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Planning toward sustainable food systems: An exploratory assessment of local U.S. food system plans

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Abstract

National planning and health organizations agree that to achieve healthy and sustainable food systems, planners must balance goals across a spectrum of sustainability issues that include economic vitality, public health, ecological sustainability, social equity, and cultural diversity. This research is an assessment of government-adopted food system plans in the U.S. that examines which topics, across the three dimensions of sustainability (social, environmental, and economic), are included in local food system plans and conducts an exploratory analysis that asks whether the community capitals (built, cultural, social, financial, human, and natural) available in a community are associated with the content of food system plans. The research team first developed a Sustainable Food System

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Policy Index made up of 26 policy areas across the three dimensions that, in aggregate, define and operationalize sustainable food systems. With this index we evaluated a sample of 28 food system plans for inclusion of these policy impact areas. We then performed an exploratory regression analysis to examine whether the availability of community capitals was associated with the content of food system plans. Findings indicated that jurisdictions integrated a broad range of issues into their food system plans; however, there are certain issues across every dimension of sustainability that are much less frequently included in plans, such as strategies related to participation in decision-making, financial infrastructure, and the stewardship of natural resources. Regression analysis identified statistically significant linear relationships between particular capitals and the proportion of policy areas included in plans. In particular, higher metrics associated with poverty were associated with the inclusion of fewer policy areas and with a potentially narrower policy agenda. This study adds to the plan evaluation literature as one of the first attempts to document the content of a sample of U.S. food system plans through a sustainability lens, contributing to the knowledge of what types of issues are advanced by local food system plans and the policy implications of current gaps in planning agendas.

Keywords
Food System Evaluation, Food System Plans, Food Policy, Food Security, Urban Planning, Regional Planning, Sustainability

Introduction

Current forms of food production and distribution fail to deliver what is expected or needed to ensure their contribution to full societal wellbeing. The negative impact of the modern food system on Earth's limited resources has been recognized internationally as "one of the most important drivers of environmental pressures, especially habitat change, climate change, fish depletion, water use and toxic emissions" (Hertwich, 2010, p. 2). The shortcomings of the globalized food system have additionally generated escalating rates of obesity and diet-related chronic disease worldwide (Ritchie & Roser, 2017). The crop inputs for much of these calorically rich but nutritionally deficient diets are fueling ongoing consolidation across agricultural sectors (MacDonald et al., 2018). This vertical and horizontal integration of commodity markets restricts access to farm inputs (seeds, fertilizer) and processing infrastructure, making it more difficult for small and medium-size farms to operate independently, resulting in even more concentration of wealth. Collectively, the health effects resulting from the abundance of cheap, unhealthy foods, the economic effects (as in the shift from secure livelihoods in small food businesses to low-wage food system jobs with few benefits), and environmental degradation from industrial food production and processing practices are causing a well-documented decline in quality of life (American Public Health Association, 2007).

Through the combined efforts of advocates, institutions, and researchers with those of community members and practitioners, the local food movement has pervaded public awareness and entered the public policy agenda. Food systems planning attempts to shape "more sustainable, just, equitable, self-reliant, and resilient community and regional food systems for present and future generations. … [It] emphasizes, strengthens and makes visible the interdependent and inseparable relationships between individual sectors from production to waste management … [while] leveraging connections to other health, social, economic and environmental issues" (American Planning Association, 2007). Pothukuchi and Kaufman (1999) were among the first to advocate for the formal integration of food systems into the planning field: "food is very much an urban issue, affecting the local economy, the environment, public health, and quality of neighborhoods. … Responses to food system issues need to be bolstered by planning and policy initiatives at regional, national, and even global levels" (p. 217). In 2007, the American Planning Association (APA), which represents urban and rural planning practitioners, released its first policy guide for community and regional food planning, recommending balancing the needs for an "efficient food system with the goals of economic vitality, public health, ecological sustainability, social equity, and cultural diversity," thus creating an imperative for the profession (APA, 2007).

Also in 2007, the American Public Health Association (APHA) emphasized the relationship between a number of interrelated food system themes in a position paper encouraging the APHA to promote more sustainable, healthier, and more equitable food systems (APHA, 2007). Alignment between planning and health organizations culminated in the 2010 APA position statement "Principles of a Healthy, Sustainable Food System," which asserted that a healthy, sustainable food system "emphasizes, strengthens, and makes visible the interdependent and inseparable relationships between individual sectors (from production to waste disposal) and characteristics (health-promoting, sustainable, resilient, diverse, fair, economically balanced, and transparent) of the system" (APA, n.d.). A broad body of literature has developed since then that traces the evolution of planning inquiry into food systems research (Brinkley, 2013), details the work and makeup of the groups engaged (Bassarab et al., 2019; DiGiulio, 2017), and interrogates the competing discourses around food system objectives (Candel & Pereira, 2017; Moschitz, 2018). Although far from being a standard practice, many local governments are beginning to include food in planning practice. Governments, from the city to the region scale, are transforming food systems structurally through changing land use codes or incorporating food into existing government comprehensive plans, sustainability plans, and standalone food system plans (Neuner et al., 2011). The call for coordinated food system policy is growing across industries and interdisciplinary groups (Mande et al., 2020).

Haysom et al. (2020) argue that although "there are a number of options open to local governments [for institutionalizing food systems planning], one of the most strategic and transversal approaches is through planning and urban design" (p. iv). Despite the role of food in city planning for the local economy, the environment, public health, and quality of neighborhoods (Pothukuchi & Kaufman, 1999), urban planners are rarely the first to launch food systems policies and plans (Hoey, in press; Mui et al., 2018). A more common scenario is that urban planners are brought into the food planning fold as targets of policy entrepreneurs coming mainly from public health departments and coalitions of scholar-activists and grassroots groups (Hoey, in press; Mui et al., 2018). Local governments seldom have a department of food, and few jurisdictions can dedicate a full-time staff member to the subject even when this blind spot has been identified (Harper et al., 2009). Consequently, much local food policy work at the substate level is undertaken by food policy councils, which often exist outside formal government or as a hodgepodge of local agencies that try to coordinate (Bassarab et al., 2019). By convening stakeholders from across the food system (e.g., farmers, grocers, food processors, educators, government, consumers) and across sectors (e.g., health, planning, transportation, nonprofit, community, for-profit, government actors) to define and organize around food system goals, food policy councils act as a "voice for system-wide changes in governance for food policy and planning … and facilitators in the networking and implementation capacity of other organizations" (Schiff, 2008, p. 216). The groundwork laid by these councils (e.g., conducting local food assessments and developing collective policy priorities through engagement with community stakeholders) is often incorporated into official government plans. There were 282 councils in 2018 in the U.S., up from fewer than 25 councils in 2000 and 125 in 2010 (Bassarab et al., 2019).

However, if a food strategy is made more comprehensive by the diversity of disciplines and stakeholders informing it, it is also challenged by the diversity of definitions, values, and goals that these actors bring along with them. M. C. Campbell (2004) maps the various tensions and conflicts that exist between food system stakeholders; some tensions are based on differences in scale, fundamental values, and positions of power, while others are a function of actors with compatible interests failing to develop a common language and agenda. Each actor has their specific ways of thinking, speaking, and acting. They also bring with them their own interests, which may or may not be stated explicitly in interactions between actors but may underlie decision-making (Moragues-Faus et al., 2013).

Ultimately, whose views are reflected in a food policy agenda is influenced by a number of factors: funding and political and public support are potent

forces, in addition to who is sitting at the decision-making table (Bassarab et al., 2019). Food policy councils often work with limited or no formal authority, and without the funding that comes with formal structures or frameworks (DiGiulio, 2017); some are disbanded after not being able to manage this (Coplen & Cuneo, 2015). In turn, food system agendas are highly malleable, bending to the current political and funding climate (Santo & Moragues-Faus, 2019). Institutionalized food policy councils are not spared from these forces. Government-embedded food policy councils appear to have the same problems with lack of funding and staff as those structured as nonprofits or grassroots organizations (DiGiulio, 2017).

The type of assessment tool used to gather information about a local food system will influence the food agenda as well. Freedgood et al. (2011) detail a number of community-based assessments (e.g., foodshed, comprehensive food system, asset mapping, land inventory, food deserts, food industry) used in conjunction with stakeholder participation to develop a vision and an actionable plan for local food systems. Besides its specific purpose, each has its own limitations, which affect the intended solutions.

Based on a number of case studies of food system policy development in the U.S. and other countries, Hoey (in press) reflects that including food in local government tends to be gradual, characterized by small, incremental wins with rare windows of opportunity that allow more dramatic leaps forward. With dogged persistence, individuals or groups inside or outside government pursue varying "entry points" into food systems planning. Examples of their strategies include molding policy champions across sectors who put their time, effort, and reputations into moving an idea forward, growing a broad base of support, codifying a focus on food in policies (like zoning or procurement), and using strategic framing to appeal to people's interests.

How food is incorporated into planning takes a number of pathways. Over the last ten years, it has become much more common for communities to integrate food system elements into comprehensive and master plans, sustainability plans, healthy community plans, and sector-specific plans (urban agriculture or food access), and to adopt related stand-alone policies such as zoning changes (Cabannes & Marocchino, 2018; Hodgson, 2012; Hodgson & Moreau, 2019; Neuner et al., 2011; Robert & Mullinix, 2018). The development of stand-alone food system plans is much less common (Nuener et al., 2011) but is a growing trend.

According to Wayne Roberts, a Canadian advocate and leader in the development of food policy, "when situations truly ripen for food policy, it is expressed as a strategy not a (stand-alone) policy, for the simple reason that a policy without a strategy is a wish list without a plan" (Roberts, 2016, p. 196). While individual policies can be highly influential on the food system, as when zoning is amended to allow for agricultural uses and the construction of small structures that do not require a permit or engineer approval, stand-alone food system plans address a more comprehensive set of food system issues and components than individual policies can. Food system plans also tend to include issues that other plans may leave out, such as topics related to food waste reduction and management (Robert & Mullinix, 2018; von Massow et al., 2019), food and farm labor, local food aggregation and processing infrastructure (Clark et al., 2021), and food distribution and transportation (Mui et al., 2018). These plans are also more likely to represent broad coalitions of support across the food system that are important for enacting sustainable food systems and practices (Hoey, in press). The food-specific focus of these plans is well suited for the investigation of issues included in the food system agenda in the framework of the three dimensions of sustainability: environment, society, and economy.

Despite the increasing use of food system plans in driving sound policies, regulations, and investment to improve the food environment, there is little empirical evidence regarding the topical scope of goals and policies in food system plans. This study investigates which issues food system plans are addressing in pursuit of healthier, sustainable food systems and tests the null hypothesis: plans address each of the three dimensions of sustainability with an equal proportion of policy areas. While we recognize that a food system plan may not represent every initiative or focus area that the

stakeholders in a community are already or intend to address, this document serves as a reflection of what topics have gained support on a government level and are outwardly acknowledged as important issues for a community.

Research has shown a relationship between levels of community capitals[1] (built, financial, human, social, cultural, natural) and community outcomes. Schmit et al. (2020) develop a comprehensive set of indicators associated with stocks of community-based wealth at the county level and use these indicators to evaluate a specific community outcome: the percentage of farms selling through direct-to-consumer channels in both metro and nonmetro counties. Their results demonstrate clear differences in the association of capital stocks and the percentage of farms' direct-to-consumer channel adoption, suggesting that the success of food system interventions, policies, and strategies for local economic development may hinge on the preexisting levels of community capitals and/or the need for planners to develop them further. In another study, Fey et al. (2008) compare 57 communities to determine the impact of different investments across community capitals and learn from their successes. They identify a host of actions and investments that set the most successful communities apart from lower-outcome communities. Unlike the less successful communities, higher-outcome communities employed a number of strategies that targeted the development of social and human capital through strategies like encouraging new partners to actively participate in economic development efforts and encouraging the emergence of new community leadership. These findings led us to ask whether the resources available in a community can influence the content of food system plans, and so we have conducted an exploratory analysis, testing the null hypothesis of no association between the existence of community capitals and the proportion of policy elements included in food system plans.

In summary, we described a simple evaluative tool that measures the inclusion of a set of characteristics that are known from the literature to be important to the food system and that span the three dimensions of sustainability. We then used this tool to evaluate the breadth of policy impact areas in a sample of U.S. food system plans, assess whether plans address each of the three dimensions of sustainability with an equal proportion of policy areas, and test for associations that exist between plan scales and policy inclusion as well as associations between the breadth of policy impact areas and community capitals. We addressed four basic questions:

[1] According to the concept of community capitals, which emerges from the discipline of rural sociology, there are things beyond monetary wealth (financial capital) that matter for the wellbeing of a community. These include the stock of trust, relationships, and networks that support civil society (social capital) (Pender & Ratner, 2014), stocks of physical or produced capital, including outputs of firms, public agencies, and durable goods used in production and consumption (built capital) (Pender & Ratner, 2014), stock of education, skills, and physical and mental health (human capital) (Pender & Ratner, 2014), stock of practices that reflect the values and identities rooted in place, class, and/or ethnicity (cultural) (Pender & Ratner, 2014), and the stock of natural resources that yields a flow of goods and services into the future (natural capital) (Costanza & Daly, 1992). Although the value of place is expanded in this conceptualization, some argue that this view still defines people, land, and resources as capital, working within the limitation of the larger macroeconomy; therefore, because this view is tied to people and nature as assets (a concept related to ownership and dominance), it is a framework ultimately limited in its ability to drive sustainability. Economists McGregor and Pouw (2016) argue that to address problems of human wellbeing in the globalizing and rapidly changing world, it is first necessary to understand "the economy" as an instituted process of resource allocation (as opposed to a simple place of exchange). Understanding the economy as a social construction is the departure point for adopting an expanded conception of the person that is fundamentally different from the individualistic and reductionist notion of "rational economic agent." To truly measure progress in wellbeing, McGregor and Pouw offer a multidimensional concept of human wellbeing: the relationship between the wellbeing of the person and the collective. Kimmerer's (2020) nonacademic exploration of the gift economy is a good complement to McGregor and Pouw. In her essay, Kimmerer describes the gift economy of indigenous communities as built on the foundation of cooperation. In the gift economy, the world and everything in it—a sweet berry, a pheasant successfully hunted, or clean water—are gifts, not objects to be possessed. The currency of exchange in a gift economy is made up of gratitude, relationships, and reciprocity. These exchanges in turn build community relationships, networks, and trust (social capital), strengthen cultural identity (cultural capital), and improve the quality of natural habitats for many species (natural capital). Kimmerer suggests that by shifting from a worldview based in scarcity (that drives competition and results in exploitation of resources and labor) to one of abundance, collective wellbeing can be greatly improved.

- Which topics, across the three dimensions of sustainability, are included in food system plans?
- Are social, environmental, or economic policy areas included at equal frequencies in plans?
- Is there an association between plan scale (city, county, region) and the policy impact areas included in plans?
- Is there a relationship between greater inclusion of policy areas in plans and documented levels of community-based capitals (human, cultural, economic, built, financial, natural)?

Methods

For the first phase of research, the research team focused on identifying a sample of comprehensive U.S. food system plans and the criteria for selecting plans for further analysis. We then developed a sustainability policy area index using a grounded approach to group topics into categories across the dimensions of sustainability. We used this index deductively to evaluate the inclusion of topics in the plans (Chun Tie et al., 2019).

Food System Plan Selection

We used the elements for conducting a systemic literature review described by Xiao and Watson (2019) to identify food system plans. Initially, we performed a search with two key terms, "food system plan" and "food action plan," using Google Scholar and the Google general search engine, and thoroughly reviewed results until no new plans could be identified. A personal account was utilized for this step, which may have resulted in biased searches influenced by Google's paid algorithms. We therefore performed additional searches in October 2021 using DuckDuckGo, a nontracking search engine, for the terms "food charter," "food system vision," and "food system roadmap" to ensure that plans by these names were not overlooked. The research team supplemented this search by seeking out peer-reviewed articles with the same terms, searching backwards and forwards, examining the grey literature, and soliciting feedback via the Johns Hopkins national food policy email list. We then used twofold criteria to finalize a sample of plans for analysis.

First, we were interested in local plans, including city, county, and regional plans, that had been formally adopted by a government body. Adoption was assumed to have taken place when the primary party responsible for constructing the plan was a government entity and a resolution of adoption was included in the plan document itself. If nothing within the document referred to adoption, we contacted a local official or organizer involved in the development of the plan to verify its status. We assumed that adoption represented a commitment of resources to the public policy issues included in the plan. The formalization of strategies into a public policy is an indication of political willingness to assign staff, funding, and time to the effort. The likelihood of implementing an adopted plan may therefore be greater than that of one that is not adopted. However, adoption is just one proxy for investment in the food system agenda; others include the work groups and individuals inside and outside government who organize around food, farm, and health issues. Our study does not attempt to identify every place where food system planning is happening, nor did it document a comprehensive set of priorities and actions undertaken in any given locality. What it does provide is an accounting of the topics that local and regional governments are addressing in formally adopted food system plans, representing the most comprehensive food system-focused document have developed.

The second criterion was that in order to be considered to be comprehensive, plans had to focus on a systemic range of issues within a locality and address a full range of activities and processes that represent a food system. By this criterion, plans that were narrowly focused on a single issue (e.g., obesity or community engagement) and plans that proposed only consumption- or production-side interventions were excluded. A plan also had to be a stand-alone document and not a component of a larger plan (e.g., part of a master or sustainability plan). Single-component and issue-based plans have narrower agendas by nature and necessarily focus their attention on particular issues. In an earlier review of the inclusion of the food system into U.S. plans and policies, Nuener et al. (2011) differentiate between stand-alone comprehensive food system plans and those focused on a

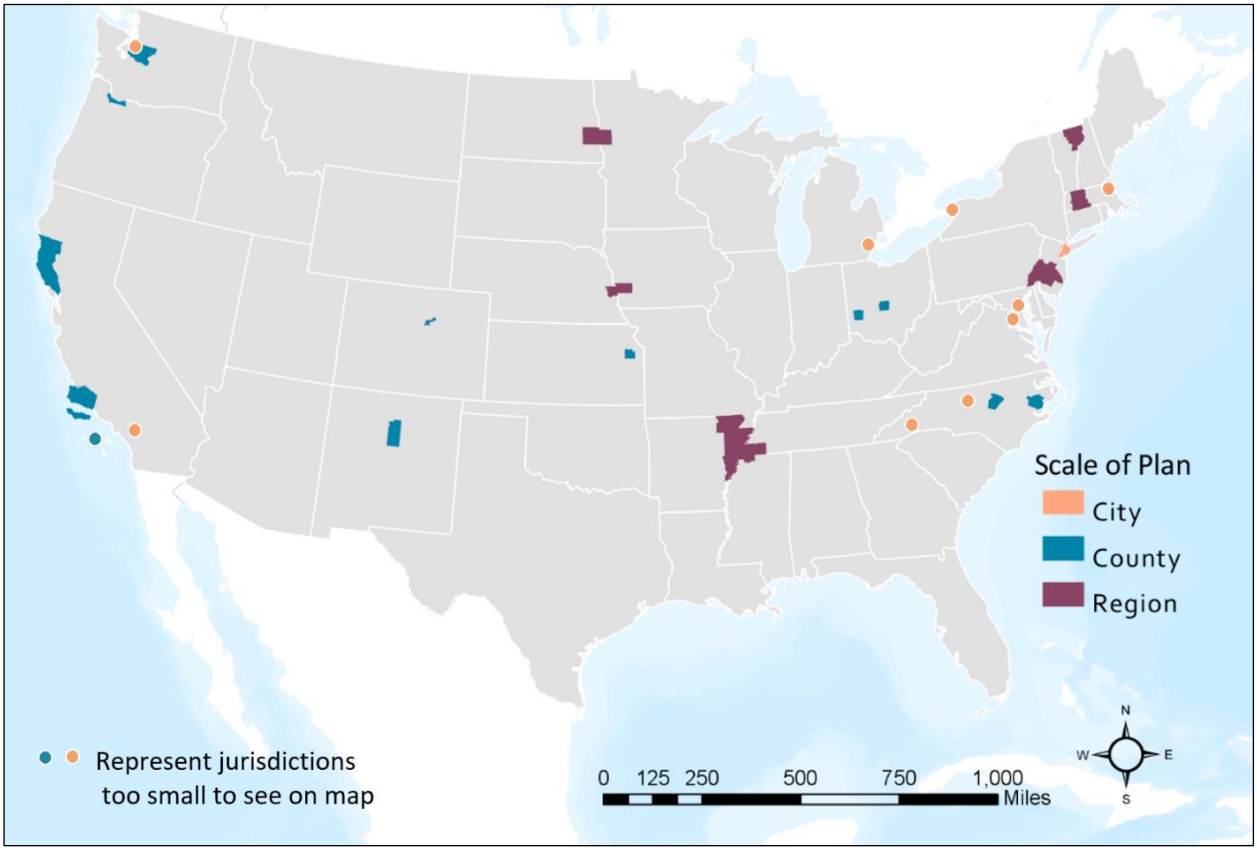
particular component of the food system (such as production, processing, distribution, consumption, or disposal), but they did not define what makes plans comprehensive. Food system definitions vary in the number of components they individually distinguish (e.g., the retail component of the food system may be specifically called out, or food distribution and consumption are referenced without the retail intermediary that connects them). Eames-Sheavly et al. (2011) define a food system as the collaborative network of actors and activities across seven components: food production, processing, distribution, marketing, retail, consumption, and waste recovery. Applying this definition, we judged that plans addressing a majority (at least four of the seven) of these food system components covered an adequately broad range of activities across the food system.

The 28 plans that met both criteria (Table 1) originate from across the continental U.S. (Figure 1) and were adopted between 2008 and 2019. In this sample are 9 city, 13 county, and 6 regional plans. Plans adopted by a city and county were categorized as a county plan, representing the total jurisdictional area affected by the plan. These 28 plans represent all food system plans in the U.S. adopted by December 2019 using the search strategy described above, except one. A single city-scale plan, Growing Food Equity in New York City, was missed in the first plan search in 2019 but would have met the study criteria. We have included it in Appendix A, which inventories the full list of sub-state-level comprehensive U.S. food system plans that were identified through October 2021.

Identifying policy impact areas for food system sustainability

The three-dimensional model of sustainability conceptualizes sustainability as the overlap between the social (or equity), environmental, and eco-

Figure 1. Map of Jurisdictions from which the Food System Plans (*N*=28) in this Data Set Originate, Distinguished by Scale (City, County, Region)



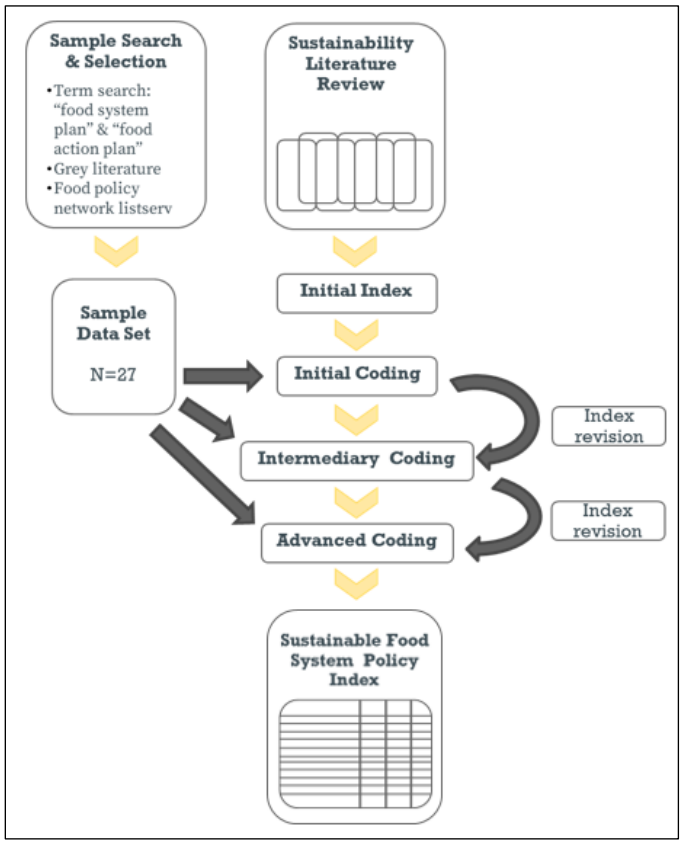
nomic. The dimensions overlap, emphasizing that the many issues facing the planet are interlocking crises and pointing to the need for active cooperation and participation from all sectors of society to manage interwoven dependencies (World Commission on Environment and Development, 1987). We used this model as a framework to guide the development of the evaluation tool.

Table 1. Selected U.S. Food System Plans (*N*=28)

Scale	Jurisdiction(s)	Plan Name	Year Published
Region	City of Fargo, and Cass, North Dakota (ND), and Clay, Minnesota (MN), counties	Metropolitan Food Systems Plan	2013
Region	Delaware Valley Region: 9 counties across New Jersey (NJ) and Pennsylvania (PA)	Eating Here: Greater Philadelphia's Food System Plan	2011
Region	Douglass and Sarpy, Nebraska (NE), and Pottawattamie, Iowa (IA), counties	Healthy Food for All: A Community Food Security Plan	2018
Region	Mid-South Region: 15 counties across Arkansas (AR), Mississippi (MS), and Tennessee (TN)	Delta Roots: The Mid-South Regional Food System Plan	2015
Region	Northeast Kingdom: Caledonia, Essex, and Orleans counties, Vermont (VT)	Regional Food System Plan for Vermont's Northeast Kingdom	2016
Region	Pioneer Valley, Franklin, Hampshire, and Hampden counties, Massachusetts (MA)	Pioneer Valley Food Security Plan	2014
County	Arlington, Virginia (VA)	Recommendations for a Food Action Plan	2013
County	Beaufort County, North Carolina (NC)	Healthy, Fresh, Local Food: An Action Plan for Increasing Availability and Access	2013
County	City and County of Denver, Colorado (CO)	Denver Food Vision	2018
County	City of Columbus and Franklin County, Ohio (OH)	Local Food Action Plan	2014
County	Douglas, Kansas (KS)	Douglas County, Kansas, Food System Plan	2017
County	King, Washington (WA)	Local Food Initiative	2015
County	Mendocino, California (CA)	Mendocino County Food Action Plan	2014
County	Montgomery, OH	Food Equity Plan	2019
County	Multnomah, Oregon (OR)	Multnomah Food Action Plan	2010
County	Santa Barbara, CA	Santa Barbara County Food Action Plan	2016
County	City and County of Santa Fe, New Mexico (NM)	Planning for Santa Fe's Food Future	2014
County	Sonoma, CA	Sonoma County Healthy and Sustainable Food Action Plan	2012
County	Wake, WA	Moving Beyond Hunger	2017
City	Asheville, NC	City of Asheville Food Policy Goals and Action Plan	2017
City	Baltimore, Maryland (MD)	Baltimore Food System Resilience Advisory Report	2017
City	Detroit, Michigan (MI)	A City of Detroit Policy on Food Security	2008
City	Greensboro, NC	Greensboro Fresh Food Access Plan	2015
City	Niagara Falls, New York (NY)	Niagara Falls Food Action Plan	2018
City	New York, NY	FoodWorks: A Vision to Improve NYC	2010
City	Riverside, CA	Food Policy Action Plan	2015
City	Seattle, WA	Seattle Food Action Plan	2012
City	Somerville, WA	Somerville Food Plan	2019

Prior to evaluating plans for topic inclusion, the research team developed a Sustainable Food System Policy Index of policy impact areas across the three dimensions of sustainability that in aggregate define and operationalize sustainable food systems. The schematic of the methods detailing the development of this tool and its use in the research is depicted in Figure 2. As a first step, we reviewed literature from various fields, including public health, agriculture and natural sciences, sustainability, urban and regional planning, and rural sociology, to identify topics related to the social, environmental, and economic dimensions of food systems. We then grouped recurring topics into thematic categories from which we derived 26 final policy areas. Next, we classified plan elements (goals, objectives, and strategies) according to these categories based on their policy intent. For each policy area, we defined an objective. During the process of iterative coding and index revision, we used negative case analysis (Shenton, 2004) to refine typologies by revisiting the data to confirm that chosen policy areas did account for all instances of the topics. The inclusion of 26 policy impact areas was then assessed across the environmental, social, and economic dimensions in the plans (Table 2). The 26 areas cumulatively represent a complete set of topics considered requisite to a sustainable food system based on literature and current practices. The first author completed the coding with input from other authors into classification and the criteria used to inform interpretation of plan elements.

Figure 2. Schematic of Methods



Resulting data were binary, as we assigned a 0 or 1 to each plan for each of the 26 policy areas. We applied three criteria to assess whether a proposed action or strategy addressed each of the 26 policy areas: (1) only the explicit effects of a goal or action were considered; (2) only the direct effects of a strategy, based on the review of literature, were considered; and (3) terms and descriptions used in the plan were used to contextualize and understand the plan element being scored. An example application of these criteria is provided in Figure 3.

We documented all instances of inclusion of each of the 26 identified policy impact areas in each plan. Higher percentage rates indicate the presence of a greater number of policy impact areas included in the plan and of a broader policy agenda.

Statistical Analysis

The research team conducted statistical analyses using Minitab. We performed one-way analysis of variance with Turkey's pairwise comparisons to test the null hypothesis: plans address each of the three dimensions of sustainability with an equal proportion of policy areas. Two-way analysis of variance was used to test the null hypothesis of no association between plan scale (city, county and regional) and percentage of policy impact areas included.

We also performed an exploratory linear regression analysis to test for linear associations between community capitals and completeness in food system plans. The community capital categories used are based on Schmit et al. (2020): built, cultural, financial,

Table 2. Sustainable Food System Policy Index

Policy Impact area		Objectives
Social dimension		**The objective of these strategies is to…**
1	Food Access	improve access, availability, and affordability of local, healthy, affordable food options
2	Food Waste Rescue & Redistribution	increase the amount of rescued and redistributed food that would otherwise be wasted
3	Food Knowledge & Education	increase consumer knowledge of healthy foods, preparation, processing, growing practices, and the food system
4	Food Safety & Nutrition	increase the safety and nutrition of the food supply and food environments
5	Celebration of Culture & Diversity	celebrate the culture, identity, and heritage of the local and regional food system and support opportunities to better reflect its diversity (e.g., agrotourism, marketplaces that highlight diversity of local food cultures, entrepreneurship support and other programs targeted at historically excluded groups such as Black, Brown, Indigenous People of Color)
6	Participation in Decision-Making	create pathways for engagement and empower actors from across the food system and across sectors to actively participate in decision-making and program implementation
7	Equity for Producers and Food System Workers	support the wellbeing of food system workers (e.g., farmers, laborers, retail, and processing workers) through measures which impact economic, mental, and physical health and address existing inequalities (e.g., 3rd party certification programs for producers, provisions of 401k, support of food co-operatives, improved housing, etc.)
8	Equity Outside the Food System	support social equity outside the food system, including in housing, transportation, and healthcare (e.g., develop policies and programs to reduce poverty)
9	Access to Natural Capital & Built Capital	encourage consumers to grow, process and sell their own food by helping them access natural capital and built capital and enabling sale of their products (e.g., access to water, land bank properties for community gardens, local seed and tool libraries, regulations to permit sale from home gardens)
10	Coordination & Collaboration (Soc)	increase coordination and social capital, and augment the impact of collective efforts in social policy areas (e.g., gardening programs to connect seniors and youth)
Environmental dimension		**The objective of these strategies is to….**
11	Water	conserve water resources, increase efficiency of water use, and protect water bodies from pollution (e.g., restore critical water bodies and protective buffer zones, improve efficiency of irrigation water)
12	Energy & Air	maintain or improve air quality, increase efficiency of energy use, reduce total use, and develop alternative sustainable energy sources (e.g., develop renewable energy capabilities on farms, connect producers with energy saving technology and practices)
13	Soil	conserve and restore soil health (e.g., encourage land use practices that reduce erosion)
14	Plants	sustainably manage populations and grow biodiversity (e.g., provide pollinator habitats, encourage diversity in production)
15	Animals	sustainably manage populations and grow biodiversity (e.g., elimination of nontherapeutic use of antibiotics and growth hormones in the food supply, protect pollinators)
16	Land Conservation & Stewardship	preserve undeveloped land, limit development of natural landscapes (e.g., land banking of commercial properties for community gardens, preservation easements, market-based strategies to protect natural resource)
17	Food Waste Reduction & Composting	reduce the environmental impacts of food waste, including GHG emissions from transportation and landfills, and increase composting of food waste for use in soil building
18	Coordination & Collaboration (Env)	increase coordination and social capital, and augment the impact of collective efforts in environmental policy areas
Economic dimension		**The objective of these strategies is to…**
19	Workforce Development	support an adequate and knowledgeable food system workforce (e.g., through vocational programs, pathways to career growth, ongoing training/education)
20	New Business & Entrepreneurship	support existing and grow new food businesses, provide technical and financial assistance to food entrepreneurs, including farms, processors, and restaurants (e.g., by offering business services, creating business incubators)

continued

21	Promotion & Markets	promote the availability, quality, and value of local food to grow market demand (e.g., local food campaigns, agrotourism, local food directory) and expand opportunities for the sale of local food (e.g. low-income CSA, healthy food in corner stores, institutional procurement, farmers markets)
22	Aggregation, Distribution & Processing Infrastructure	support economic viability of the food system through development of physical food system infrastructure (e.g., permanent farmers markets, food hubs, distribution networks, processing facilities and machinery)
23	Financial Infrastructure	develop and increase access to funding mechanisms and infrastructure for food system entrepreneurship (e.g., block grants, revolving funds)
24	Access to Natural Capital for Entrepreneurship	support entrepreneurs in accessing land, water, clean soil, and other resources necessary for entrepreneurship in the food system (e.g., establish urban boundaries, reduce water expenses for urban agriculture, support intergenerational land transition)
25	Food Waste for Entrepreneurship	decrease costs associated with food waste and turn waste into a resource (e.g., decrease hauling costs for businesses, recycling of food waste into compost or biofuel for sale, sale of imperfect foods that would otherwise be wasted)
26	Coordination & Collaboration (Econ)	increase coordination and social capital, and augment the impact of collective efforts in economic policy areas (e.g., interagency coordination to streamline regulations affecting farmers and food businesses, know-your-farmer field trips)

human, natural, and social. Two to three measures for each capital were selected from publicly available sources, including the U.S. Census and the National Arts Index (Table 3): Social Capital: number of nonprofit organizations (excluding those with an international approach), number of social organizations per 1,000 residents; Natural Capital: acres in farmland, proportion of land area in farms; Human Capital: total population, percentage of population (25+) with at least a bachelor's degree, rate of food insecurity; Financial Capital: owner-occupied housing rate, percentage of persons below poverty level; Built Capital: number of food and manufacturing establishments (combination of two separate measures); Cultural Capital: nonwhite population, number of libraries per 100,000 residents, number of museums per 100,000 residents. Regression was also used to test for a linear association between the number of plan elements (the number of goals, objectives, or strategies contained in a plan) and completeness scores. City-level food insecurity data were not available, so county statistics are used as an estimate in these regressions.

Results

Topics Found in Food System Plans

Figure 4 shows the percentage of plans that addressed each policy area with at least one plan element (goal, objective, or strategy). Some topics were widely addressed across food system plans. For instance, all the plans had at least one plan element focusing on food access, food safety and nutrition, new business and entrepreneurship, and promotion and marketing. Other policy areas in

Figure 3. Example of the Plan Policy Evaluation Method

Example 1: A policy under the Farming and Sustainable Agriculture section of the Delaware Region Valley Plan states that "New Jersey and Pennsylvania should expand programs that match interested farmers with interested landowners or retiring farmers. As development pressure increases, land values increase. … Farmers need access to less expensive land because agriculture is land-intensive, has slim margins for profitability, and is subject to extreme fluctuations in prices" (Delaware Valley Regional Planning Commission [DVRPC], 2011, p. 33). The explicit intent of this policy is to support farmers in accessing land and thus is scored under access to natural capital for entrepreneurship in the economic dimension. Simultaneously, keeping farmland from development maintains a higher ecological value for it and thus is also scored under the land conservation policy area in the environmental dimension.

Example 2: Another strategy from the Delaware Valley Region Plan is that "national and regional policy advocates should work on immigration reform to recognize the importance and needs of temporary agricultural workers" (DVRPC, 2011, p. 65). The rationale for this strategy addresses workforce needs as well as the need to weed out abuses faced by farmworkers, and therefore is scored as addressing workforce development in the economic dimension as well as equity for producers and food system workers in the social dimension.

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Table 3. Linear Regression Results of Exploratory Analysis

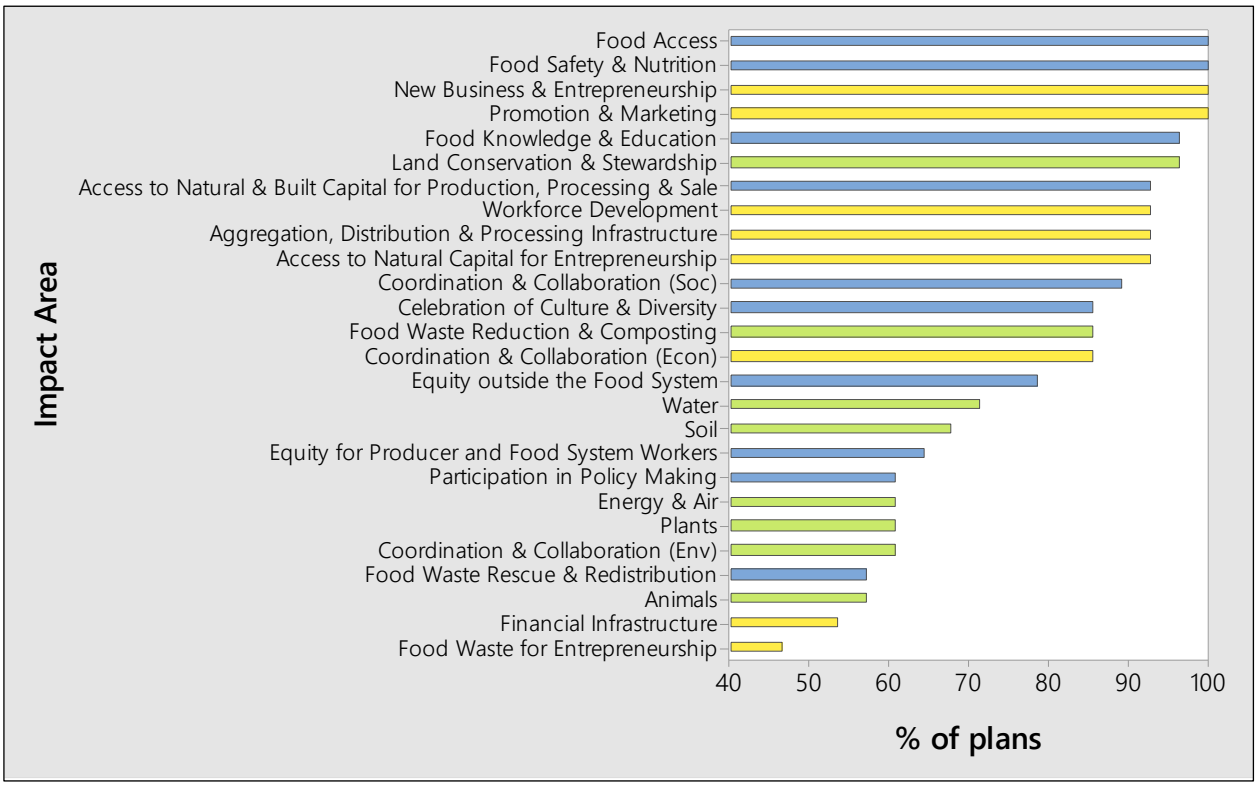
		Proportion of impact areas included in plan (%)				Proportion of impact areas within dimension included in plan (%)											
						Society				Environment				Economy			
Variable	Source	Slope coeff.	Coeff. std error	Slope coeff. P-value	r^2 (%)	Slope coeff.	Coeff. std error	Slope coeff. P-value	r^2 (%)	Slope coeff.	Coeff. std error	Slope coeff. P-value	r^2 (%)	Slope coeff.	Coeff. std error	Slope coeff. P-value	r^2 (%)
# of plan elements	This research	0.262	0.076	**0.002***	31.63	0.304	0.085	**0.001***	32.85	0.358	0.164	**0.039***	15.41	0.113	0.087	0.203	6.14
Social Capital																	
Number of nonprofit organizations without including those with an international approach	Rupasingha et al. (2006)	0	0	0.712	0.53	0	0	0.894	0.07	0	0	0.587	1.15	0	0	0.961	0.01
# of social organizations per 1,000 residents**	Rupasingha et al. (2006)	–27.2	13.8	0.060	12.93	–26.6	16.1	0.110	9.50	–41.1.2	27.9	1.52	7.72	–14.18	14.3	0.335	3.58
Natural Capital																	
Acres in farmland	USDA NASS (2019)	0	0	0.321	3.78	0	0	0.3	4.13	0	0	0.674	0.69	0	0	0.350	3.36
Proportion of land area in farms (%)	USDA NASS (2019)	0.087	0.118	0.469	2.03	0.024	0.136	0.860	0.12	0.233	0.230	0.319	3.82	0.087	0.118	0.469	2.03
Human Capital																	
Total population	U.S. Census Bureau (2018)	0	0	0.616	0.98	0	0	0.904	0.06	0	0	0.380	2.98	0	0	0.926	0.03
% of population (25+) with at least a bachelor's degree	U.S. Census Bureau (2018)	0.226	0.208	0.287	4.34	0.366	0.231	0.126	8.78	0.227	0.414	0.588	1.14	0.050	0.2082	0.814	0.22
Rate of food insecurity (%)	Feeding America (n.d.)	–2.274	0.840	**0.012***	21.97	–2.10	1.00	**0.046***	14.45	–3.47	1.73	0.056	13.38	–1.291	0.899	0.163	7.35
Financial Capital																	
Owner-occupied housing rate (%)	U.S. Census Bureau (2018)	–0.004	1.67	0.981	0	–0.110	0.189	0.565	1.29	–0.009	0.326	0.979	0	0.142	0.161	0.388	2.88
% persons below poverty level	U.S. Census Bureau (2018)	–1.259	0.462	**0.011***	22.23	–1.039	0.561	0.075	11.68	–2.151	0.934	**0.030***	16.94	–0.640	0.498	0.210	5.97
Built Capital																	
Number of food and beverage manufacturing establishments	U.S. Census Bureau (2018)	0.011	0.015	0.457	2.15	0.007	0.017	0.694	0.60	0.031	0.028	0.273	4.61	0	0.014	0.779	0.31
Cultural Capital																	
Nonwhite population (%)	U.S. Census Bureau (2018)	–0.364	0.156	**0.028***	17.26	–0.203	0.192	0.299	4.15	–0.652	0.311	**0.046***	14.46	–0.277	0.106	0.095	10.36
Number of libraries per 100,000 residents	Kushner & Cohen (2019)	–0.20	0.330	0.550	1.39	–0.452	0.368	0.230	5.48	–0.277	0.649	0.673	0.70	0.192	0.324	0.558	1.33
Number of museums per 100,000 residents	Kushner & Cohen (2019)	0.314	0.284	0.280	4.47	0.010	0.331	0.976	0	0.549	0.559	0.335	3.57	0.458	0.271	0.103	9.91

Note: Slope coefficients given as "0" in the table are -0.001≤ and ≥0.001

Bolded values* significant at p<0.05

** social organizations include religious, civic, social, business, professional, and labor organizations; golf courses and country clubs, fitness and recreational sports centers, sports teams and clubs

Figure 4. Percentage of 28 Food System Plans that Address Each of 26 Policy Areas Addressing Social (Blue), Environmental (Green), and Economic (Yellow) Dimensions of Sustainability

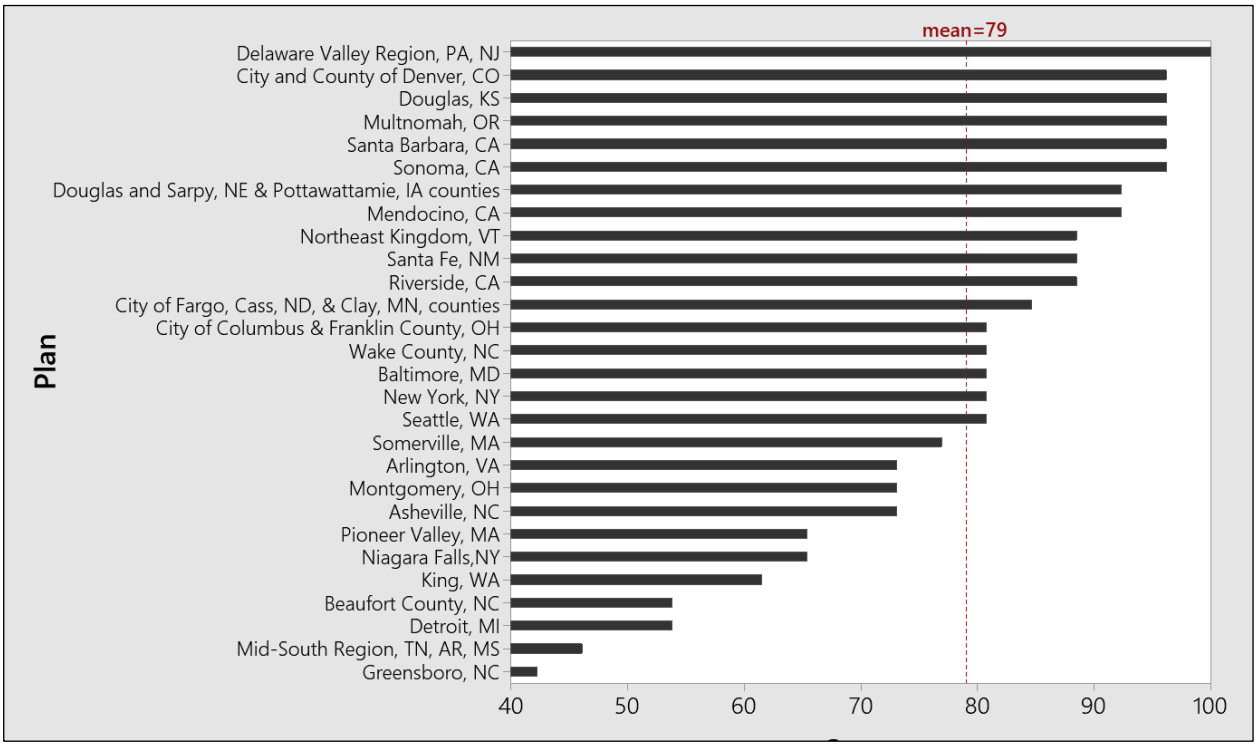


each dimension of sustainability were generally left out of plans, for example, financial infrastructure and the entrepreneurial opportunities in repurposing food waste. About half the plans (13 of 28) addressed the quality or conservation of every natural resource (water, soil, air and energy, flora and fauna, and land) with at least one plan element, although close to a third of plans (8 of 28) did not address biodiversity, water, or soil at all. Six of these 8 plans identify increasing access to healthy, affordable food as a primary goal of the plan (Beaufort County, NC; Greensboro, NC), are titled "food security plans" (Pioneer Valley, MA; Wake County, NC; Detroit, MI), or have been developed by organizations focused on food access (Somerville, MA). These plans focused on nutrition and food security but did not extend to crucial environmental components of a sustainable food system.

Food waste is discussed primarily as an environmental issue (24 of 28 plans), leaving out opportunities for the rescue and distribution of otherwise wasted food, including the entrepreneurship opportunities (included in 16 and 13 of 28 plans, respectively) inherent in the social and economic dimensions of food waste. Participation in decision-making, a policy area in the social dimension of sustainability, was mentioned in 18 plans. Plans from only about half the jurisdictions (15) included a plan element aimed at developing funding mechanisms to finance food systems.

The proportion of impact areas included in plans ranged from 42–100%. The average plan included 79% of impact areas (95% CI: 72.56, 84.86) (Figure 5). In Figure 5, the 28 plans evaluated in the data set are listed on the vertical axis, and the proportion of policy impact areas addressed in the 26 plans are represented on the horizontal axis. While only one plan addressed all 26 policy areas, 11 plans included at least 88% of policy areas, reflecting three missing policy areas. The proportion of included impact areas did not vary significantly between city, county, and regional plans ($F_{2,25}$=1.55, p=0.232).

Figure 5. Percentage of Policy Impact Areas Included in Plans



Inclusion of social, environmental, and economic policy areas

The differences in inclusion between social, environmental, and economic policy areas within plans were not statistically significant, at alpha=0.05 [$F_{2,81}$= 2.78, p=0.068]. The proportion of environmental impact areas included in plans exhibited the widest variation across the data set, whereas the proportion of economic impact areas varied the least (Figure 6). Individual plans at the city, county, and regional scale exhibited wide variation in the inclusion of impact areas within the three dimensions. However, no significant interaction was oserved between scale of plans and the proportion of impact areas within a specific dimension of sustainability [$F_{4,75}$=0.31, p=0.87], indicating that differences in the proportion of impact were independent of plan scale.

Variables associated with the inclusion of impact areas

We observed negative linear relationships between the proportion of included policy impact areas and metrics related to human, financial, and cultural capitals (Table 3). The proportion of impact areas included in a plan were significantly negatively associated with the following local metrics (based on U.S. Census data): percentage of food-insecure households, people in poverty, and nonwhite population. The proportion of impact areas in the social dimension included in a plan were significantly negatively associated with the percentage of households experiencing food insecurity. The proportion of impact areas within the environmental dimension included in a plan were significantly negatively associated with the metrics of people in poverty and nonwhite population (Table 3).

The proportion of impact areas included in a plan was positively associated with the number of plan elements, which were classified according to which of the 26 policy areas they addressed (Table 3). The number of plan elements ranged from 10 to 106. On average, plans identify 48 goals, objectives, and strategies. Of the four plans that included the fewest topics, three have the fewest plan elements (between 10 and 18). Of the three, the Mid-South Regional Food System Plan is positioned as a strategic plan presenting a set of strategic interventions to build on existing, competitive

Figure 6. Percent of Policy Areas, in Each of Three Dimensions of Sustainability Included in Plans, Across Plan Scales

(Orange Dot=City Plan; Blue Dot=County Plan; Red Dot=Regional Plan)

strengths in growing markets. The other two plans, from Beaufort County, NC, and Greensboro, NC, are focused on improving access to healthy, fresh, local, foods, a narrower overarching goal than other plans in the data set. From this, we suggest that plans in the sample attain a similar level of impact area inclusion with varying numbers of plan elements. For example, one plan included 81% of policy impact areas with 45 plan elements, whereas four others addressed the same proportion of impact areas with 61, 77, 89, and 120 elements.

Discussion

This study evaluates the breadth of policy impact areas included in food systems plans. On average, food system plans in the U.S. cover a broad range of topics: 79% or about 20 of 26 policy impact areas that contribute to sustainable food systems. A number that cover the lowest proportion of these important sustainable food system components are focused on a specific set of issues in the food system, perhaps as a strategic choice. Social, environmental, and economic policy impact areas are integrated at statistically similar levels in food system plans, with the proportion of environmental impact areas exhibiting the greatest variability. Within each dimension, certain policy areas are included more frequently than others.

In the environmental dimension, land conservation and composting appear in nearly 90% of plans; the remaining natural resource stocks—water, air and energy, soil, and flora and fauna—are addressed less consistently. Seven plans (25%) did not address the management of water, soil, or plant and animal resources at all. Considering that good agricultural practices are critical to local food production as well as environmental health and justice, the absence of planning for natural resources may indicate a limited approach to systems thinking in some plans. Expanding food system assessment tools to include investigations of the environmental impacts of current practices on soil fertility, recovery of organic materials, and soil and water quality would be a good way to start integrating environ-

mental health into food system analysis (Freedgood et al., 2011).

Plan elements in the social dimension, for participation in decision-making, equity for producers and food system workers, and food waste rescue and redistribution, are absent from 36–43% of plans. There is room for improvement, especially in creating processes for ongoing community-driven development (included in 60 % of plans). According to McKenzie (2004), widespread participation by citizens in electoral procedures and in other areas of political activity, particularly at the local level, is a key indicator of the social dimension of sustainability; a sustainable community "provides resources and support to enable disadvantaged people to participate" (p. 19). It should be noted that this research is coarse-grained on the subject of equity. There is a range of "who is being planned for" (e.g., none specified, food system workers, producers, immigrants) and "how." Greater understanding of inclusion of equity into plans will require a more fine-grained investigation of existing inequities in a community and the strategies pursued to address them.

In the economic dimension, food waste entrepreneurship and financial infrastructure are absent in 64% and 46% of plans, respectively. All plans included elements regarding new business and entrepreneurship, and may be supporting actions within this sector without explicitly naming it. The absence of financial infrastructure elements in plans can be explained partially by the lack of awareness of how to deploy traditional financing tools to support localized food systems. Water and sewer, road, and other major forms of public infrastructure are funded through well-developed and well-known finance tools such as bonds, tax credits, and loan programs, but only recently have these same finance tools begun to be utilized to fund food system projects.

Food system plans are created at various scales and with a wide range of priorities for local concerns. Given the diversity of jurisdictions in this sample, the variation in scores in part indicated varied local priorities. Whether a plan was a city, county, or regional plan only mattered when it came to the proportion of included economic policy impact areas. Specifically, cities fell behind counties when it came to incorporating elements related to financial infrastructure. Some researchers suggest that there is a specialization of roles between cities and counties with respect to economic development and that counties fulfill a regional coordination function for municipalities and towns and emphasize different types of economic development activity (Morgan, 2009; Reese, 1994). In addition to providing strategic regional leadership, counties employ a greater variety of economic development strategies and more nontraditional techniques than cities, with a greater tendency to collaborate and involve more organizational partners in administering their economic development programs (Morgan, 2009; Reese, 1994). As the food movement has matured, the scales and costs of projects have grown as well (Rittner et al., 2020), exacerbating the struggle food system efforts already face in accessing funds (Bassarab et al., 2019). Without additional financial infrastructure, competition for limited capital may result in the stagnation of food system development. Cities, therefore, should consider diversifying the types of economic strategies they can employ to include specific financing mechanisms for food entrepreneurs and food system infrastructure.

As part of our exploratory analysis of the relationship between availability of community capitals and percentage of policy elements included in food system plans, we observed that there is a negative relationship between food insecurity and the overall proportions of policy impact areas and social impact areas in a plan. We also observed a negative relationship between the proportion of all 26 impact areas included in a plan and higher rates of poverty and nonwhite populations. A negative relationship was also observed between the inclusion of environmental impact areas with those same two factors, with increasing rates of poverty and nonwhite population. One common-sense interpretation for these associations is that communities with higher rates of poverty may prioritize a more focused set of topics and issues rather than pursuing a broader set of social, environmental, and economic policy areas, at least within the specific context of food system plans.

Santo and Moragues-Faus (2019) have documented accounts from food system groups in the

U.K. and U.S. that perceive the predominance of funding from the public health sector as driving the focus of food initiatives toward working with chronic disease and healthy food access, while issues such as the environment, sustainable agriculture, and the needs of farmers and agricultural workers (who composed a substantial part of the original food movement) have a more tenuous role. Tighter focus may also be attributed to stronger representation of public health and anti-hunger workers or emergency responders on food policy councils, compared with individuals representing labor, food retail, social justice, economic development, or natural resources interests (Bassarab et al., 2019). Some food system plans in this sample were in fact developed by food policy councils and later adopted by local jurisdictions. In this way food policy council membership is a force that can work parallel to or independent of funding in guiding the local food system agenda. A follow-up study could revisit these plans and delve more deeply into the makeup of stakeholders and how they have influenced the topics included in plans; for example, by asking whether food system plans developed by boards with more representation from BIPOC individuals include more equity measures.

The evaluative tool used in this research was designed as a broad survey of what is incorporated into the agendas of food system plans, but much could be gained with more nuanced explorations of the ways or the degree to which specific strategies or issues in policy areas are advanced in plans. One exploration would be through tertiary scoring to determine instances of the integration of a topic, such as urban agriculture, across multiple dimensions of sustainability. Another way to add depth to the analysis involves inventorying strategies based on mechanism of action, such as regulatory, market-mechanism, and education, to understand how different "levers for change" are applied across food system issues (Moragues-Faus & Marceau, 2019). Besides providing additional depth to analysis of plans and policy, measurement and analysis of the outcomes and impacts of the strategies supported by plans would provide a deeper understanding of food system dynamics.

The specificity of policy areas chosen had direct consequences for observed inclusion rates. In choosing to collapse many different types of food system strategies into 26 categories, some detail was lost. Future evaluations may build on our work by specifying subcategories or utilizing indicators to measure the success of efforts across policy areas. The sample data set could also have affected findings; for example, including less comprehensive food system plans—those focused on less than five components of the food system—may have led to more variable inclusion rates. Additional coders are frequently used in a research team to increase the validity of qualitative data; in the absence of a second coder, however, multiple authors reviewed and offered input into classification and the criteria used to inform interpretation of plan elements.

Food system plans represent the final product of a complicated policy-making process that can be visualized as interactions between the "problem stream" and "politics stream" that shape the "policy window," together with "policy entrepreneurs" who are informed by the "policy stream" (Sabatier, 2007). Groups involved in food policy face a host of challenges at various stages in this process, as described earlier. To further investigate the constricting and enabling forces that shape food system plans, case studies may be better suited to discerning the particular local forces behind policy than content analysis conducted on refined public-facing plan documents. Research is sorely needed to document the past experience of plans successfully translated into action and change in food systems with the intended impacts.

Because a food system plan is only a slice of a greater policy landscape, there is an opportunity to assess a larger policy landscape by including all planning or policy elements that could have a bearing on food systems, even if they exist outside food system plans. Food system plans are often complemented by resilience or sustainability goals and plans, growth management plans, land use plans, solid waste management plans, and others that can affect a local food system. Therefore, expanding this type of analysis to include the broader policy and planning environment would provide fuller insights into the impact of planning on food, although this was beyond the scope of the current study.

The enduring challenge that exists in planning

for sustainable food systems is that different issues are important in different places, each with differing levels of urgency, so plans need to address every impact area at a specific point in time. However, the path toward sustainability must recognize the ways in which society, the environment, and the economy interact across temporal and spatial scales. Gragg et al. (2018) show that, whereas in the short- to mid-term these three dimensions may exist completely apart from one another, over a longer timespan they overlap and eventually become nested; that is, economy is nested within society nested within environment. This model conveys that what may not be critical now may be defining or constraining later. A final suggestion for future research is the development of tools to help communities prioritize place-based strategies, such as that developed by Moragues-Faus and Marceau (2019), but based on understanding how dimensions of sustainability interact at various spatial and temporal scales (Gragg et al., 2018).

Policy and Practice Recommendations

Food systems play a critical role in the sustainability of communities. To ensure that these systems further the goals of a society, a local food system strategy ought to be a forward-thinking and long-range plan that balances the goals of social justice, ecological health, and economic development. This research identifies which topics food system plans currently address and those less frequently included.

Because there will always be diverging opinions about what ought to be sustained and for how long, with little regard for balance between social, environmental, and economic priorities, food system planners and others advocating in this area can improve awareness, integration, and communication of the complex relationships within and among the chain of food system activities across the dimensions of sustainability. This may require practitioners to engage subject-matter experts (especially local community members) who can assist with the integration of food system policy in plans and translate between languages of economics, environmentalism, and social justice, as well as to utilize data to convey the value of initiatives in these connected realms of community wellbeing (S. Campbell, 1996). The need for alternative measures of wellbeing that extend beyond economic and market measures is well documented (S. Campbell, 1996; Giannetti et al., 2015), and such measures would go a long way toward establishing a foundation for systems thinking across the dimensions of sustainability in every sector. While multiple indices have been developed to adjust, supplement, or substitute for gross domestic product, consensus is still needed before any single index or combination of indices is adopted as a standard (Giannetti et al., 2015). Practitioners can facilitate conversations about measurement, at every level of governance, by convening locally and regionally about how to determine more meaningful social and biophysical measures of progress.

An immediate step that practitioners can take toward comprehensive food system planning is to include environmental assessments in their toolbox and to center equity as a guiding principle in their planning processes and plans. Plans should ensure that the unique experience of vulnerable groups is honored, leading to more strategic action that promises better results for all groups and the narrowing of gaps among them. Loh and Kim (2020) provide examples and recommendations from which food practitioners can draw for inclusion of equity in comprehensive plans. Social equity[2] impact assessments (Dundore, 2017) can help communities consider how people, place, process, and power are interrelated in a particular plan, policy, or proposal. This meaningful engagement should originate during the early stages of discussions about how to evaluate the local food system, and continue indefinitely. Shared ownership of agenda-setting and implementation and accountability across diverse partners are essential to achieving inclusive and impactful outcomes.

[2] The widening gap in wealth and wellbeing across certain groups in the U.S. is well documented. In addition to race and gender, class dynamics in combination with the nature of the American economy help explain the still growing disparities between the best and worst well-off. Literature that explores the growing divide between the wealthiest Americans and the poorest includes *The American class structure in an age of growing inequality* (Gilbert, 2020) and an analysis by Elliott et al. (2019).

Conclusions

Sustainable food systems have become an aspirational goal for many localities, with the concept of sustainability cited as an overarching framework for helping communities recognize links among equity, environment, and economy. This study is the first to improve our understanding of what issues U.S. localities are addressing in their food system planning, using the three dimensions of sustainability as a guiding framework. The evaluation developed in this research can be repurposed by local governments as an audit of existing policy or to frame future planning efforts. By describing the evaluative tool, we enable others to reproduce and build on these findings. (A more detailed description of the tool and a more thorough example of its application can be found in Karetny [2020]). The data set of plans in this work represents the most comprehensive list of plans we have been able to find and may provide useful examples for practitioners, researchers, and communities seeking to create their own food system plans.

Specifically, we found that food system plans vary greatly in the inclusion of sustainable food system policy impact areas, although there are examples of high policy inclusion in every dimension of sustainability and at most of the scales examined. Cities, counties, and regions that operate in very different contexts nevertheless attain high levels of inclusion in one or more dimensions. Furthermore, there is much creativity in the strategies across the data set. The collective awareness of local governments around pressing food system issues is multidimensional and includes innovative strategies that span urban and rural regions. These approaches lay a rich foundation for policy evolution. As for policy impact areas excluded from plans, these too span the three dimensions of sustainability among the 28 food system plans analyzed. Impact areas more frequently left out of plans include strategies that address participation in policy-making and stewardship of specific natural resources, two critical components of just and ecologically sound food systems. The absence of these particular policy impact areas, especially in tandem, place the resilience of the food system at risk and may require reactive responses to crises down the road (similar to the response to disruptions in food supply chains during the COVID-19 pandemic), although we acknowledge that these issues may be addressed in planning or policy not specifically identified as food system planning. Finally, communities do not need an exhaustive agenda to develop a relatively comprehensive food system agenda, as we find examples of plans that include a high proportion of policy impact areas with relatively fewer plan elements. Our primary recommendations to address gaps in existing food system plans are to develop new indices of value to measure social and environmental wellness that can be factored into more implementation research, and expanding the conceptualization of food system issues by practitioners as steps toward more holistic planning for sustainable food systems.

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Appendix 1. U.S. Comprehensive Food System Plans at the Substate Level as of October 2021

#	Scale	Jurisdiction	Plans	Year	Included / Reason for Exclusion
1	Region	City of Fargo, and Cass, ND, and Clay, MN, counties	Metropolitan Food Systems Plan	2013	Included
2	Region	Delaware Valley Region, 9 counties across NJ and PA	Eating Here: Greater Philadelphia's Food System Plan	2011	Included
3	Region	Douglass and Sarpy, NE, and Potta-wattamie, IA, counties	Healthy Food for All: A Community Food Security Plan	2018	Included
4	Region	Mid-South Region, 15 counties across AR, MS, and TN	Delta Roots: The Mid-South Regional Food System Plan	2015	Included
5	Region	Northeast Kingdom, Caledonia, Essex, and Orleans counties, VT	Regional Food System Plan for Vermont's Northeast Kingdom	2016	Included
6	County	Pioneer Valley, Franklin, Hampshire, and Hampden counties, MA	Pioneer Valley Food Security Plan	2014	Included
7	County	Arlington, VA	Recommendations for a Food Action Plan	2013	Included
8	County	Beaufort County, NC	Healthy, Fresh, Local Food: An Action Plan for Increasing Availability and Access	2013	Included
9	County	City and County of Denver, CO	Denver Food Vision	2018	Included
10	County	City of Columbus and Franklin County, OH	Local Food Action Plan	2014	Included
11	County	Douglas, KS	Douglas County, KA Food System Plan	2017	Included
12	County	King, WA	Local Food Initiative	2015	Included
13	County	Mendocino, CA	Mendocino County Food Action Plan	2014	Included
14	County	Montgomery, OH	Food Equity Plan	2019	Included
15	County	Multnomah, OR	Multnomah Food Action Plan	2010	Included
16	County	Santa Barbara, CA	Santa Barbara County Food Action Plan	2016	Included
17	County	City and County of Santa Fe, NM	Planning for Santa Fe's Food Future	2014	Included
18	City	Sonoma, CA	Sonoma County Healthy and Sustainable Food Action Plan	2012	Included
19	City	Wake, WA	Moving Beyond Hunger	2017	Included
20	City	Asheville, NC	City of Asheville Food Policy Goals and Action Plan	2017	Included

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#	Scale	Jurisdiction	Plans	Year	Included / Reason for Exclusion
21	City	Baltimore, MD	Baltimore Food System Resilience Advisory Report	2017	Included
22	City	Detroit, MI	A City of Detroit Policy on Food Security	2008	Included
23	City	Greensboro, NC	Greensboro Fresh Food Access Plan	2015	Included
24	City	Niagara Falls, NY	Niagara Falls Food Action Plan	2018	Included
25	City	New York, NY	FoodWorks: A Vision to Improve NYC	2010	Included
26	City	Riverside, CA	Food Policy Action Plan	2015	Included
27	City	Seattle, WA	Seattle Food Action Plan	2012	Included
28	City	Somerville, MA	Somerville Food Plan	2019	Included
Not Included in Data Set					
29	City	New York, NY	Growing Food Equity in NYC: A City Council Agenda	2019	Plan missed in 1st selection phase
30	City	New York, NY	Food Forward NYC	2021	Adopted after sample search period
31	City	Atlanta, GA	East Point City Agriculture Plan	2021	Adopted after sample search period
32	City	City of Phoenix, AZ	2025 Phoenix Food Action Plan	2020	Adopted after sample search period
33	City	Minneapolis, MN	Minneapolis Food Action Plan	—	In development
34	City	Pittsburg and Alleghany County	The Greater Pittsburgh Food Action Plan	2020	Developed after study search period, unclear if adopted
35	County	Wichita and Sedgwick County, KS	Wichita and Sedgwick County Food System Master Plan	—	In development
36	County	San Diego County, CA	San Diego County Food Vision 2030	2021	In development, unclear if being adopted
37	Region	Sacramento Region, 6 counties, CA	Valley Vision Food System Action Plan	—	In development, unclear if being adopted
38	Region	City of Buffalo and Erie County, NY	The Buffalo and Erie County Local Food Action Plan	2020	Adopted after study search period
39	Region	Southeastern Wisconsin Regional Planning Commission (SEWRPC), WI	Regional Food System Plan	—	In development
40	Region	New England Region	A New England Food Vision 2060 Update	—	In development, unclear if being adopted