure 4). The most used research method to address food systems within the food sovereignty framework was the case study, accounting for 34%. This was followed by interviews at 19% and surveys at 10%. Approximately 64% of the reviewed publications utilized these three methods.

Next, we analyzed the studies in which a second-mentioned research method was clearly stated or explained well (Table 3). These studies used a combination of research methodologies to enhance their design approach.

3.2 Food initiatives developed across FSDs (RQ2)

Regarding RQ2, Figure 5 presents the distribution of the reviewed papers by domains of food sovereignty. The AFSD was the most commonly addressed domain, accounting for 29% of the studies, followed by the KFSD at 20%. The SFDS and PFSD were each addressed in 19% of the cases, and the LFSD was the least addressed.

Food sovereignty initiatives often include specific actions, such as managing seed systems, configuring short food supply chains, providing critical food systems education, facilitating farmer-to-farmer learning, and coordinating food and social policies. These initiatives also outline the broader goals that these actions are intended to achieve. Based on the reviewed initiatives, the goals of each domain's initiatives are outlined next.

3.2.1 AFSD

3.2.1.1 Embracing the agroecological production model

In the realm of agroecological practices, agricultural diversification was found as a way to overcome maladaptive local agricultural institutions (Davila, 2020), low-cost vertical hydroponic systems to develop rural agriculture (Borrero, 2021), and a range of ecological community practices to achieve healthy and sustainable local food systems (Gallegos-Riofrío et al., 2021).

Horticulture emerged as a pathway to sustainably meeting urban dietary needs (Walsh et al., 2022), but according to Butrico and Kaplan (2018), governmental support is imperative for the horticulture industry to compete with imports.

Adopting organic agriculture was proposed as a way to address the limited diversity in production systems and reduce the use of high chemical inputs in conventional agricultural production (Bisht et al., 2020), the need to regionalize food

TABLE 3 Reviewed studies using a second-mentioned research method.

First-mentioned research method	Second-mentioned research method	Articles
Interview	Focus group	Beingessner and Fletcher (2020), Joseph et al. (2023), Naylor (2019), Paddock and Smith (2018), and Powell and Wittman (2018)
	Participatory observation	Kerr et al. (2019), Butrico and Kaplan (2018), Campbell and Veteto (2015), and Dale (2021)
	Workshop	Robin (2019) and Ruelle et al. (2022)
	Talking circle	Arthur and Porter (2019)
	Database/document analysis	Kurtz (2015) and Resler and Hagolani-Albov (2021)
	Discourse analysis	Graddy-Lovelace et al. (2023)
Semi-structured interview	Survey	Rice et al. (2023)
	Storytelling	Picos (2020)
	Workshop	Wolff and Gomes (2015)
Questionnaire	Interview	McCarter et al. (2023)
	Workshop	Martin and Wagner (2018)
Survey	Semi-structured interview	Bokan et al. (2023), Hurtado-Bermúdez et al. (2020), and Rojas et al. (2011)
	Interview	Bisht et al. (2018) and Katikiro and Mahenge (2022)
	Focus group	Durán-Díaz (2023) and Sowerwine et al. (2019b)
	Participatory observation	García-Sempere et al. (2019)
Database/document analysis	Discourse analysis	McInnes (2019)
	Semi-structured interview	Ferrerira de Moura et al. (2017)
	Workshop	Raheem et al. (2022) and Wilson et al. (2020)
Ethnography	Interview	Huambachano (2018), Millner (2017), and Ngcoya and Kumarakulasingam (2017)
	Semi-structured interview	Velicu and Ogrezeanu (2022)
	Survey	Cadieux and Slocum (2015)
Focus group	Interview	Gallegos-Riofrío et al. (2021)
	Questionnaire	Bisht (2021)
	Survey	Blesh and Wittman (2015)
Participatory observation	Semi-structured interview	Burke (2021), Finnis et al. (2013), Ibarra et al. (2011) Lelea et al. (2023), Reckinger (2018), and Roman-Alcalá (2018)
	Interview	Barta (2017), Partalidou (2015), and Siebert (2020)
	Storytelling	Castagnetti et al. (2021)
	Workshop	Laforge et al. (2021)
Photovoice	Semi-structured interview	Hanemaayer et al. (2020)
Talking circle	Focus group	Jernigan et al. (2023a)
	Storytelling	Poirier and Neufeld (2023)
Storytelling	Interview	Domingo et al. (2021)
Workshop	Interview	Freedman et al. (2022), Guariguata et al. (2020), and Levkoe et al. (2019)
	Semi-structured interview	Horstink et al. (2023)

systems by considering local preconditions (Rüschhoff et al., 2021), the declining numbers of profitable small and mid-sized farms, an aging farmer demographic, and insecure agricultural working conditions (Smith et al., 2019). Participatory guarantee systems have emerged as a response to global changes in order to restructure agri-food systems through agroecological networks (Vallejo-Rojas et al., 2022). These systems aim to empower local producers and consumers, but should not be considered a substitute for third-party certification systems, unless certain conditions related to socially consolidated groups and an agroecological and food sovereignty perspective of the food system are met (Cuéllar-Padilla and Ganuza-Fernandez, 2018).

When considering urban areas, there is the challenge of inequitable and inadequate public investment that fails to support the diverse practices and practitioners involved in growing food locally (Siegner et al., 2020), the lack of space and competition with other land uses within the city (Taylor, 2020) and the design of agroecological urban food systems for deprived neighborhoods (Simon-Rojo, 2019). Some initiatives to tackle these challenges include mapping existing urban agriculture sites as an initial step to creating successful policies

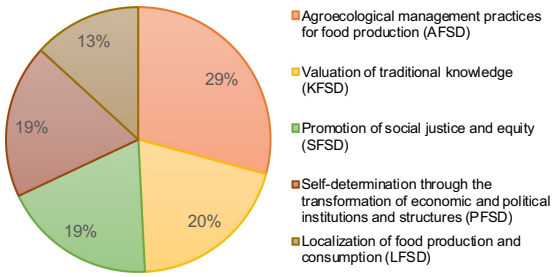

FIGURE 5
Distribution of the reviewed papers by domains of food sovereignty.

and programs at the city or neighborhood level (Taylor and Lovell, 2012) and enabling agricultural activities at the municipal level could help restrict urban sprawl into agrarian areas (Condon et al., 2011).

Agroecological farming reduces dependence on imported food, addressing the agro-food system's insufficiency in meeting the needs of the population (Diaz and Hunsberger, 2018). It also acknowledges the significance of involving Indigenous, small-scale, and peasant farmers in agroecology to improve people's wellbeing by providing a path to overcome alienation, commodification, and exploitation, considering broader political-economic conditions that limit this potential (James et al., 2023).

3.2.1.2 Food security and consumption

Barriers to accessing healthy food can include financial constraints and lack of geographic proximity (Kassam and Bernardo, 2022), poverty, climate change, and development disparities (Gunaratne et al., 2021), and people's dietary habits disconnected from locally available resources and land (Schön and Böhringer, 2023).

Agrobiodiversity could counter market volatility, high food prices, poor food quality, and limited availability and access to food (Fernandez and Méndez, 2019). Seed-saving conservation is an initiative that challenges the neoliberal economic framework, food insecurity, and malnourishment (Campbell and Veteto, 2015). Managing seed systems can lead to agroecological transformation and sustainable household dietary diversification (Bisht et al., 2018; Tschersich et al., 2023). Planting food-bearing trees and plants and creating a seed library to establish edible landscapes to counter colonial policies that disrupted Indigenous food systems and lands, impacting identity, culture, and wellbeing (Delormier and Marquis, 2019).

Food insecurity caused by harsh climate and terrain conditions has become a major issue in agricultural development. It is affected by various factors such as biophysical, economic, institutional, political, socio-cultural, and technological constraints (Seguin et al., 2021). Furthermore, the effect of increasing temperatures on agriculture as a result of climate change underscores the significance of agroecology in environmental stewardship, economies, knowledge, social dimensions, and governance (Price et al., 2022). Additionally, urban agroecology has the potential to mitigate the decline of agrobiodiversity, thus positively impacting nutrition and aiding in climate change adaptation (Villavicencio-Valdez et al., 2023).

Through community-supported agriculture, there is an emphasis on advocating for healthy food choices (Tursunova et al., 2020). This approach helps to address structural problems in the global food system and reduces food supply chain disruptions (Schanbacher and Cavendish, 2023). Additionally, community-supported agriculture promotes locally based food practices that are founded on ethical goals of social and environmental justice (Piccoli et al., 2021).

The connection between food sovereignty and the sale and rental of land in areas influenced by mono-crops affects food insecurity (Hurtado-Bermúdez et al., 2020). An economic system based on individual farmland ownership reasons for farmland protection goes beyond simply calculating land rents. It recognizes the social and ecological benefits of future regional food security, biodiversity conservation, and watershed protection (Wittman et al., 2017).

Private spaces have been transformed into productive land, increasing home gardens and contributing to food security at the individual, household, and community levels (Boone and Taylor, 2016; Sanyé-Mengual et al., 2018).

3.2.1.3 Environmental stewardship

Adaptation to an increasingly variable climate could be achieved by using an ecological calendar (Ruelle et al., 2022). Climate change can impact food systems by directly affecting crop production through changes in rainfall, temperatures, and the length of the growing season, as well as by influencing markets, food prices, and supply chain infrastructure (Allouche, 2011). Additionally, ecological restoration should involve incorporating knowledge from Indigenous communities (Grenz and Armstrong, 2023).

Harvesting and consumption patterns have emerged as important practices to consider when assessing the impact of climate change on the abundance of marine species (Andrade-Rivas et al., 2022) and the effects of industrial activities on harvesting practices and food contamination (Marushka et al., 2019).

3.2.1.4 Education for the agroecological production model

Education for the agroecological production model counters several challenges. These include empowering young people to create a community of learning and practice (Chollett, 2014), developing the agroecology curriculum in collaboration with farmers (Kerr et al., 2019), including Indigenous and peasant knowledge in food production (Domené-Painenao and Herrera, 2019), recognizing that increasing crop yields and livestock production efficiency will not solve world hunger and will have an impact on resource availability (Francis et al., 2017), recognizing the limited transformative potential of formal agroecology programs in the neoliberal context (Rivera-Ferre et al., 2021), lack of formal education in agroecological alternatives (Laforge and McLachlan, 2018), lack of a comprehensive understanding of agroecology and regional, national, and continental networks (Wezel et al., 2018).

3.2.1.5 Sustainable agriculture and agroecology transition

Alternative food networks emerged as an effort to facilitate the shift from industrial agriculture to agroecology (Machado, 2017). This aims to reduce the impact of neoliberal agriculture and address the challenges posed by population growth, climate change, resource scarcity, sustainable social and solidarity economies (Kumbamu, 2018), and urbanization (Vieira et al., 2021). Cooperatives present an alternative approach to prioritize the local community over profit in food production (Pewton, 2023). Agroforestry has the potential to

help address challenges in transitioning agricultural production systems (Hastings et al., 2021).

To advance in this transition, a sustainability assessment to view sustainability as a path to move away from industrial food systems and towards systems prioritizing local wellbeing, food access, food autonomy, and food justice over corporate profit (King et al., 2022), to tackle the challenge regarding corporatization of agriculture through a market-led ideology and high-priced input packages that carry heavy economic risks for farmers (Shilomboleni, 2017). This assessment might decrease rural mismanagement consequences on food systems in depressed and contested agro-territories (Horstink et al., 2023).

3.2.1.6 Reduce market dependency

This goal tackles the corporate influence in politics at all levels and control of global food chains and those for non-food agricultural products, as well as markets for inputs, especially seeds (Edelman et al., 2014). Wach (2021) discusses market dependency resulting from the commodification of *agricultural inputs* and reliance on markets for selling outputs. De-commodification occurs when food is not primarily treated as a commodity for profit (Lutz and Schachinger, 2013).

3.2.1.7 Crisis preparedness

Fostering an agroecological actor network has emerged during the pandemic to engage in both connecting and disconnecting practices for crisis preparedness (Skill et al., 2022). This network includes the production of compost, seeds, and experience exchanges, as well as governmental programs and food fairs. It is organized and aims to move away from the traditional agro-industrial model, which relies on pesticides, chemical inputs, supermarkets, and the global food system.

Farmers and food producers who prioritize sustainability can easily adapt to local food emergencies because they are not heavily reliant on a single production and distribution model. This enables them to better understand and meet the needs of their local communities (King et al., 2022).

Rice et al. (2023) stress the significance of promoting collective actions to improve economic solidarity within rural farming communities. This is essential for building resilience in the livelihoods of peasants, especially in coping with economic shocks caused by mobility restrictions and sudden changes in access to formal markets. The study underscores the impact of factors such as the limited use of synthetic agrochemical inputs, crop diversity, and the level of self-produced food consumption during the pandemic.

3.2.2 LFSD

3.2.2.1 Food security and consumption

Several community-based initiatives are working toward achieving food security within localized settings. Datta (2021) proposes a community-led food system that engages the local community in developing coordinated approaches to addressing food insecurity. Joyner L. et al. (2023) emphasize the significance of comprehending the relationship between urban agriculture and food equity. They examine the willingness of community-supported agriculture members to subsidize shares for low-income residents. This aims to overcome the obstacle of the growing urban agricultural movement exporting food. Dower and Gaddis (2021) highlight the presence of cooperative principles in Indigenous food systems before colonization and emphasize their continued relevance in ensuring community access to fresh, local foods produced following cultural beliefs, behaviors, and processes. Bunge et al. (2019) acknowledge urban foraging as a way to achieve cultural appropriateness and community engagement in urban ecosystem services knowledge and food security. Ray et al. (2019) recommend a food sovereignty health framework to address the limitations of a neoliberal approach to Indigenous health promoting spaces to provide an opportunity to understand the cultural teachings, practices of medicine picking and the preparation of medicines and supports traditional subsistence through organizing community hunts.

Food autonomy enhances food security as it boosts the supply, accessibility, and use of healthy, organic, locally grown food at the household level. This helps reduce reliance on external food systems and supports resistance to dependence on commercial food chains (Farfán et al., 2021).

3.2.2.2 Short and local distribution channels

Short food supply chains can exacerbate several challenges within the food system. These challenges include the impact of the pandemic on minority farmers and vulnerable communities (Mucioki et al., 2022). To make the food system more locally focused and accessible to everyone, local institutions and stakeholders need to tackle administrative barriers in short food supply chains. Additionally, they should incorporate food sovereignty values and practices into the local community systems (Bokan et al., 2023).

Local production and distribution address challenges such as geographic isolation, a decreasing agrarian workforce, the demand from international tourists for familiar food, and the lack of investment in sustainable and innovative farming practices (Burke, 2021).

3.2.2.3 Fair and transparent commercial relationships

Food sovereignty focuses on localizing the food system by gaining access to financial assets and local markets. This requires a more complex market, with the need for adequate infrastructure, such as roads, crop storage, shipping, and communication networks that provide farmers with access to the latest prices and the ability to meet supermarket supply standards (Zamanialaei et al., 2022).

Community-supported agriculture is a small-scale response to global agribusiness. It emphasizes a shift in the market away from neoliberal globalization and promotes environmental and organic practices. Establishing new avenues for trade that are aligned with cross-border initiatives and international movements aimed at resisting trade and investment organizations, treaties, and multinational corporations that have played a role in reducing and reshaping sovereignty is imperative (Ayres and Bosia, 2011).

The incorporation of urban markets and free fairs into the design of climate-resilient cities reduces commuting time for farmers to sell their produce and for citizens to buy it. This also strengthens peri-urban agriculture, providing food for the immediate population within reach without the need for private transport (Iñiguez-Gallardo et al., 2022).

3.2.2.4 Marketing agroecological products

Initiatives to market agroecological products focused on transforming agriculture-based economies by emphasizing the unique

qualities of products, such as taste and color, linked to specific regions or geographical areas (John et al., 2016).

When it comes to food tourism, there is a focus on developing opportunities in rural areas that would benefit both locals and visitors while also considering the environment. The emphasis is on promoting local and regional cottage-based products (Robinson, 2021). It is important to preserve natural resources in light of the increasing tourism activities. There is a growing movement in the Nordic-Arctic food system that aims to promote traditional foods through food tourism. This approach has sparked greater interest in food production, consumption, local identities, and communities (Raheem et al., 2022).

3.2.2.5 Crisis preparedness

During the initial COVID-related lockdown, organic and agroecological farmers responded by implementing local grassroots initiatives, significantly impacting the assurance of food access, provisioning, and distribution (Zollet et al., 2021). This was especially notable given the slow response or insufficient action from mainstream food system actors and institutions.

According to Mucioki et al. (2022), it has become clear that greater funding and control over the infrastructure and markets of decentralized regional food and farming systems is needed within Native American agriculture and food systems. This is necessary to enhance their financial sustainability and adaptability, particularly in light of disruptions caused by the COVID-19 pandemic.

3.2.3 SFSD

3.2.3.1 Fair and equal gender, race, and class relations

Gender equity initiatives can benefit from using gendered food provisioning practices to address complexities, power dynamics, and challenges within localized food systems (Turner et al., 2022). Policy discussions and programs often overlook the control over food production and consumption held by female farmers, impacting their food consumption agency (Tkaczyk and Moseley, 2023). Additionally, it is important to examine the disproportionate adverse impacts of colonization on Indigenous women in terms of food security, health, and overall wellbeing (Neufeld and Richmond, 2020). A successful initiative, for example, refers to impoverished migrant women relying on informal food networks for growing and sharing food and seeking out organic, fresh foods (Hammelman, 2018).

A feminist political ecology approach is proposed to tackle unequal access to resources and the erosion of traditional lifestyles (Lemke and Delormier, 2017). In relation to uneven resource access, Oliver et al. (2022) also address disparities in the distribution of agricultural aid. This includes instances where non-governmental organizations from the global North have foreign country offices, even when collaborating with local organizations.

The dismantling of racism is a crucial part of bringing about change in the food system, achieved through the convergence of the food justice movement (Brent et al., 2015) and research on the repositioning of food justice activism (Passidomo, 2014).

The pursuit of food justice and food sovereignty involves addressing issues of race, class, and gender across the entire food system, including production, distribution, and consumption. Some examples of transformative actions include preserving social memory, recognizing the cultural and practical importance of rural–urban relationships, and acknowledging the significance of agri-food diversity (Ugueto-Ponce and Felicien, 2022). Other actions focus on integrating social justice into urban food strategies by raising public awareness, fostering discussions, and taking collective action to address food system inequalities, while also ensuring that these concerns are reflected in policy budgeting (Smaal et al., 2021). There is also a shift toward emphasizing justice for community-supported agriculture members rather than just for farmers and exploring food justice through actions that provide social support (Parot et al., 2023). Additionally, efforts are being made to provide marginalized communities with access to and control over food production and distribution (Clendenning et al., 2016).

3.2.3.2 Food security and consumption

Settler colonialism has been identified as a significant factor contributing to food insecurity among people of color (Elliott et al., 2023). It has also created systemic and social barriers between Native communities and their land (Kepkiewicz, 2020; Antonio et al., 2021). Therefore, there is a pressing need for transformative reconciliation within food movements, focusing on improving relationships between settlers and Indigenous Peoples. This should involve a closer examination of food practices within Indigenous households, as well as an understanding of the distances between regions and food sources through three channels: local Indigenous production, purchased goods, and external donations (Elliott et al., 2021).

One limitation of the food sovereignty movement is its lack of involvement in discussions about health equity (Welch et al., 2021). Some studies, such as Maunakea et al. (2023), discuss social transformation and acknowledge the challenge of health disparities resulting from rapid changes in diets and food systems. They address this issue by implementing a social justice program. Freedman et al. (2022) acknowledge that interventions in the food system have not led to sustained improvement in dietary outcomes for underrepresented minorities in neighborhoods with a history of disinvestment through mechanisms promoting nutrition equity.

When it comes to local food networks, even though marginalized communities want to establish a local food system, focusing on creating green jobs in agriculture might lead activists to adopt a market-driven strategy that prevents food-insecure neighborhood residents from accessing local food economically (Alkon and Mares, 2012).

Preserving native food traditions has become important in establishing a more inclusive food system (Cachelin et al., 2019). Therefore, it is essential to discuss the role of cultural capital in perpetuating inequality on an individual level and shaping behaviors within alternative food networks (Barta, 2017).

Community-based cooperative markets addressed the challenge of transitioning to more just and sustainable food systems while building cultural ties and creating economic opportunities for community members (Figueroa, 2015). Community gardens were found as a pathway to access local food, and they emphasize the essential role of Indigenous women in addressing food security issues (Stein et al., 2018).

3.2.3.3 Crisis preparedness

We found a compelling example of an effective response to the pandemic, spearheaded by Indigenous social movements, organizations, and communities with the assistance of settler allies.

The Indigenous-led network's approach to addressing the pandemic utilized food as a means to rally communities and collaborators, facilitate emergency aid, and address fundamental, systemic food-related challenges for the long term (Levkoe et al., 2021).

3.2.3.4 Participation and organization among all food citizens

The food system needs a cultural shift that draws media and policy attention to collective efforts rather than focusing solely on individuals. This shift promotes greater consumer involvement (Reckinger, 2018) and an intersectional form of organizing in the food system. This approach addresses social position, structural inequality, and resistance, promoting community-to-community development (Sbicca et al., 2020), such as engaging Indigenous communities in food policy councils to address food system injustices (Levkoe et al., 2019, 2021) and urban food producers actively produce and appropriate space in the agri-food system (Siebert, 2020). One study discusses how degrowth values and strategies may emerge in cities heavily reliant on global food systems (Rooney and Vallianatos, 2022).

Employing a deliberative democracy approach can effectively address the ethical challenges in the global food system (Thompson et al., 2020). Additionally, there is a call for food democracy in the policy and practice of articulating agroecological urbanism, emphasizing the missed opportunities for creating holistic, inclusive, and scalable transformation in the urban food system (Resler and Hagolani-Albov, 2021).

3.2.3.5 Fair educational spaces

Multiple studies have discussed educational initiatives. Meek and Tarlau (2016) recognize the challenge posed by the lack of critical perspectives on food system education and the incorporation of critical pedagogy, food justice, and food sovereignty through experiential learning in food justice campaigns. Meek et al. (2019) emphasize the necessity for critical food systems education to cultivate crucial awareness about the social and environmental unsustainability of the present food system. Soma and Nuckchady (2021) highlight the need to integrate a social perspective to address the absence of equity and food sovereignty in digital agricultural training and education. Joyner L. et al. (2023) emphasize the need to train social work education practitioners to address issues related to racialized violence in food systems, ongoing exploitation of land and labor, the impacts of pollution and climate change, and the crisis of hunger.

3.2.4 KFDS

3.2.4.1 Food security and consumption

Reliance on other countries for food security emphasizes the shift of public attention from underlying structural issues in a nation's food system (Takeda et al., 2016). The disruption of traditional Indigenous foodways and practices has led to high rates of diet-related diseases at individual, family, and community levels and impacted land and place (Jernigan et al., 2023a). Consequently, there is a need to honor relationships with traditional foods and recognize traditional lands and waters as vital for healing and sustaining the health of Indigenous communities (Poirier and Neufeld, 2023). Moreover, there is a need to strengthen place-based design to enhance the food system (McCarter et al., 2023), supporting traditional food practices and food sovereignty, and evaluate the impact of these efforts on health by sharing traditional food practices (Jernigan et al., 2023b). Ruelle et al. (2019) point out that non-domesticated plants are rarely consumed as food or sold at the local market.

The penetration of processed foods has led to the displacement of Indigenous food knowledge, techniques, and products in traditional food systems. This suggests that experiential learning in critical food systems education could be key in opposing this trend (VanWinkle, 2023). Urban communities face distinct challenges regarding traditional food consumption, including limited experiences, knowledge, and perceptions of traditional foods (Hanemaayer et al., 2020).

Traditional ecological knowledge plays a key role in promoting food sovereignty by preserving and safeguarding ancestral knowledge of ecosystem management. This helps to improve the wellbeing and food security of indigenous communities (Sowerwine et al., 2019b). For example, indigenous groups are encouraged to engage in eco-cultural restoration activities and traditional food practices to increase access to and consumption of native foods (Sowerwine et al., 2019a). The vital role of women in producing, acquiring, and transforming biodiversity into a variety of meals within a traditional food system is also recognized (Pérez-Volkow et al., 2023).

3.2.4.2 Preservation of traditional practices and culture

The significance of building a knowledge base to promote food sovereignty is emphasized in several studies. These include reconnection with culture and identity through land and food (Miltenburg et al., 2022), the right of all food citizens to define their own conservation policies (Hanke et al., 2023), rethinking and redesigning traditional training processes to incorporate collective learning experiences, organization, exchange, and practical application of agroecological practices (Casado et al., 2022). Additionally, addressing the interconnected issues of biodiversity loss and poverty is crucial (Patria, 2013). Furthermore, there is a need for comprehensive documentation of the production process of traditional beverages within ethnobiological studies (Cano et al., 2020) and for documenting the spectrum of ecosystem management, the roles of forestry and agricultural biodiversity, and human culture (Moreno-Calles et al., 2016).

Also, traditional ecological knowledge relates to practices such as community orchards based on ancestral traditions (Lovell et al., 2021), urban backyard food production (Larder et al., 2014), and the creation of food system learning spaces in the context of food justice (Herrera, 2018). These efforts aim to understand how to conserve biodiversity and live in harmony with nature, drawing from a deep-rooted connection to the land, sea, and spiritual beings. Ultimately, these practices and processes restore Indigenous peoples' food systems, cultural knowledge, and environmental health today (Huambachano, 2019). The challenges also involve addressing the dominant agro industrial model by preserving traditional ecological knowledge (Espluga-Trenc et al., 2021). Additionally, the local knowledge of food system laborers can counter the decrease in nutrition and agrobiodiversity resulting from the loss of food labor (Marrero et al., 2023).

Various studies have emphasized the importance of preserving cultural heritage. A community-based food program aims to re-establish traditional cultural values related to the land in a relocated Indigenous community (Kamal et al., 2015). An agro-spiritual cycle aims to highlight the spiritual aspect of local and Indigenous food systems (Castagnetti et al., 2021). There is also an effort to retell the

history of food systems to reconnect communities with traditional and healthier food systems (Arthur and Porter, 2019).

Regarding biocultural heritage, Pieroni et al. (2021) argue that it is linked to wild food plants and neglected and underutilized species. Picos (2020) explores political ecology and the significance of acknowledging the historical colonization and Western dominance over Indigenous lands and food systems. Soma et al. (2023) highlight in their photovoice food assessment that food mapping can address the lack of consideration for ecological and cultural assets. Stevens and Brewer (2019) highlight the need to re-establish an intellectual relationship with nonhuman entities, such as corn, to build resilience.

3.2.4.3 Participation and organization among all food citizens

Community-based knowledge transfer and policy advice could help rebalance power in the food system and bolster farmers' position in value chains (Omar and Thorsøe, 2023). Similarly, farmer-to-farmer learning should recognize the experiences and expertise of small-scale farmers, emphasizing the importance of the right to know in shaping the future of food (Millner, 2017).

There is a need for open spaces for dialog between Indigenous and settler communities regarding the food system (Curtis et al., 2023) and participatory approaches to knowledge translation that effectively support public health research and program development (Domingo et al., 2023).

3.2.4.4 Educational spaces

The following studies examine school food programs to promote food sovereignty. McEachern et al. (2022a) advocate reclaiming traditional food-related skills. Holmes et al. (2022) seek to assess the degree of local control over food production, distribution, and consumption in a public school garden program. McEachern et al. (2022b) recommend enhancing youth access to local, healthy, and traditional foods. Tartaglia et al. (2022) advocate for food literacy to counter the globalization of food systems, which leads to limited healthy choices for children. Moreover, there is a movement promoting social justice in science by employing anti-colonial and feminist methodologies and interdisciplinary praxis. This includes using a science storybook resource to demonstrate how stories impact interpersonal relationships in collaborative settings and how knowledge about health, environmental science, and representational imagery is created and shared among fishing families (Cohn et al., 2023).

3.2.4.5 Environmental stewardship

Biocultural diversity is seen as essential for promoting food sovereignty. Nabhan et al. (2022) highlighted the challenge posed by climate change in causing agricultural crop failures and reducing wild food harvests for Indigenous desert dwellers. Meanwhile, Spring et al. (2023) explored the impact of climate change on traditional food system resources as key drivers of the food system. They emphasize that traditional knowledge and social practices enable community members to access food from natural sources.

3.2.5 PFSD

3.2.5.1 Environmental stewardship

A number of environmental stewardship initiatives have been identified. These include aligning community needs with global governance mechanisms, and engaging with global networks to address climate change adaptation and food sovereignty (Johnston and Spring, 2021). Another important aspect is developing an adaptable theoretical framework for sustainable land governance in water-energy-food systems (Durán-Díaz, 2023). Efforts should also focus on addressing the limitations to climate resilience posed by climate-smart agriculture and development efforts rooted in green revolution thinking (Clay and Zimmerer, 2020).

In the realm of governance structures, top-down approaches and solidarity networks have been used to counter the capitalist practices that shift the social and environmental costs of the food system onto external entities (Laforge et al., 2021). There is a need for a bottom-up governance structure to address the food system crisis associated with climate change and to contribute to sustainable development goals (Anderson et al., 2019a). Farreras and Salvador (2022) have presented a challenge in understanding the underlying conditions that social-ecological systems present for local agri-food systems governance through participatory guarantee systems. This aims to promote the multifunctionality of agriculture and the diversification of the production system for small-scale organic farming studies.

3.2.5.2 Addressing economic issues

In addressing economic issues, it is imperative to conduct a thorough assessment of socioeconomic indices to effectively combat challenges such as food security, escalating energy prices, climate change, and terrorism, as proposed by Oderinde et al. (2022). Graddy-Lovelace et al. (2023) strongly advocate for the immediate implementation of farm gate pricing and market protections to revolutionize agri-food systems and establish farmer-led agricultural policies. There are legitimate concerns regarding the capacity of national government policymakers to safeguard domestic production. Clark (2010) asserts that the state must actively encourage social economy enterprises and alternative methods of food production and consumption. Furthermore, Suárez-de Vivero et al. (2019) emphasize the urgency of addressing food security in relation to maritime security. They specifically emphasize the necessity of reducing reliance on imported fishery products to reinforce coastal economies, support small-scale fisheries, and promote sustainable aquaculture activities within the European Union's ocean policy framework.

3.2.5.3 Educational spaces

Strategies for increasing the presence of urban agriculture and maximizing food production in public spaces are crucial for developing a healthy community-based food system, as emphasized by Martin and Wagner (2018) Martin and Wagner (2018). This involves focusing on school engagement, community development, and compliance with regulations and bylaws; it also requires a city administration with an integrated vision and a dedicated position to facilitate connections, oversee bylaws, and explore local food procurement systems.

Governance strengthens local food systems by allowing civil society and communities to share model farming practices and encourage the adoption of innovative, environmentally friendly farming practices (Guell et al., 2022).

3.2.5.4 Crisis preparedness

According to Hongsprabhas (2023), it is imperative to grasp how farmers adjust to promote sustainable and environmentally friendly food p and the contribution of rural areas to areas in sustaining urban

livelihoods. This is particularly significant given recent policies and actions addressing food and nutrition security, alternative farming methods, and incentives to promote sustainable agroecology, which have been emphasized in the aftermath of the pandemic.

In their study, James et al. (2021) urged states to establish a comprehensive strategy for reshaping food systems in the wake of the pandemic. The authors have formulated a strategic policy framework aimed at reorganizing the distribution of land, wealth, and influence among major corporate players in the food industry. This initiative is in line with the principles of food sovereignty, encompassing Decolonization, Decarbonization, Diversification, Democratization, and Decommodification.

3.2.5.5 Food policy making

We structured the food policy-making initiatives using the participation dimensions for fair governance in the food system transition, as acknowledged by Huttunen et al. (2022): (1) distribution addresses how benefits and harms are distributed, (2) recognition focuses on who is valued and given respect, and (3) procedural considers who is capable of participating and how they can influence decisions.

- The distribution dimension further categorizes policy-making initiatives related to (1) access and availability of healthy and sustainably produced food, (2) livelihood of farmers, food and agriculture workers, and (3) utilization of resources locally and globally.

For access and availability of healthy and sustainably produced food, better coordination of policymaking across various sectors at national and regional levels is necessary to implement more integrated approaches to enhancing nutrition (Guariguata et al., 2020). Desmarais and Wittman (2014) discuss the challenges of defining inclusive policies that engage with food sovereignty at different and sometimes overlapping scales within people's food policy. Levkoe and Sheedy (2019) emphasize the importance of policy frameworks enabling and constraining food-related practices. They propose a people-centered food policy process based on the principles of food sovereignty. Isakson (2014) discusses the detrimental impact of neoliberal policies on maize agriculture, leading to a loss of crop genetic resources and increased reliance on imported grain and agrochemicals. Kurtz (2015) delves into the political intricacies surrounding the standards, customs, and tactics employed in managing population health. The author underscores the role of scalar politics in shaping and being shaped by social, economic, and political hierarchies.

For livelihood of farmers, food and agriculture workers, Baldivieso et al. (2023) raised concerns about barriers to the successful implementation of agricultural projects and the realization of collective rights.

For utilization of resources locally and globally, reclaiming control over food policy locally is imperative by constructing how social movements try to build strength and resilience for territorializing food systems (Brent, 2023). Blesh and Wittman (2015) focus on analyzing power distribution and access to rights and resources. Ferrerira de Moura et al. (2017) proposed integrating an agroecological agenda into public policies. Tilzey (2021) proposed policy making for the adoption of an agroecological enabling the sustainable management of hedgerows and maximizing their potential for ecosystem services delivery.

- The recognition dimension further categorizes policy-making initiatives related to (1) cultural aspects and different meanings and ways of knowing related to food and the food system and (2) diverse, often underrepresented voices.

For cultural aspects and different meanings and ways of knowing related to food and the food system, Silva et al. (2022) examine the transition from locally produced foods to processed items in urban areas and recommend subsidizing stakeholders and implementing public policies to prevent the loss of local food traditions.

For diverse, often underrepresented voices, Raja et al. (2023) highlight the impact of political misgovernance on food sovereignty in conflict cities, emphasizing the need for governance and planning in education, research, practices, and policy advocacy. Through document analysis, Steckley et al. (2023) inquire about the potential impact of a food sovereignty policy on land, gender, health, trade, and agriculture. They specifically focus on supporting smallholder farming, promoting the production and consumption of traditional foods, and safeguarding domestic food production from competition by imports. A proposed national policy and strategy for food sovereignty, security, and nutrition aims to address these issues. Additionally, addressing racism in government policy within colonial policy and government control over lands and territories is essential (Phillipps et al., 2021).

- The procedural dimension further categorizes policy-making initiatives related to (1) different capabilities to participate, empowerment and learning, (2) developing deliberative and democratic forms of decision-making, and (3) opposition as form of participation, need to create novel ways to participate.

For different capabilities to participate, empowerment, and learning, Godek (2021) raises concerns about the extent to which national food sovereignty policies have aimed to democratize local control over food systems, their level of success, and the reasons behind it. This highlights the need for participatory democratic governance. Roman-Alcalá (2018) recognizes the potential of autonomist-inspired focus on pre-figurative participatory democracy mobilization tactics in contributing to developing food sovereignty policy and policies influenced by autonomist tendencies. Government-sponsored school lunch programs have not reached their transformative potential, highlighting the need for redesign at a national scale to drive sustainability transitions within agri-food systems (Gaddis and Jeon, 2022).

For developing deliberative and democratic forms of decision-making, McInnes (2019) analyzes the shortcomings of civil society organizations' consultation in food policy development within the state, food supply chain, and civil society triangle. There is no agreement on government-sponsored food sovereignty, hence the necessity for an approach to policy development involving both the state and society (McKay et al., 2014). There is political contestation over the food system between the state and society (Schiavoni, 2017).

For opposition as a form of participation, need to create novel ways to participate, a shift away from traditional food policy advocacy results in gradual changes that recognize the importance of a "prefigurative institutionalization" approach to food policy; this approach emphasizes the development of policy proposals centered on movement building and the creation of institutions and governance processes that will shape strong ideas about food sovereignty (Dale, 2021).

3.3 Drivers of the food system based on FSDs (RQ3)

We have identified 29 drivers of a food system based on the domains of food sovereignty (Figure 6). In this section, we will outline the general findings of the identified drivers in each domain.

3.3.1 AFSD drivers

Alternative food *networks* leverage trust and engagement established through non-traditional distribution methods to enhance the availability of fresh, diverse, and nutritious foods for consumers. Simultaneously, they offer farmers additional sources of income, risk mitigation, and direct marketing strategies (Kremen et al., 2012).

Agroecology-sustainable production emphasizes sustainable horticultural production and organic agriculture for domestic food security. These practices reduce reliance on international trade networks and provide locally sourced food for urban populations (Butrico and Kaplan, 2018; Walsh et al., 2022). Organic agriculture promotes locally grown food, reconnects farming to its spiritual roots, and contributes to sustainability (Siegner et al., 2020). It is essential to comprehend the diverse practical forms of organic production, the political conditions required for establishing alternative economic spaces, and the certification dynamics (Nikol and Jansen, 2021). Urban farming addresses ecological, social, economic, and political aspects, allowing for transformative changes in food systems (Taylor and Lovell, 2012).

Natural resource restoration includes initiatives involving Indigenous communities and their knowledge in restoration efforts to achieve ecological reconciliation (Grenz and Armstrong, 2023) and implementing management plans to restore habitats. These plans should align closely with ongoing chemical monitoring and harvesting restoration activities (Andrade-Rivas et al., 2022).

Innovation in agroecological management practices for food production involves developing social initiatives to transition to sustainable food systems. These initiatives include sharing and exchanging best practices among various food stakeholders, promoting education, and transferring agroecological knowledge (Marchetti et al., 2020).

The *climate adaptation* driver focuses on investing in adaptation to reduce vulnerability and strengthen the resilience of food systems against the impacts of climate change (González, 2014). It involves incorporating food production into community strategies within an agroecology framework (Price et al., 2022), including traditional seafood harvesting and consumption patterns and the use of ecological calendars to synchronize food systems with an increasingly variable climate (Ruelle et al., 2022). Agroecological practices like home gardens and urban agroecology have proven resilient in extreme weather events (Boone and Taylor, 2016; Villavicencio-Valdez et al., 2023).

Land use management is crucial for transforming the local food system by assessing food demand, creating agro-climatic maps, and evaluating crop suitability. Changing crop types can address nutritional needs, minimize supply chain losses, and increase yields to reduce agricultural land demand. For example, focusing on sugarcane monoculture has led to environmental crises and disruptions in traditional food production (Hawkins et al., 2022; Ibarrola-Rivas et al., 2022; Menconi et al., 2022). Hawkins et al. (2022) propose that effective land management can decrease reliance on processed imports and enhance the value of dairy products. Menconi et al. (2022) stress the importance of considering land suitability and requirements in boosting food resilience and self-sufficiency. Additionally, Ibarrola-Rivas et al. (2022) suggest that utilizing land resources can play a key role in promoting healthier diets in nations facing high import dependency and food security vulnerability.

Agricultural biodiversity is promoted by implementing strategies to enhance and diversify local food systems and the biodiversity of indicator species, thereby improving food and nutrition security and food sovereignty (Fernandez and Méndez, 2019; Kassam and Bernardo, 2022).

Agroecological food production processes protect the natural environment and biodiversity while allowing for conservation efforts, thus advocating *climate change mitigation* (Gunaratne et al., 2021). Agroecological education can be integrated with climate change efforts by considering human and soil nutrition, gender, and other social equity components for smallholders (Kerr et al., 2019).

3.3.2 LFSD drivers

Local food *networks* bring together farmers and consumers to promote organic and sustainable production methods, minimize food waste, and reduce transportation distances for a healthier environment (Lutz and Schachinger, 2013; Nigh and Cabañas, 2015). These networks support community-based agriculture to resist global agribusiness and prioritize factors such as produce variety and market accessibility (Ayres and Bosia, 2011; Kato, 2013).

Downstream exchange of agricultural products between producers and consumers is vital in food systems. This exchange leads to the creation and retention of value in the alternative food economy. For example, small-scale mobile milk traders collect raw milk from smallholder farmers and deliver it to consumers (Lelea et al., 2023). Urban planning should incorporate markets and free fairs networks to promote climate adaptation and resilience (Iñiguez-Gallardo et al., 2022). This shift in urban planning focuses on creating cities where services are within walking distance. It also emphasizes the importance of local markets (Zamanialaei et al., 2022), informal markets, and urban foodways (Dwiartama et al., 2023). Short food supply chains can involve direct exchanges between producers and consumers or be managed by citizens or business organizations (Bokan et al., 2023). Short food supply chains may foster a direct and local exchange between producers and consumers (Matacena and Corvo, 2020). Partalidou (2015) highlights using direct distribution channels to minimize the geographical, social, and economic distance between producers/farmers and consumers/urban dwellers. According to Dwiartama et al. (2023), informal *local markets* and

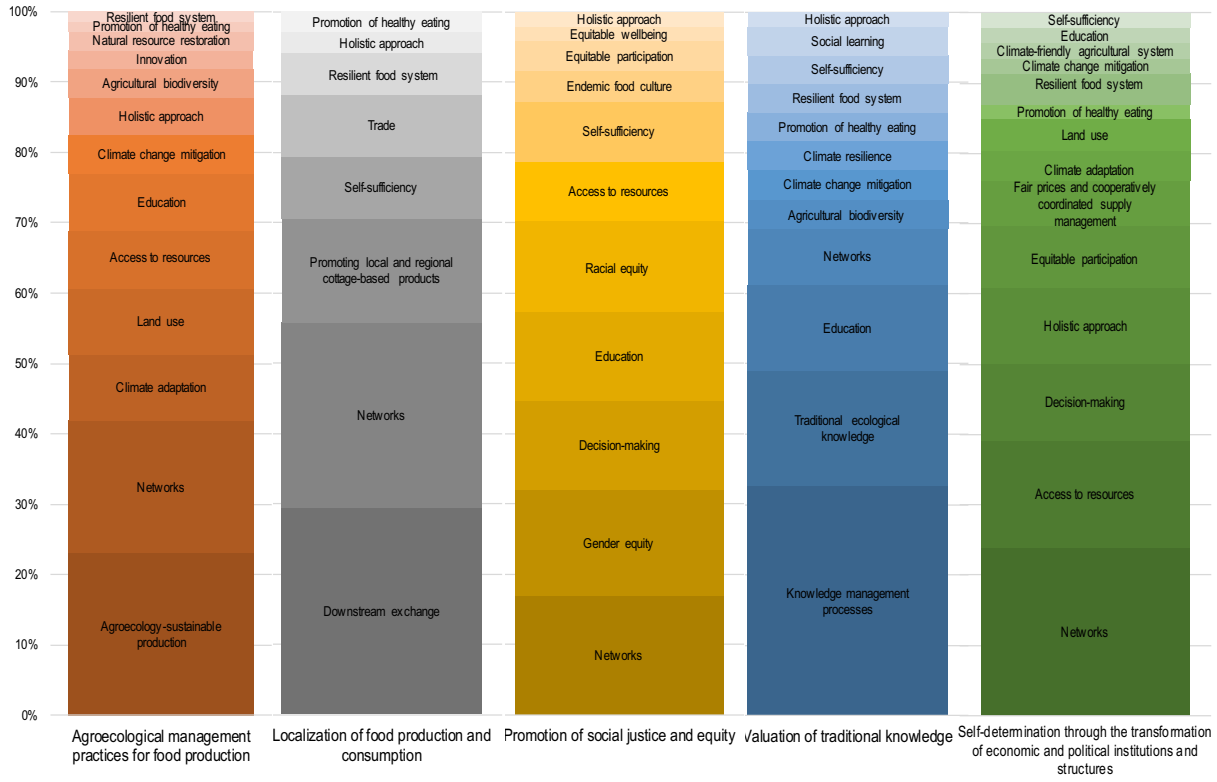

FIGURE 6
Drivers of the food system based on food sovereignty domains.

urban foodways address the issue of the urban poor's inability to access healthy and nutritious food due to distance, price, and preferences.

Promoting local and regional cottage-based products supports local food cultures and environments, creating employment opportunities and economic value (Barrionuevo et al., 2019). Food tourism benefits rural economies and environmental sustainability (Robinson, 2021) by redirecting agriculture, food processing, and consumption to the local region (Santafe-Troncoso and Loring, 2021). Additionally, short marketing circuits promote local and organic agriculture (Gómez-Ramos and Gonzalez, 2023). Santafe-Troncoso and Loring (2021) advocate for promoting Indigenous food systems and conserving their values through food tourism.

Trade connects local and global economies, with a focus on local markets but the ability to tap into broader networks when needed (Paddock and Smith, 2018). Supporting local agricultural development through smallholder cooperatives is important for food sovereignty and security (Bacon, 2018). Cooperative groups in food production can act as nodes in modern intertribal trade networks (Dower and Gaddis, 2021).

3.3.3 SFSD drivers

Gender equity is crucial for all human rights. This challenges established institutions and knowledge systems and requires social mobilization and collective action. Frameworks such as feminist political ecology (Lemke and Delormier, 2017) and female farmers' food consumption agency (Tkaczyk and Moseley, 2023) play a key role. Also, gendered food provisioning practices (Turner et al., 2022) and informal food networks for fresh and organic foods by migrant women living in poverty (Hammelman, 2018). Ghale et al. (2018) argue that achieving food security for marginalized and oppressed communities necessitates gender-responsive food systems.

Networks combat obesity through education, promote the growth of vegetables, create value-added products, support immigrant farmer programs, encourage local buying campaigns, and establish farmers' markets (Clendenning et al., 2016).

Within the agri-food system, the *decision-making* process promotes value change, including social mobilization, institutional negotiation, self-management, and education (Di Masso and Zografos, 2015). This approach is community-driven, culturally appropriate, and reflects local priorities to effectively address the food crisis (Rudolph and McLachlan, 2013). Farmers' movements also focus on social learning, community building, and organizing for transformative social change (Cruz and van de Fliert, 2023) and the rights to dietary autonomy, healthy diets, and resource management (Welch et al., 2021). The food justice *social movement* is part of global movements against extractivism and restoring peasant life dignity (Velicu and Ogrezeanu, 2022).

Promoting *racial equity* involves implementing systemic changes through power analyses and strategically fostering interracial alliances led by individuals living in positions such as low-income or communities of color (Passidomo, 2014). Additionally, it requires strategies for organizational decolonization through social movements (Elliott et al., 2023).

Endemic food culture is a tool for retaining identity, building community, and maintaining health among refugee populations. The revitalization of traditional foodways is a means through which Indigenous Peoples practice cultural and political resurgence (Cachelin et al., 2019; Elliott et al., 2021).

Equitable participation is demonstrated in community-supported agriculture through actions that provide social support, resulting in beneficiary empowerment and contributing to systemic change and charitable interventions (Parot et al., 2023).

Equitable wellbeing addresses food waste, alters and reimagines local food supplies, and establishes equity within local alternative food movements (Rooney and Vallianatos, 2022).

3.3.4 KFSD drivers

The *knowledge management processes* involve storing and sharing knowledge. This includes creating a knowledge base on biodiversity conservation, poverty reduction, use of edible wild plants, harvesting practices of smaller marine organisms for food and health, and systematizing agroecological practices. Constructing a knowledge base preserves the narrative around good food stories in Indigenous communities through knowledge holders (Robin, 2019) and undocumented harvesting practices for food, health, and wellbeing (Rapinski et al., 2018). Joseph et al. (2023) advocate university-citizen knowledge generation and sharing sustainable agricultural practices. It also involves integrating cultural identity, relationships, history, and connection to land and water, as well as analyzing the production process of traditional beverages and land-based knowledge and relationships (Patria, 2013; Rapinski et al., 2018; Robin, 2019; Cano et al., 2020; Casado et al., 2022; Miltenburg et al., 2022). Furthermore, knowledge transfer includes promoting family meals to preserve traditional culture and knowledge, encouraging healthy eating behaviors and lifestyles, sharing traditional and agroecological knowledge, building urban–rural partnerships, and supporting sustainable practices (Aguayo and Latta, 2015; Takeda et al., 2016; Sowerwine et al., 2019a; Cohn et al., 2023; Joseph et al., 2023; Poirier and Neufeld, 2023).

Networks support research and education, share knowledge and practices horizontally, and promote agroecology throughout the food chain and society. For example, they facilitate community-based knowledge transfer to harness the transformative power of small and medium-sized agroecological and regenerative agriculture enterprises (Omar and Thorsøe, 2023), as well as farmer-to-farmer learning to standardize experimental methods for testing, evaluating, and sharing agroecological practices (Millner, 2017).

Traditional ecological knowledge refers to the knowledge and insights acquired through extensive observation of an area or a species (Huntington, 2000). It intends to preserve and safeguard ancestral knowledge of ecosystem management, implementing sustainable production based on "good living principles" (Huambachano, 2018). Examples include retaining and protecting important ancestral knowledge of ecosystem management, biodiversity conservation, and living in harmony with nature. It also involves increasing the capacity of social-ecological systems to cope with shocks and disturbances and maintaining long-term resilience; as well as the biocultural restoration of the traditional food system (Larder et al., 2014; Herrera, 2018; Huambachano, 2018, 2019; Sowerwine et al., 2019b; Espluga-Trenc et al., 2021; Marrero et al., 2023; Pérez-Volkow et al., 2023).

Agricultural biodiversity is influenced by practices such as local food systems embedded within a broader spiritual landscape. The reduced availability of land can lead families to abandon certain crops, affecting both plant diversity and the variety of foods in household diets (Castagnetti et al., 2021). Small farms serve as reservoirs of biodiversity, housing valuable genetic resources and traditional ecological knowledge gained over thousands of years of agricultural experience (Moreno-Calles et al., 2016).

Social learning of traditional food skills education opportunities in youth community programs provide an ideal social setting for peer learning (Hanemaayer et al., 2020).

Mitigating climate change could involve protecting wild food plants as climate change poses a threat to Indigenous communities (Nabhan et al., 2022). Building climate resilience could involve using traditional ecological knowledge in community orchards, which have the potential to address challenges related to food security and human health as nature-based solutions (Lovell et al., 2021).

3.3.5 PFSD drivers

Decision-making encompasses issues such as people's food policy about food and agriculture regarding the creation of more just policies to ensure the wellbeing of rural communities, control of markets, and agrarian reform (Desmarais and Wittman, 2014); differing food systems actor's needs and priorities, land access, conversion, and health, representation, consultation and consent in agri-food programming and capacity building (Rotz et al., 2023); and building community-level power by acting outside and against state institutions, maintaining decision- making autonomy (Roman-Alcalá, 2018). Developing *policies* for the agri-food sector faces Indigenous representation, leadership, and control challenges and lacks Indigenous-led planning and decision-making (Rotz et al., 2023). It is important to involve *civil society* in decision-making when developing policies that impact them (Katikiro and Mahenge, 2022).

Networks for self-determination are involved in food system governance and creating solidarity networks among academics, activists, and food producers/harvesters (Laforge et al., 2021).

Equitable participation through a multi-scale governance approach encompassing local, territorial, state, national, regional, and international levels (Clark et al., 2021) and a governance system with social-ecological boundaries (Baldivieso et al., 2023).

Fair prices and cooperatively coordinated supply management involve alternative food and agricultural policies that promote social economy enterprises, alternative food production and consumption practices, and a common fisheries policy that can effectively manage resources and markets (Clark, 2010; Suárez-de Vivero et al., 2019).

Adopting *climate adaptation* policies and integrating food and nutrition security with climate-adaptive landscape design in rural areas can boost the economic production of agricultural products (Hongsprabhas, 2023).

Climate change mitigation requires policies for sustainable food systems, such as adopting agroecological practices to enable sustainable hedgerow management and maximize their potential for ecosystem service delivery (Tilzey, 2021). There is a need to strengthen local community-level economic incentives and policy considerations for sustainable food systems (Bisht, 2021).

Land use encompasses local governance of agri-food systems, re-embedding these systems in the territory, and promoting the

multi-functionality and diversification of the production system to foster endogenous rural development, employment, and the sustainability of rural communities (Farreras and Salvador, 2022).

The *climate-friendly agricultural system* recognizes the need for policy advocacy to promote the growth of ecological farming. Transitioning agriculture includes comprehensively addressing marketing, land access, and climate change at different levels of government (Dale, 2021).

4 Discussion

4.1 Research methods (RQ1)

According to the first research method mentioned, approximately 36% of the studies focus on collecting data through interviews, semi-structured interviews, surveys, and questionnaires. Approximately 34% of the studies focus on conducting targeted fieldwork for specific data through case studies. Furthermore, we observed that around 19% of the articles utilize methods involving in-depth interaction with a specific group, such as participatory observation, ethnography, workshops, focus groups, photovoice, talking circles, and storytelling. Just under 10% of the studies employed documental analysis, using methods like database/document analysis and discourse analysis (Figure 7).

In the studies that employed a second-mentioned research method (refer to Table 3), we observed that those with the first-mentioned focus on data collection also emphasized in-depth interaction with specific groups through strategies such as interviews with focus groups, participatory observation, workshops, and document analysis from databases. The opposite can also occur. Studies using the first-mentioned method, which focuses on in-depth interaction with specific groups, also utilized alternative data collection methods or another for in-depth interaction, such as participatory observation with semi-structured interviews, interviews, storytelling, and workshops.

4.2 Food initiatives developed across FSDs (RQ2)

Regarding RQ2, we have identified three common goals that underpinned initiatives across the FSDs, specifically: food security and consumption, environmental stewardship, and crisis preparedness.

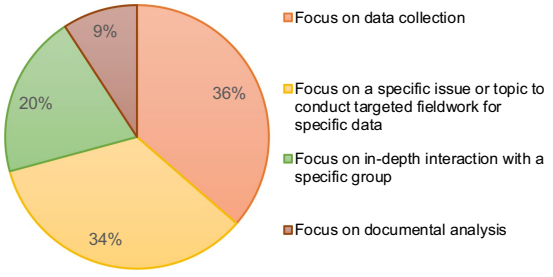

FIGURE 7
Distribution of the reviewed studies papers by the focus of the first-mentioned research method.

The initiatives developed to achieve food security and consumption goals took an integrated approach to address challenges arising from the complexity of farming systems around the four "pillars" of food security, availability, access, utilization and stability (CFS, 2009). To address these challenges and benefit the agriculture, food science, and sustainability sectors, agricultural techniques cannot be limited to a series of individual practices along the food chain (Marchetti et al., 2020). The issue of food-related policies prioritizing economic development over people's access to healthy and culturally appropriate food has emerged as a pressing concern (Clark et al., 2021) as well as a community-based approach initiatives such as community-led action planning is a pathway to food security and sovereignty for revitalizing local food systems (Domingo et al., 2021).

Encouraging collaboration among various food stakeholders to enhance community resilience for food security by preserving traditional harvesting practices in the face of climate change. For instance, addressing the challenges related to harvesting fish, wildlife, and other natural resources and ensuring secure access to essential foods for sustenance and cultural preservation (Heeringa et al., 2019).

Regarding environmental stewardship (IATP, 2013), conducting an agri-food vulnerability assessment emerged as an initiative to address issues such as large-scale specialization in monoculture production for export markets and environmental degradation. It also involves recognizing the shift toward food sovereignty in urban settings and focusing on the vulnerability of local agri-food systems to global change.(González, 2014; Vallejo-Rojas et al., 2016; García-Sempere et al., 2019). Additionally, we recognize alliances with ecological farmers as a strategy to expand agricultural systems for reducing greenhouse gas emissions and storing carbon (Dale, 2020). National food-related policies often do not consistently consider the crucial role of land in sustainable food systems (Delgado, 2023). When developing policies for sustainable food systems, it is important to consider cultural, geographic, environmental, and political contexts within harvesting, fisheries, agriculture, processing, distribution, and retail (Wilson et al., 2020).

Recent studies have highlighted crisis preparedness as a primary goal, especially in light of the pandemic. For this purpose, it is crucial to achieve long-term, sustainable increases in local food production to reduce the impact of food system shocks. It is essential to focus on localized, systems thinking approaches to improve communication, coordination, and resilience (Hickey and Unwin, 2020). For example, Hutchins and Feldman (2021) stress local production to decrease the state's reliance on imported food after the pandemic, and Rudolph and McLachlan (2013) call for a community-driven response to the food crisis, citing disregard for food sovereignty principles, environmental issues, and food justice concerns.

Having outlined the common goals, we now highlight key findings in each domain of food sovereignty.

Within the AFSD, sustainable agriculture and agroecology transition are key goals, evaluating the potential of local small farmers to drive a sustainable and agroecological food system transition (Benegiamo and Borrelli, 2020). Local grassroots efforts highlight challenges and opportunities for transitioning the agri-food system from market-based to localized, agroecology-based, and resilient systems that prioritize food sovereignty and democracy (Zollet et al., 2021). Agroecological networks have the potential to decouple from the conventional agro-industrial model involving pesticides and chemical inputs, supermarkets, and the global food system (Skill et al.,

2022). Education for the agroecological production model fosters critical awareness about the social and environmental unsustainability of the current food system and advocates for agroecological production (Meek and Tarlau, 2016; Meek et al., 2019). For example, Reardon and Pérez (2010) propose developing food sovereignty indicators to manage the challenges faced by smallholder farmers in managing agroecosystems due to the volatility of food crop prices and the rising cost of inputs. Quimby et al. (2023) recognize the challenges of implementing a co-management site-specific framework for locally focused approaches to natural resource management in fisheries within community-based organizations. Embracing the agroecological production model aims to organize and mobilize farmers to create processing and sales structures, and to encourage positive changes in farming practices. This will help to increase production and productivity through agroecological farming methods (Wolff and Gomes, 2015).

A primary goal of the LFSD is to promote fair and transparent commercial relationships, placing a focus on the role and envisioning a future with rural food sovereignty that may involve interconnected yet mostly self-sufficient communities that trade only for items they cannot produce (Anderson, 2015a). For instance, Paddock and Smith (2018) discuss the role of trade in securing access to valued resources and challenging the neoliberal modes of agriculture and trade through diversified trade relationships. Bacon (2018) emphasizes the role of cooperatives in governing the global fair trade system and meeting farmers' demands for food security and sustainable livelihoods. Another goal of this domain is to establish short and local distribution channels. This involves promoting initiatives like civic networks and producer-consumer alliances to facilitate the operation of shorter supply chains. These operations indicate an intention to develop and oversee short circuits that aim to increase the value of local, traditional, and sustainable production (Matacena and Corvo, 2020) and the connection between farmers with low-income consumers through direct distribution channels (Lelea et al., 2023). Marketing agroecological products emerged as another important goal regarding the importance of identifying the geographical origin of food products to add value and promote local agricultural products (Barrionuevo et al., 2019).

Crucial goals within the SFSD relate to participation and organization among all food citizens, fair gender and class relations, fair educational spaces, and cultural preservation. Some representative initiatives related to these goals refer to decentralized collective decision-making that achieves social control of the agri-food system (Di Masso and Zografos, 2015), the engagement of all food citizens in a democratic and collective struggle for socially just and environmentally friendly food systems (Pungas, 2023), gendered and racialized agrarian questions, land struggles, social reproduction, and perceptions of women's crops (Ngcoya and Kumarakulasingam, 2017), democratizing the food system and making it more equitable through educational spaces, not just through educational tourism (Naylor, 2019), the defense of land, water, and resource rights to underpin food self-provision capabilities (Elkharouf and Pritchard, 2019); and the promotion of a global peasant identity, and collective action to transform food systems (Cruz and Van De Fliert, 2023).

For the KFSD, three major goals were identified preservation of traditional practices and culture, participation and organization among all food citizens and educational spaces. Some challenge to achieve these goal include the hierarchical monopolization of knowledge, where producers become recipients rather than creators and custodians of agricultural inputs and know-how (Aguayo and Latta, 2015), the urgent need to address the rapid loss of food-related biocultural heritage using decolonial approaches to rejuvenate Indigenous knowledge within the context of traditional crops, food heritage, landscapes, and cultural and spiritual values (Swiderska et al., 2022). In order to address these challenges, it is essential to have effective knowledge management processes for rural communities and higher education organizations to collaboratively produce relevant knowledge that incorporates both expert understanding and the real-life experiences of farmers. This can play a significant role in transforming established agricultural practices and enhancing the food security of subsistence farmers (Joseph et al., 2023).

Finally, the PFDS initiatives aimed to incorporate food sovereignty into concrete policies and practices often marked by conflicts and controversies stemming from different institutional logics guiding the involved actors (Mercado and Hjortsø, 2023), as well as the debate regarding the definition of the role of the state in transforming the food system, including the scale at which it can best bring about change and the willingness or ability of the nation-state to play a role (Carlile et al., 2021). Participation and organization among all food citizens, addressing economic issues, and food policymaking are the main goals. Food democracy can enhance food sovereignty by promoting inclusive participation, especially for marginalized and disadvantaged people. This is more important than localizing control because it can address the full human rights of those without privilege and voice (Anderson, 2023). Community conservation initiatives can help address challenges such as reduced maize production and other crop yields, decreased agricultural land availability, and shortened fallow cycles resulting from conservation policies (Ibarra et al., 2011). Addressing barriers to healthy food access, such as financial obstacles and lack of geographic proximity, through a financial incentive program and federally funded prescription programs (Nugent et al., 2022). Food policy making should aim for coordination between food and social policies, rather than policies that disrupt access to land, water, and food.(Staines et al., 2021), to support peasants in reclaiming control over production and establishing cooperative governance structures (Lubbock, 2020), and to transform the food system in local schools by involving multiple local stakeholders and establishing sustainable institutional food systems in public schools through civil society consultation in policy processes (Rojas et al., 2011).

4.3 Drivers of the food system based on FSDs (RQ3)

We have identified several key drivers across various domains of food sovereignty (Figure 8). The drivers, networks, and holistic approach are found in all five domains. Additionally, a resilient food system, self-sufficiency, promotion of healthy eating, and education were present in four domains, while access to resources was found in three domains. We present an overview of these drivers and some examples of the food system outcomes resulting from their adoption.

4.3.1 Networks

Networks are vital for improving access to healthy food, creating fairer conditions for farmers, and reducing food waste. They also help

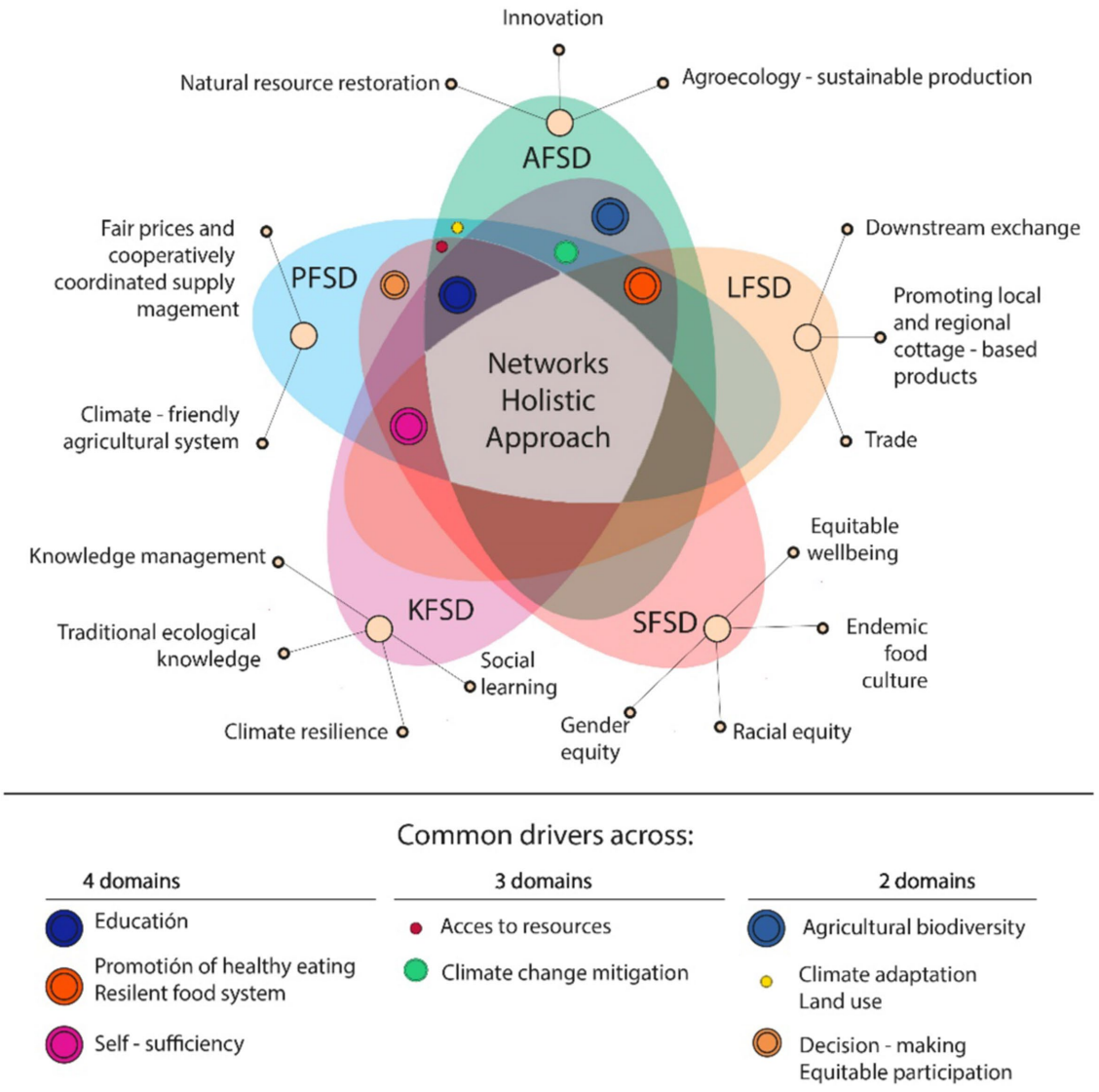

FIGURE 8
Drivers across various domains of food sovereignty.

adapt to environmental protection and climate change (Wezel et al., 2018; Vieira et al., 2021). Alternative food networks provide wider access to fresh, diverse, and healthy foods while offering additional revenue sources and reducing distribution costs for farmers (Kremen et al., 2012). The agroecological network supports sustainable practices and local markets (Skill et al., 2022; Vallejo-Rojas et al., 2022), while community-based organizations (Tursunova et al., 2020; Piccoli et al., 2021; Schanbacher and Cavendish, 2023) and cooperatives aim to promote sustainable agriculture and social justice (Pewton, 2023). Alternative food networks are seen as a means of transitioning toward sustainable food systems that prioritize ecology and human rights while empowering local autonomy and democratizing economic processes (Popławska, 2020).

Alternative food networks support the smallholder family economy through more direct, face-to-face relationships (Nigh and Cabañas, 2015) and recognize its involvement in countering an ecologically, economically, and socially unsustainable food system (Lutz and Schachinger, 2013). The challenges of alternative food networks within the localization of food production encompass agricultural decision-making and access to healthy and appropriate foods (Finnis et al., 2013). It also involves the development of food networks for food system transformation (Schiff and Levkoe, 2014), addressing a highly industrialized, export-focused food system (Beingessner and Fletcher, 2020), as well as the structural weaknesses and inequalities embedded in the global industrial agri-food system and the impacts of the COVID-19 pandemic (Zollet et al., 2021).

Lutz and Schachinger (2013) outline the outcomes of local food networks, which include: ensuring decent incomes for the peasantry and small-scale farmers, thus promoting a sustainable livelihood and economic resilience; prioritizing food production for people rather than for an anonymous market; fostering equitable relationships among producers, consumers, and retailers; ensuring democratic decision-making and control mechanisms for social equity; providing access to healthy, ecologically sound, and culturally diverse food;

promoting organic and similar sustainable production methods; and reducing food wastage, environmentally-unfriendly packaging, and long transport miles.

Urban food movements offer alternative food production methods such as backyard and community gardening, local markets, and community-supported agriculture (Cadieux and Slocum, 2015; Clendenning et al., 2016; Barta, 2017). Community-based cooperative markets encourage collective purchasing of food items primarily grown in Black farming communities, aiming to provide good food at lower costs and build cultural and economic opportunities for community members (Figueroa, 2015). They emphasize the benefits of community gardens and farms in addressing food poverty and recognizing the essential contribution of Indigenous women (Stein et al., 2018). Hughes (2019) points out that alternative food networks often mirror racial, class, and gender inequalities, emphasizing the need to address the structural disparities that lead to unequal access to food.

An outcome of community-supported agriculture with a focus on social inclusion is the empowerment of low-income farmers through supportive actions and charitable interventions (Parot et al., 2023). Other outcomes of mobilizing networks and relationships are leadership among members, accountability from those that hold power, promotion of healthy and sustainable lifestyles, satisfaction of basic needs of existence, and access to resources (Barta, 2017; Levkoe et al., 2021).

Some outcomes from a community-based approach are resource sharing, resource control, and cultural restoration (Kamal et al., 2015) and community empowerment and knowledge production (Millner, 2017).

Networks for self-determination connect organic farming with marketing interventions, community-level actions, and policy support (Bisht, 2021). They work toward developing a healthy community-based food system by growing more food in public spaces (Martin and Wagner, 2018) and by strengthening the network capacity of small pelagic fisheries to meet local demand for fish to ensure food security and sovereignty by measuring among other indicators the estimated amount of catch landed per boat at present, the estimated amount of catch landed per boat in the past 10–20 years, number of mechanisms to favor poor households in the management of fisheries and fisheries government initiatives have succeeded to safeguard the interests small pelagic fisheries (Katikiro and Mahenge, 2022).

Some outcomes include increased school engagement, community development, food production in public places, and regulations and bylaws intended to improve urban agriculture (Martin and Wagner, 2018); strengthening governance structures to prioritize local produce over corporate and import markets, collaboration and co-learning, and alternative agro-food practices support (Guell et al., 2022); community conservation initiatives (Ibarra et al., 2011); and engagement in food system governance, number of networks of solidarity between academics, activists, and food producers/harvesters, and realization of Indigenous food sovereignty (Laforge et al., 2021).

4.3.2 Holistic approach

Food sovereignty aligns with an emphasis on ecological principles and holistic methods to design and manage sustainable agroecosystems, supported by indigenous farming knowledge rooted in values of interconnectedness, mutual support, and meaningful connections (Stefanovic et al., 2020; Maudrie et al., 2023).

The holistic approach, as acknowledged by Vallejo-Rojas et al. (2016), is utilized to evaluate the transformation of agri-food systems and by Vallejo-Rojas et al. (2022) to enable a transformative reconfiguration of these systems in response to global change. For these objectives, the authors include various dimensions, including household information (such as household size, age, gender, and education of the respondent); production activities (including access to and use of land, credit, training, agricultural practices, crop and livestock management, and production destination); processing and distribution activities (such as artisanal processing, commercialization, access to markets, and sources of income); consumption activities (including consumption habits); and social relations (such as participation in social exchanges and community-based organizations). Additionally, it involves considering rights, like access to land, agency in decision-making about crop and livestock management, and power issues such as gender-role division of tasks and responsibilities within the household in different agri-food activities.

A holistic approach can integrate the seven pillars of food sovereignty and the seven roles of food (Curtis et al., 2023). This involves focusing on food for people's health and survival, valuing food providers for economics and livelihoods, localizing food systems for regionalization, exerting control locally through community and production practices, building knowledge and skills, working with nature in different places and regional ecology, and recognizing that food is sacred, with emotional and metaphysical significance. Correspondingly, a holistic approach emerged, focusing on improving food security and strengthening local food systems through community-led action planning. This includes improving access to food, the availability and use of fresh nutritious food, restoring community connections to the land and traditions, and supporting locally grown food (Domingo et al., 2021).

Five key dimensions of food democracy represent a holistic approach to food sovereignty. This approach involves empowering communities and developing skills through collaboration, prioritizing the common good, sharing knowledge, and addressing food needs. It also includes localizing the food system and promoting livelihoods and agroecological practices through effectiveness and deliberation (Resler and Hagolani-Albov, 2021).

A holistic approach to food sovereignty policy should address issues related to land, gender, health, trade, and agriculture (Steckley et al., 2023). This should also encompass science and innovation, competitive enterprises, marketing and trade, business risk management, consumer demand, priorities, and reviewing previous agricultural policies through civil society consultation in policy processes (McInnes, 2019).

It is also crucial to focus on increasing food harvest capacity, promoting local production, expanding fisheries activities, enhancing food processing and distribution, improving transportation links, and making food more affordable (Wilson et al., 2020).

Some outcomes of an agroecological network in transforming a local agri-food system used indicators (Vallejo-Rojas et al., 2022) related to five food sovereignty pillars adapted by Ruiz-Almeida and Rivera-Ferre (2019) to measure food system outcomes from a holistic approach: access to resources, which includes the access human, financial and natural resources; production model, which refers to both the land and labor organization and the management practices adopted based on agroecology; transformation and commercialization, which includes indicators of transformation practices, prices, access

to markets; food security and the right to food, which includes indicators of the food and nutritional security, but also access to culturally appropriate food and dependence from buying food; agrarian policies and civil society organizations.

4.3.3 Education

Education can influence farming practices and support alternative food systems. Agroecological education for food sovereignty involves *diálogo de saberes* (wisdom dialogs), participatory methods, and rotational learning, emphasizing the interaction between theory and practice, reflection, and action (Rivera-Ferre et al., 2021). Emotional and organizational spaces, informal networks, and relationships between farmers, mentors, and trainers are crucial for supporting learning journeys (Laforge and McLachlan, 2018). Agroecological education helps understand social movements' processes to ensure that agroecology and food sovereignty are mutually reinforcing (Anderson et al., 2019b).

The following outcomes are addressed by this driver: empowering students to establish a community of learning and practice (Chollett, 2014); enabling students to observe, participate in, engage in dialog about, reflect on, and envision agroecology (Francis et al., 2017); collectively building capacity for food sovereignty as well as confidence in food sovereignty (Anderson et al., 2019b); ensuring that students complete their program degree in agroecology within the expected timeframe (Domené-Painenao and Herrera, 2019); promoting systems thinking, critical reflection, diverse ways of knowing, practical skills (through experiential learning), collective action, and advocacy (Rivera-Ferre et al., 2021); and fostering social, independent, and institutional learning within community-based economies (Laforge and McLachlan, 2018).

Education involves creating a meaningful space for dialog about food sovereignty involving educators, farmers, students, retirees, farmworker organizers, and activists (Naylor, 2019). It plays a role in engaging critical social scientists and critical data studies in digital agriculture (Soma and Nuckchady, 2021), shaping health trajectories among Indigenous youth (Maunakea et al., 2023), and in social work education (Joyner M. et al., 2023). Furthermore, education integrates educational and policy interventions within schools and school boards to drive the goals of food system sustainability, food security, and food sovereignty (Rojas et al., 2011).

Several outcomes highlighted by this research include the development of student skills as social work practitioners, the extent to which a community-engaged project contributes to the food sovereignty movement, the establishment of local partnerships, and real-time skills practice (Joyner M. et al., 2023); community partnerships and the impact of an Indigenous-led land-based food sovereignty program on youth leadership and health disparities (Maunakea et al., 2023); the need for spaces to facilitate dialog in educational tourism, providing a meeting place for educators, farmers, students, retirees, farmworker organizers, and activists (Naylor, 2019); and raising critical awareness of the social and environmental unsustainability within critical food systems education (Meek and Tarlau, 2016; Meek et al., 2019).

Education involves school food programs. For instance, nutrition and food preparation education, garden education, and creating a coalition of school and community garden boosters; policies and procedures, local food production and consumption, local/cultural knowledge and practice, self-determination and governance, social justice and equity, the health of the land, and adaptability and resiliency and; and activities to improve access to local, healthy, and traditional foods for school communities (Holmes et al., 2022; McEachern et al., 2022a, 2022b; Tartaglia et al., 2022). The outcomes of this driver include advocating for institutional procurement of local and sustainable foods, mobilizing food literacy to increase public engagement with social justice and equity issues in food systems (Powell and Wittman, 2018), and enhancing knowledge about Aboriginal culture and bush foods (Tartaglia et al., 2022).

4.3.4 Promotion of healthy eating

Promoting healthy eating requires agroecological farming to re-regionalize food systems and align diets with planetary boundaries. This approach aims to help people reconnect with the food they eat. It encourages farmers to adopt crop rotation systems and more extensive husbandry practices. These practices aim to measure outcomes such as the number of animals needed to meet the demand for regional animal products, the number of livestock required to achieve complete self-sufficiency, and the amount of food grown locally to feed the local population in a plant-based, healthy, appealing, and diverse manner (Schön and Böhringer, 2023).

Promoting healthy eating emphasizes a shift from globalization to community-based practices. This approach incorporates traditional foods and medicines into dietary and cultural practices, aiming to enhance local production and consumption. It acknowledges the use of traditional foods and medicines as an outcome of community health and wellbeing (Ray et al., 2019).

This driver strengthens Indigenous food systems and practices to promote health and wellbeing. This emphasizes connectedness, the transmission of knowledge across generations, and the restoration of relational responsibilities (Jernigan et al., 2023a). It also involves nutrition equity mechanisms for meeting basic food needs with dignity and local food supply and demand dynamics (Freedman et al., 2022). In this context, several factors influenced the outcomes on individual, community, and land and place levels (Jernigan et al., 2023a): on an individual level, exposure to healthy, nutritional, and Indigenous food led to increased self-efficacy in healthy eating and improvements in physical, emotional, and spiritual health; on a community level, there was an increase in family knowledge of traditional foods and nutrition, as well as strengthened collective efficacy; and on a land and place level, there was a restoration of relational responsibilities between people and the land, leading to renewed connectedness.

Promoting healthy eating involves implementing policies to regulate advertising, discourage unhealthy food choices, and bolster the local agricultural sector to enhance food sovereignty (Guariguata et al., 2020). To improve nutrition and achieve desired outcomes, it is important to coordinate policymaking across various sectors at national and regional levels. This involves integrating approaches that address issues such as access to the market economy, livelihood conditions, and diets. Public policies should also consider the potential risks to local customers due to changes in food practices, as well as evaluate the socioeconomic and agro-food adjustments that affect livelihood diversity (Silva et al., 2022).

4.3.5 Resilient food system

A resilient food system refers to a farmer's capacity to adapt operations and continue functioning through crises, based on

community-driven, local connections, capacity building, and deep collaboration (Datta, 2021; Hutchins and Feldman, 2021).

This driver involves promoting ecological diversity in various ways, including diversity of plants, animals, crops, and pollinators. It also involves cultural diversity, by providing a variety of foods for different people, and economic diversity, through various ways of distributing food among people. Community farms' ability to adapt their budgets and business models is a direct result of their diverse knowledge, values, relationships, and customer bases (King et al., 2022).

Resilient food systems can be achieved by maintaining traditional harvesting practices and intellectual relationships with nonhuman entities, demonstrating a commitment to the community, and harnessing the power within intellectual traditions (Stevens and Brewer, 2019). Investing in knowledge transmission and protecting ecological spaces can maintain food and community resilience through ancient intellectual traditions (Stevens and Brewer, 2019). This includes considering outcomes such as the preservation of cultural food assets, the level of community support for revitalizing Indigenous food systems in culturally relevant ways and documenting local food assets (Soma et al., 2023).

A resilient food system calls for rural development policies that promote climate-resilient livelihoods. Adaptive governance that allows smallholder land use decision-making, support for smallholder food producers' existing agroecological intensification strategies, and participatory approaches to identify and address inequalities in local social-ecological resilience processes can facilitate this (Clay and Zimmerer, 2020).

4.3.6 Self-sufficiency

Local agricultural production is gradually modernizing with sustainable food technologies, gaining recognition for food self-sufficiency with an increase in agricultural production strengthened by institutional partnerships (Burke, 2021). Initiatives such as food autonomy are emerging as a community and political strategy. These initiatives integrate the strengthening of family gardens, the adaptation of food program menus, education, and governance toward the development of autonomous processes from a decolonial perspective, for the promotion of health and *buen vivir* (Farfán et al., 2021). Moreover, foraging in urban food systems could be leveraged as a way to contribute to nutrition, food security, cultural appropriateness, and community engagement (Bunge et al., 2019).

This driver becomes socially relevant during socio-environmental conflicts involving practices such as food self-provisioning, small-scale agriculture, and food sharing (Velicu and Ogrezeanu, 2022). Additionally, it is relevant in relation to access to markets, land tenure rights, and NGO-supported agricultural technology (Elkharouf and Pritchard, 2019). Furthermore, support for subsistence cultivation by women farmers is also important for self-reliance (Ngcoya and Kumarakulasingam, 2017). In this context, acquisition of increased knowledge and awareness, strong communities and solidarity networks, a focus on the common good, socio-economic resilience, food security, and psychological wellbeing are some of the outcomes (Pungas, 2023).

Promoting self-sufficiency can involve preserving and recognizing traditional plant foraging methods (Pieroni et al., 2021) and developing social and cultural capital related to food security planning. This includes activities such as monitoring the health of the land, conducting research, and enhancing community capacity through training (Spring et al., 2023). Some outcomes of these initiatives relate to promoting the community's local gastronomic heritage and identity enhancement (Pieroni et al., 2021).

Restructuring agrarian policy is crucial for self-sufficiency, promoting domestic maize producers and shielding them from foreign competition. This will help address widening inequality, the growing dependence on imported grain and agrochemicals, environmental degradation, and decreased food security (Isakson, 2014).

4.3.7 Access to resources

Access to resources such as soil health improvement activities, income opportunities, land rights, and policy engagement is critical for addressing food security and political economy issues (Tschersich et al., 2023).

Farmers' access to and rights over seeds are essential for food sovereignty. Prioritizing technical solutions for unsustainable farming practices and low profitability of small farmers, such as low-cost vertical hydroponic systems, can improve the eco-efficiency of home gardens and reduce dependence on external crop inputs (Sanyé-Mengual et al., 2018; Borrero, 2021).

It is crucial to preserve and ensure unrestricted access to plant varieties, genetic diversity, and quality seed (Bisht et al., 2018). Initiatives like Seed Commons aim to create sustainable transformations in agri-food systems by offering alternatives to the private-property based and highly concentrated seed sector. This challenges the ongoing dynamics of seed and variety commodification and enclosure (Tschersich et al., 2023).

Access to resources also includes settler farmers asserting land rights, challenging state and private property systems, and returning land to Indigenous nations. This can lead to considerations of cultural values, community strengthening, preservation of traditional lifestyles, and improved health and wellbeing through familial relationships between peasants and the land, as well as the appropriation of space for production (Kepkiewicz, 2020; Antonio et al., 2021).

Access to resources influences the shaping of policies concerning food and employment, access to land, income, time, and influence (Staines et al., 2021). Programs offering financial incentives (Nugent et al., 2022) and sustainable management of land, water, and energy view food systems as a unified entity (Durán-Díaz, 2023). Policymaking plays a vital role in governing ancestral lands and waters, by promoting natural resources regulation and establishing culturally sensitive partnerships with Indigenous leaders and organizations. These partnerships can facilitate the transfer of power to support the development of Indigenous food sovereignty by government institutions (Phillipps et al., 2021).

5 Conclusion and implications for food sovereignty proponents

This study aimed to summarize how advancements in food sovereignty contribute to the existing literature on essential action lines for transforming a food system based on food sovereignty principles. We have identified implications for food sovereignty

advocates within the context of the goals of the food initiatives discussed in RQ2.

5.1 Sustainable agriculture and agroecology transition

Building strong alliances is necessary for a just agroecological transition and social transformation. This involves fostering a dialog between environmentalists, scholars, farmers, farm workers, and Indigenous peoples (Dale, 2020). One way to achieve this goal is through agroforestry, which offers a resilient approach to land management. However, supporters of food sovereignty need to confront conflicting values and unequal power dynamics between practitioners and dominant institutions that hinder the fair transition to agroforestry (Hurtado-Bermúdez et al., 2020).

5.2 Food security and consumption

Agroecosystems operate within sociopolitical and economic contexts, facing challenges such as inequality and resource access. Food sovereignty advocates should prioritize access to quality seeds, soil health, income opportunities, land ownership rights, and policy engagement to address food security; these efforts address technical production aspects and economic obstacles to food security (Tschersich et al., 2023).

A change-oriented, community-based participatory approach bridges practice, science, and social movement (Stefanovic et al., 2020) promoting community-led food security through capacity building and deep collaboration to establish genuine partnerships for the long-term development goals of Indigenous communities (Datta, 2021). At a family level, while also acknowledging the strength of a community-based approach, consuming healthy, chemical-free, homegrown food promotes food autonomy and reduces reliance on commercial chains (Farfán et al., 2021). When creating a community food security action plan, it is crucial to value traditional knowledge as a foundation for sustaining the community and environment. This knowledge should be complemented by research, land health monitoring, training, and the use of traditional ecological knowledge and social practices to help community members access food from natural resources (Spring et al., 2023).

Food self-provisioning enables all food participants to access and participate in agriculture while preserving productivity for the future. It aims to measure changes in agri-food systems in terms of socio-economic resilience and food security, emphasizing control over one's food system and ensuring family food security (Pungas, 2023).

5.3 Environmental stewardship

Advocates for climate change mitigation should acknowledge the potential of sustainable farming practices and the power of collaboration among various food stakeholders. This recognition is crucial in promoting an agroecological transition in a specific region (Horstink et al., 2023).

When tackling climate change, it is essential to establish partnerships involving multiple stakeholders to help communities build their capacity. This will support their efforts to promote food security through traditional harvesting practices (Heeringa et al., 2019).

A sustainable food system requires a clear territorial perspective and a shift from sectorial policies to a more integrated food system approach that includes land as a central component (Delgado, 2023).

5.4 Education spaces

Network-based strategies of community-supported agriculture should focus on building and expanding a social and solidarity economy, highlighting the need for and educating civil society organizations and the general public about sustainable agri-food alternatives (Kumbamu, 2018). Moreover, agroecology education combined with practical and political knowledge to advance food sovereignty as a social movement (Anderson et al., 2019b).

Education on critical food systems can promote awareness about the social and environmental unsustainability of the current food system and advocate for agroecological production (Meek and Tarlau, 2016; Meek et al., 2019). However, the studies within these thematic areas are highly specific to each case. Therefore, for dedicated scholars striving to promote education for food sovereignty, it is crucial to consider the lessons learned and challenges faced by these movements (Meek et al., 2019).

The partnership between universities and local farmers enhances food sovereignty and improves the food security of subsistence farmers by incorporating farmers' experiences into knowledge production (Joseph et al., 2023). Network organizers should enhance farmer-to-farmer learning to collectively build a shared vision of agroecology and present alternative frameworks for food scarcity (Mann, 2019).

5.5 Crisis preparedness

The pandemic has exposed vulnerabilities in our food system, affecting under-resourced communities and the working and middle classes. Challenges include limited food access due to travel restrictions, increased prices, unemployment, and the need for more daily meals, as highlighted by King et al. (2022). Food sovereignty advocates can analyze the implications of these challenges to develop agricultural and food policies that promote resilient, sustainable, and fair food systems. This can be achieved by involving local actors and promoting the sustainability of their practices (Zollet et al., 2021). Further research is needed to determine if new practices like increased access to local food systems and changes in food producers' business models signal a new normal or are just temporary responses to the pandemic (King et al., 2022).

Networks often play a crucial role in governance practices, as demonstrated by the institutionalization of clusters, not only in agroecology; it is important to continue studying the practices and development of the agroecological actor network to explore how it will evolve as the pandemic phases out (Skill et al., 2022). The recent pandemic has significantly impacted rural communities, disrupting agricultural and food systems due to worsening living conditions in rural areas, it is fundamental to prioritize food safety over food

sovereignty; this may be attributed to a lack of government commitment and public awareness (Silva et al., 2022).

5.6 Embracing the agroecological production model

Within agroecology sustainable production, organic agriculture draws attention to the certification dynamics to guarantee organic products, especially a space for participatory guarantee systems to enhance decision-making for producers and consumers (Cuéllar-Padilla and Ganuza-Fernandez, 2018; Bisht et al., 2020; Nikol and Jansen, 2021).

5.7 Short and local distribution channels

Direct distribution channels and short food supply chains must be strengthened regarding downstream exchange. Farmers are confident that they can survive without intermediaries to mitigate the effects of the economic crisis and alter the predominant role of the agro-food system (Partalidou, 2015). Farmers re-value local, traditional, and sustainable production by participating in short food supply chains inspired by solidarity and civic engagement principles. They acquire new skills, receive valuable feedback, and secure fair product prices (Matacena and Corvo, 2020).

5.8 Marketing agroecological products

When addressing the geographical origin of food, it is important to recognize the challenges associated with preserving and promoting local products. This emphasizes the significance of actively involving consumers as key participants in the social, economic, scientific, and political aspects of a regional area. Such involvement requires strategies that integrate heritage preservation, knowledge systems, and territorial development (John et al., 2016).

5.9 Fair and transparent commercial relationships

Policymakers should prioritize farmer empowerment, hunger alleviation, and agricultural sustainability in the global food system instead of presenting fair trade, food security, and food sovereignty as competing terms (Bacon, 2018).

5.10 Participation and organization among all food citizens

Alternative food network organizers need to make more explicit connections with social and environmental issues and include voices from all groups in the food system to build a truly more inclusive and resilient movement (Hughes, 2019). Community initiatives should prioritize local produce over corporate and import markets, promote collaboration and co-learning, and support alternative agro-food practices (Guell et al., 2022). Regarding access to resources, passive consumers can become active citizens and mobilize around food and land issues with a focus on local and ecological production and solidarity within and beyond communities through social movements (Siebert, 2020).

Food actors must urge the government to fulfill its constitutional commitment to land reform to increase access to resources. This includes access to resources for planting and harvesting crops, such as seeds, and control over production (Blesh and Wittman, 2015).

When democratizing the food system, decision-making should consider the interests of all affected parties, address power imbalances, and center discussions around various types of food (Thompson et al., 2020). For instance, local knowledge and decision-making principles rooted in social justice should guide the localization of agricultural aid (Oliver et al., 2022). Equitable participation encompasses three food justice dimensions, political representation, economic redistribution, and cultural recognition (Smaal et al., 2021).

5.11 Fair gender and class relations

Gender equity initiatives advocate for social movements to promote gender-responsive food systems. These systems encompass food policies, programs, institutional arrangements, and individual, family, and community behavioral changes (Ghale et al., 2018). They also require significant resistance from farmworker advocacy groups, as they connect systems of oppression, particularly related to class, immigration status, gender, and race (Sbicca et al., 2020). Similarly, the food justice movement has demonstrated that addressing racial equity is crucial to transforming the food system (Brent et al., 2015).

5.12 Preservation of traditional practices and culture

When managing knowledge, harvesters' knowledge about family history, harvesting methods, conservation ethics, and their relation to other harvesters is essential to defining conservation policies (Hanke et al., 2023). Community knowledge transfer regarding the experimentation and use of wild crops to improve the climate resilience of cultivated varieties for agrobiodiversity conservation (Swiderska et al., 2022).

5.13 Addressing economic issues

Policymakers should ensure fair prices and coordinated supply management within agricultural parity policies. These policies are farmer-led, government-enacted programs designed to establish a minimum price and regulate supply. They aim to prevent the economic and ecological damage caused by unregulated corporate agro-capitalism (Graddy-Lovelace et al., 2023).

5.14 Food policymaking

Policymakers should safeguard smallholder growers' control of their food system, especially over land and water, through governance and planning processes (Raja et al., 2023).

State-mediated redistribution of land, wealth, and power held by major actors in the corporate food regime aligns with the food sovereignty

principles of Decolonization, Decarbonization, Diversification, Democratization, and Decommodification (James et al., 2021).

Making policies centered on people and challenging established power structures facilitated by food movement networks have included harvesters and producers, workers, and eaters in decision-making and action (Levkoe and Sheedy, 2019). When participation in policy-making is fair, it can change policy from merely a bureaucratic process to offering real strategies for addressing political issues (Brent, 2023).

Consulting with civil society in policy processes emphasizes the relationship between the government and various social groups, such as farmers and urban dwellers. This interaction involves using political language and establishing a dialectical relationship with the actions of societal actors, and vice versa (Schiavoni, 2017). It also includes participatory democratic decision-making and allowing the community a degree of local control over development processes to create the kinds of political spaces that food sovereignty movements aim to foster (McKay et al., 2014).

Data availability statement

The datasets presented in this article are not readily available because no restrictions apply to the dataset. Requests to access the datasets should be directed to DD, denisediazdeleonb@gmail.com.

Author contributions

IR: Conceptualization, Formal analysis, Methodology, Supervision, Writing – original draft, Writing – review & editing. DD: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. MP-S: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that financial support was received for the research, authorship, and/or publication of this article. This research was funded by the Instituto Politécnico Nacional (project nos. SIP20242444 and SIP20241323). We would also like to express our gratitude for the support from CONAHCYT (project no. 314822) and the Instituto Politécnico Nacional (project no. SIP-2020-RE/042). This research was funded by Instituto Politécnico Nacional-MEXICO.

Acknowledgments

We would like to express our gratitude for the support from the Instituto Politécnico Nacional-MEXICO (project nos. RDE-2024, SIP-2020-RE/042, SIP20242444, SIP20241323), and from the CONAHCYT-MEXICO (project nos. 314822 and project number 62563569).

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fsufs.2024.1450321/full#supplementary-material

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