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Food Supply Chain Shocks and the Pivot Toward Local: Lessons From the Global Pandemic

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Studies of how consumers acquired food provisions during the COVID-19 lockdown indicate that some US consumers and institutional provisioners pivoted to locally produced food. In some locations local food system organizations, along with state governments, created the infrastructure to enable this pivot. Research on this phenomenon—what we call "the local pivot"—has been extensive. However, evidence collected so far has mostly been reports of case studies looking at particular communities. Using Google Trends and Twitter data, we examine whether "the local pivot" was evident as a general trend in the US during the depth of the COVID-19 food supply crisis in 2020, and whether places with high local food infrastructure allowed more people to pivot to local food provisioning. Our Google Trends analysis indicated a temporary rise in searches for local food. However, we found very little discussion of local food systems on Twitter. We then compared three states with a "high," "medium," and "low" local food infrastructure based on the Union of Concerned Scientists rankings. We found a weak but positive relationship between places that were classified as high local food system infrastructure and a pivot toward local food reflected on Twitter. We did, however, find strong support for local restaurant businesses during this period on Twitter, although this support did not necessarily reflect a local food system pivot. We acknowledge that Twitter results are not generalizable to the entire population: local food system actors may not be using Twitter in their interactions, so Twitter activity may not reflect local food system activity in general, or COVID food sourcing behavior in particular. However, our results do indicate the need for more research on whether or not the evidence of a pivot to local food systems during COVID in the United States reflected a larger national movement or occurred in just a few scattered communities. Further research on this topic can help ascertain the ability of local food system infrastructure to provide a resilient response to future global food supply chain crises.

Keywords: COVID-19, local food systems, infrastructure, Twitter, resilience, social infrastructure, food supply chains, supply chain crisis

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INTRODUCTION

The long-term response of consumers to COVID-19 food supply chain disruptions is not yet clear. Both in the United States and globally, all indicators point to a massive switch from eating in restaurants and institutions to eating at home (Bennett et al., 2021), at least during the initial COVID-19 lockdown. Yet, studies of how consumers acquired food provisions during the lockdown indicate two trends. First, national analyses by Mckinsey, Neilsen, and Gallup indicate a significant rise in online food ordering (Ahuja et al., 2021; Neilsen survey reported in Lo et al., 2021; Gallup reported in Brennan, 2021). Many studies found that home food provisioners turned to grocery store delivery and online shopping from large retailers like Amazon and Walmart (Weersink et al., 2021).

Second, food studies researchers reported case studies that indicate a pivot to local food systems, in terms of consumers who pivoted to locally produced food through food system organizations such as Community Supported Agriculture (CSA) farms and food hubs. In addition, a number of state programs were established or expanded to connect local farms with local food hubs and food banks (e.g., Sanderson, 2020; Hilchey, 2021; Oncini, 2021). The news media also covered a number of these stories (e.g., Ricker and Kardas-Nelson, 2020; Roberts, 2020; Robey, 2020). In particular, both news stories and peer reviewed case study research focused on how local food organizations bridged the gap between farmers in need of markets and consumers in need of fresh food. Based on these stories, some have argued that recent global food supply disruptions could lead to a restructuring of the food system in favor of more localized food system infrastructure (LFSI) (Garnett et al., 2020; Hendrickson, 2020; Thilmany et al., 2020) and that LFSIs could make communities more resilient against future food supply chain disruptions (Thilmany et al., 2020).

While research on local pivots are mostly case studies, polling companies collected data on the turn to online and grocery delivery at the national and global level. These studies have found a general turn to national online ordering from companies like InstaCart and Amazon (Redman, 2020). Surveys also note an increase in purchase of shelf-stable vs. fresh food (Food Insights, 2020; Hamstra, 2020). As Morgan (2020) notes in Forbes magazine:

> A year ago, 81% of consumers had never bought groceries online, but during the pandemic nearly 79% of shoppers have ordered online. In August 2019, U.S. online grocery sales totaled $1.2 billion; in June 2020, that total was $7.2 billion. Over that same time period, the number of online customers increased from 16.1 million to 45.6 million and the average spend per order grew from $72 to $84.

While grocery stores are stocking an increasing supply of local food products (Tropp, 2013), and some food hubs have implemented online ordering, indicators suggest that despite the global food supply chain crisis, consumers continued to provision themselves from national and global supply chains.

In contrast, case studies of "the local pivot" report that consumers turned to local food systems in response to the COVID-19 food supply chain crisis. Many states initiated programs that worked with community organizations to connect farmers and consumers. Our article is a first attempt to examine the extent of "the local pivot." We ask, to what extent did people across the country turn to their local food system when restaurants closed and their supermarket shelves were bare? Additionally, were states with a stronger local food system infrastructure—preexisting programs that connect farmers to food providers or consumers, food hubs, food policy organizations—better able to connect farmers and consumers at the local level?

Considering the potential for future food supply chain crises, it is important to determine whether local food system infrastructure (LFSI) is able to respond and adapt to these crises. Therefore, we examine in this study whether the local pivot cases are representative of a larger phenomenon. To do so, we look at data from US national social media. This examination provides a first step toward understanding the local pivot at a larger scale, asking whether it did, in fact, occur more broadly, if the occurrence varied by regions, and how might existing LFSI have influenced its occurrence. In particular, case studies indicate that a strong LFSI can provide a resilient response to future shocks (Thilmany et al., 2020). For this reason, we seek to understand the relationship between LFSI and the response by consumers and other key actors to food supply chain disruption during the COVID crisis.

To frame our research, we draw upon the alternative food network (AFN) and LFSI literature (e.g., Morley et al., 2008; Goodman et al., 2012). Our results are meant to contribute toward a better understanding of whether and how local food systems are currently able to provide a resilient response to future supply chain disruptions. The alternative food movement has long held that the relocalization of food systems, and the shortening of food supply chains, would have a positive impact on citizens by helping to fulfill health and equity goals (see, e.g., Hendrickson and Heffernan, 2002; Holloway and Kneafsey, 2004). Research on "the local pivot" indicates that relocalization could help meet food supply resiliency goals as well.

To understand the general response of food system actors to the first year of the pandemic, we examine two social media sources: Google Trends and Twitter. In our Google Trends analysis, we looked at searches related to terms that we determined are indicative of a local pivot including keywords "local," "food," and "farm." We also searched for terms indicative of a turn to alternative food systems such as "community supported agriculture" and its acronym: "CSA." In addition, we gathered trends on "food pantry" and "food bank," terms that are not identical but do intersect with the broader discourse on alternative food systems (e.g., food justice, food sovereignty). Finally, we gathered trends on the term "local restaurant" based on our discovery of the frequency of that term in our preliminary Twitter analysis.

In our examination of Twitter discourse, we conducted a comparative, nationwide study of tweets from 2015 and 2020 using a range of keywords related to local food systems. We found that while the Google Trends data indicates a strong, although perhaps temporary, pivot to the local in 2020, the Twitter data does not indicate a strong pivot to the local. Instead,

we found Twitter discourse was more likely to focus on support for local restaurants. However, while not as robust as expected, we do see a trend in states identified as having a stronger LFSI (Union of Concerned Scientists, 2018) also have more tweets related to the local pivot. Yet, content analysis of the tweets from three contrasting states finds contextual differences in the concerns about "local" and much of the local discussion involves issues not necessarily related to local food systems or alternative food networks.

This research contributes to the question as to whether or not relocalization is an effective response to the food supply chain crisis, as some studies claim, or if it is a "side-show" to a larger move to ever-greater food system globalization and concentration. Our analysis of whether or not a local food system response is reflected in Twitter discourse is just a first step in answering that question.

BACKGROUND

The COVID-19 pandemic caused severe disruptions in global food supply chains. Potential supply chain disruptions continue to be part of media discourse, illuminating a continuing fragility (see, e.g., Farrer, 2021). Initial supply chain disruptions that occurred in the early months of the pandemic prompted food studies scholars to investigate how local food systems have responded to the crisis. Both *Agriculture and Human Values* (Sanderson, 2020) and the *Journal of Agriculture, Food Systems, and Community Development* (Hilchey, 2021) published flashpoint studies on COVID's effect on the food system. In addition, the Wallace Center (2021), a non-profit that is part Winrock International, coordinates an ongoing resource hub with food NGO partners, and three universities—Penn State, Colorado State, and University of Kentucky—to aggregate research that evaluates the impacts of COVID-19 on the food system.

Longer-term studies of pandemic-induced disruptions are beginning to emerge, and show in a more rigorous and systematic way how local food systems have responded. Both the short-term and the emerging longer-term studies indicate pivots in some consumer behaviors in response to COVID-related food supply chain disruption, especially during the quarantine lockdowns (e.g., Hobbs, 2020; Mahajan and Tomar, 2020; Banerjee et al., 2021). These articles describe the effects of restaurant and school closures, which strongly affected dairy, fishing, and other sectors that had traditionally provided significant proportions of their total production to the food service and restaurant sector (e.g., Petetin, 2020; Maples et al., 2021). News articles described how lockdowns and quarantines led to major changes in how consumers bought food (e.g., Dannenberg et al., 2020; Li et al., 2020; Ricker and Kardas-Nelson, 2020; Roberts, 2020; Robey, 2020). Finally, lockdowns led to significant concerns about how laid-off workers would feed themselves and their families, prompting research on how the food chain disruption affected food security (Gundersen et al., 2020; Laborde et al., 2021; Mueller et al., 2021).

Agriculture and food (agri-food) system researchers took notice of these changes. Scholars looked at whether and how local farmers would both survive without access to their usual food service and restaurant markets and how they would respond as consumers pivoted their food purchases away from these sectors and toward retail establishments (e.g., Weersink et al., 2021). One study, for instance, examined how LFSI might be leveraged to meet the food security needs of consumers who were stuck at home and without income (Casey et al., 2021). Researchers who have studied local food system infrastructure and food relocalization movements were particularly interested in whether the system could and would facilitate a pivot to more localized food provision in response to these disruptions (O'Hara and Toussaint, 2021).

The local pivot studies fall into two categories. First, are the stories of farm production areas that highlight chaotic bottlenecks in supply due to the loss of farm workers (e.g., Ridley and Devadoss, 2020) and food service markets (Hashem et al., 2020). These bottlenecks included both large scale farms such as livestock and milk producers, and fisheries operators, who had to euthanize animals, dump milk, or leave boats in the harbor in response to unexpected and widespread closures of fast-food retailers and chain restaurants [OECD (Organisation for Economic Co-operation Development), 2020; Weersink et al., 2021]. Within this stream of work are studies of smaller farms that served local farm-to-table restaurants that were also left without markets (Severson, 2020). In some states, farms that operate in local and regional supply chains were severely affected by the closure of farmers markets, often instituted by law (Martinez et al., 2021).

Second, are the stories of food sector pivots to new markets as an adaptation to the crisis (for an overview, see Wallace Center, 2021). For example, in one case a small dairy of only 50 cows was able to adapt its operation to supply grocery stores that were otherwise unable to obtain milk through their regular supply chain (Huber, 2020). The third line of research focused on the role of local food system organizations that helped both farmers and consumers adapt to the crisis. These stories describe how local food policy non-profits and other food hub organizations provided resources to connect producers and consumers at the local level (Ammons et al., 2021; Harden et al., 2021; Wallace Center, 2021). While often part of a more conventional food philanthropy sector, case studies showed that food banks also worked to provide connections between farmers without markets and local consumers in need (Thilmany et al., 2020). Moreover, several states implemented local food policy changes to reduce the supply chain bottlenecks and increase food access, followed shortly thereafter by federal policy responses, especially the Coronavirus Aid, Relief, and Economic Security (CARES) Act [HFPP (Health Food Policy Project), 2021]. An example of local policy changes included laws that allowed food service establishments to continue operating or operating in a modified manner (e.g., allowing for curbside pickup), and policies that focused on vulnerable populations that saw regular meal distribution disrupted (e.g., school lunches, Meals on Wheels). This fits with the general understanding that food system resilience depends not only on the impact of the initial

shock or crises, but also how actors, including policymakers, respond to the crises (Béné, 2020).

Most of this research, however, involved examinations of specific case studies and communities: describing their problems, their successes, and the continuing weaknesses of producer-to-consumer local and global supply chains. There has been little work examining this phenomenon at a regional, comparative regional, or national level. In other words, although a number of stories have emerged, detailing the ways that particular groups in particular places worked to link local producers and consumers in new, more resilient, short food supply chains, there has been no overall assessment of the extent to which these efforts have been widespread. Through an analysis of social media, we seek to understand (1) to what extent "the local pivot" described in the case studies was typical in the United States as a whole, and (2) to what extent state food policies and LFSI were important to this pivot.

Alternative Food Networks and Local Food System Infrastructure

Participants in alternative food networks (AFNs: food policy and food movement organizations) in the United States have focused on building of LFSIs (e.g., farmers markets, CSAs, food hubs) as a means of creating alternative food economies. Measuring the benefits of LFSI has been the topic of nearly four decades of agri-food studies research. This body of work has focused on the promise of LFSI to counteract the disbenefits (e.g., loss of farm communities in rural areas; environmental degradation; highly processed, nutrient poor, foods) attributed to the global food system. Sometimes called "short food supply chains" or "distributed" systems (Morgan et al., 2006; Moragues-Faus et al., 2020), researchers have examined the positive potential for AFN/LFSIs to provide communities with more just, fair, healthy, sustainable foods, as well as economically revitalized rural communities (Kloppenburg et al., 1996; Hendrickson and Heffernan, 2002; Sonnino et al., 2016). Some argue, more broadly, that the building of LFSI will lead to greater economic democracy (Whatmore et al., 2003; Moragues-Faus et al., 2020). Other research has problematized these claims, critiquing food re-localization as an idealized and impractical "local trap" (Born and Purcell, 2006) that overestimates the potential benefits that LFSI can offer to "fix" food systems (DuPuis and Goodman, 2005; DeLind, 2011; Hinrichs, 2016). In the light of these critiques, some current research on AFN/LFSIs has taken a more reflexive approach, calling for an assessment of AFN/LFSIs' potential without assuming that LFSI is sufficient to solve food system problems (Goodman et al., 2012; Fonte, 2013).

In accordance with this reflexive approach, we seek to better understand the ability of LFSI to respond to the COVID pandemic. While there is significant research on LFSI response in other parts of the world, our focus is on the United States. Given the lack of national data on COVID-related food system relocalization, we chose to draw from an analysis of social media. Our analysis, therefore, measures: the extent to which consumers pivoted to the local and the role of LFSI in that pivot, as well as the ability of a national social media analysis to answer these questions. Our analysis, therefore, looks at how "local" and "food" are used in Twitter discourse as a whole, which included terms that focus on LFSI—local farms, CSAs, food hubs. Additionally, due to the impact of the lockdown, with large numbers of people unable to earn a living, we also consider food security, thus including food pantry and food banks in our searches. In our approach to the local pivot, we share a strong interest in how LFSI *can* contribute to the pragmatic goal of food system resilience during crises. In other words, we recognize that regions with an existing and perhaps more robust LFSI *should* be more capable of contributing to local food system resilience during supply chain crises. Our broader examination, however, seeks to understand *whether* these LFSI-enhanced local pivots, as described in published case studies, took place more generally or only in particular places at particular times.

Local Food Systems as Resilient Social Infrastructure

As noted above, a great deal of research has been carried out on the community benefits of local food systems. More recently, new conversations about the nature of local interaction have resulted in the emergence of a new concept: social infrastructure. Klinenberg et al. (2020: 653) describe social infrastructure as emerging out of, but distinguished from, the concept of social capital, which "largely attribute bonds and cohesion to cultural preferences and practices of particular groups…the theory of social infrastructure proposes that some variation in social capital is attributable to the quality of physical places and organizations at the neighborhood level." In other words, social infrastructure is rooted in the place-based organizations and interconnections between people possessed with "accessible gathering places, including branch libraries, community gardens and parks, playgrounds, religious and non-profit organizations, and certain commercial establishments (such as diners, cafes, barbershops, and salons), [which] foster interaction" (Klinenberg et al., 2020: 653). As is evident in this list, food plays a part in these notions of gathering places, indicating that elements of the food system would be a component of social infrastructure. Klinenberg's (2018; 2020) work on the Chicago Heatwave of 1995 and in New York resilience planning shows that place-based social infrastructure creates more resilient communities, capable of adapting and protecting themselves from disasters and disruptions. In the same way, one can argue that LFSI can help communities adapt to food supply chain crises by creating the ability to pivot toward local food systems when global and national food systems break down.

As published case studies show, in certain places during the COVID food supply chain crisis, local food systems acted as forms of social infrastructure, enabling communities to adapt food provisioning practices during the crisis (Thilmany et al., 2020; Wallace Center, 2021). Food hubs and local food banks created connections between farmers who lost access to local restaurant provisioning and brought local farmers together with interested consumers through various strategies including online farmers markets, expanded CSA programs, and other forms of adaptive direct marketing (Bachman et al., 2021). Flash studies

looking at the first COVID wave reported that CSA farm shares sold out early in the 2020 sign-up season (White, 2021). In addition, several food banks reported not only increased interest in farmers who could provision these organizations with fresh food, but also increased demand for local produce from customers who had lost jobs (Siddiqi et al., 2021). This case study research shows that, in certain places and at certain times, local food system organizations responded quickly with new efforts to join local producers with local consumers.

It is worth asking, therefore, whether this local pivot was a general phenomenon, whether it was isolated to particular places and, if so, which communities were more likely to pivot toward the local. Secondly, it is also important to ask whether local pivots, where they happened, were linked to LFSI. To answer these questions, we turned to analysis of social media, looking at national and state level data, in combination with the Union of Concerned Scientist's LFSI rankings. We started with Google Trends to capture broad internet-based queries, then conducted a systematic analysis of Twitter "scrapes" before and during the initial 2020 COVID pandemic wave. Then we took a more targeted deep dive into the 2020 Twitter data to examine the context of pandemic era tweets in three states with differing levels of LFSI. We selected the Union of Concerned Scientists LFSI rankings for the breadth of metrics incorporated into their ranking scheme. The LFSI rankings considered five different indicators including: number of farmers markets per 100,000 residents; number of food hubs per 1 million residents; number of food policy councils, networks, coalitions per 1 million residents; capacity for food waste management via composting; and percent of census tracts with at least one healthier food retailer within 0.5 miles of the tract boundary (Union of Concerned Scientists, 2018).

While stronger or weaker LFSI can impact the capacity for consumers to pivot, how governments respond to a crisis also impacts food systems. There were two COVID-19 programs, the Coronavirus Food Assistance Program 1 and Coronavirus Food Assistance Program 2, at the federal level, which then were administered by states (USDA, 2022a,b). For example, within CFAP 1, New York received approximately $231 million, Pennsylvania received a total of $178 million, and Alabama $115 million in support of producers in these three states. The largest recipients of the funding by commodity were dairy farmers in New York and Pennsylvania, $169 million and $107 million, respectively, and cattle farmers in Alabama ($86 million). All three states also used federal funding to support feeding programs, especially for vulnerable populations. However, with a few exceptions (e.g., free school meals to all school children), the majority of this funding was channeled through existing programs, which means states that had more robust programming pre-pandemic had readymade avenues for distribution of additional funding. For example, the Pennsylvania Agricultural Surplus System (PASS) is a pre-pandemic program that makes connections between production agriculture and the non-profit sector to help feed vulnerable populations. In addition to the general PASS appropriation from the state, the Federal CARES Act infused an additional $10 million dollars in funding to PASS (Pennsylvania Department of Agriculture, 2022).

METHODS

This article is a first attempt to analyze the effects of the local food pivot at a national level, focusing on the general extent of the pivot and the role of local food infrastructure in that change. Using Google Trends data, we identified the prevalence of keywords searched during COVID as it related to food and agriculture in the United States. Google Trends has been used by other researchers to study consumption patterns (Kamiński et al., 2020), including COVID-19 era consumption (Schmidt et al., 2020), although it is used more frequently in the business and marketing literature. Based on the Google Trends data, our reading of LFSI case studies, and media reports, we identified 39 keywords to use in "scraping" Twitter. These keywords seemed most relevant to the food supply chain disruptions and responses at the onset of the pandemic. The search for relevant tweets encompassed the entire 2020 calendar year (January 1, 2020–December 31, 2020), with the goal of capturing the start of the COVID-19 pandemic and the supply chain disruptions that occurred in the U.S. To have a point of comparison, the same 39 keywords were used for scrapping tweets for the 2015 calendar year. Only tweets for the 48 contiguous states, plus Washington, D.C. were collected.

We also utilized Twitter data to determine if places with a stronger LFSI, as ranked by Union of Concerned Scientists (2018), were more likely to have social media conversations about local food as a way to adapt to food supply chain crises. The following key words were identified and analyzed: Local Food, Local Restaurant, Local Farm, Food Bank, Food Pantry, Farmers Markets, Community Supported Agriculture (including the abbreviation CSA), and Food Hub. We also included garden in our initial search, but discovered the term garden is widely used to identify restaurant names (e.g., Olive Garden Italian Restaurant™) or a location (e.g., beer garden, garden center), so we did not include garden in our final analysis. We analyzed these data to gauge consumers' interest in existing LFSI (i.e., tweets) and consumers' ability to pivot (i.e., LFSI ranking). We also examine in more detail three regions and states with low, medium, and highly developed local food system infrastructure resources, as identified by the Union of Concerned Scientists rankings, for evidence of adaptation to food supply chain disruption. In other words, we are examining to what extent the LFSI may have contributed to food system resilience during the COVID crisis.

These data included both tweets and retweets. We are primarily interested in 2020, as it included the initial pandemic lockdown and response period, but also used a non-COVID year, 2015, as a point of comparison. By examining the 2020 Tweets where local and food/farm/restaurant were discussed, but not necessarily referring to the local food system, we can make inferences about consumers' concerns and their thoughts about what the concept of local means.

Twitter data is increasingly used by social scientists to study a wide range of topics, including debates surrounding meat consumption (Maye et al., 2021), the rise of vaccine opposition (Bonnevie et al., 2021), and individual's perceptions of their government's handling of the unfolding COVID-19 crisis

(McKay et al., 2021). As a popular form of social media, Twitter has been studied as an important platform for communication during disasters (Kusumasari and Prabowo, 2020). Twitter is also viewed as a mechanism to better understand different attitudes and perspectives on a wide range of topics. As a recent Pew Report states, "Twitter is a modern public square where many voices discuss, debate and share their views" (Wojcik and Hughes, 2019). However, as the Pew report explains, users of Twitter are not representative of the U.S. population (Wojcik and Hughes, 2019). Rather, Twitter users are thought to be younger (40 vs. median age of 47), more educated (42% college educated vs. 31% in the U.S. population), and more likely to be democrat (36% of Twitter users vs. 30% of the U.S. population; while 21% of Twitter users identify as Republican compared to 26% of the U.S. population) than the general public. For these reasons, we cannot assume Twitter results are generalizable to the entire population. However, Twitter does give social scientists the opportunity to explore behavioral practices and attitudes.

Twitter also allows for geolocation of tweets. This feature has proven valuable for social science researchers interested in spatial patterns of behaviors and attitudes. However, in 2019 Twitter announced a change in their geolocation policies, which significantly reduced the number of tweets that are geocoded (Kruspe et al., 2021). For this reason, in our dataset, we have significantly fewer 2020 tweets (233,116) than 2015 tweets (4,118,001). Of the geocoded tweets for both years, we have tweets geocoded at the state level. In our analysis we are able to identify similarities and differences between states, but not within states. Given the significant differences between the 2 years in terms of tweets, as well as differences between states in terms of total tweets (e.g., New York has many more tweets than South Dakota), our results are reported out in percentages. Moreover, to ensure results were not skewed by a few large states (e.g., California, New York), we analyzed percentage of local tweets out of all tweets within each state.

For a deeper analysis of tweets, we focus on three states, New York (NY), Pennsylvania (PA), and Alabama (AL). These three states were selected due to each of the author's prior research and knowledge about food and agricultural issues within these three states. When referring back to the LFSI ranking by the Union of Concerned Scientists, we find that NY, PA, and AL were ranked 14th (high), 26th (medium), and 44th (low) in LFSI, respectively.

We also conducted a thematic analysis (Guest et al., 2011) of each individual tweet from our three states—NY, PA, AL—to better understand the issues of importance, as well as the context of the views expressed. Due to the brevity and casual nature of tweets, we focused on their functional meaning (Van Dijk, 1985) and sought to identify the surface or "semantic appearance" of themes (Javadi and Koroush, 2016). Analyzed were all 2020 tweets that included the word Local and at least one of the following: Food, Farm, or Restaurant. In addition, all tweets were searched for the words Food Bank, Food Pantry, Food Hub, and CSA within these three states and, if present, these tweets were also assessed.

The qualitative analysis began with a preliminary scan of each tweet and the development of a coding scheme. For example, during the initial assessment of LocalFarm tweets several themes emerged including frequent references to farmers markets; buying or supporting local foods, farms, and related businesses; specific foods, beverages, and products; and pandemic related health issues such as sanitation and social distancing. Each of these themes were assigned a code. Using Excel, each tweet (row of data) was coded for each theme (columns of data) accordingly, meaning that each tweet was assigned a 1 for the presence of an identified theme or a 0 for the absence of the theme. When a tweet referenced a type of enterprise, event, or activity that was unclear, a Google search was conducted before coding. For instance, the tweet "Please support the local non-profits [sic] that give your community its heart and soul Happy Dog Farm LLC" was found in a search of LocalFarm tweets in Pennsylvania. A Google search of Happy Dog Farm LLC revealed that it is an apple orchard and cider mill, which was not evident from the name, alone. During coding of this tweet a 1 for the "support/buy local" code was assigned, and a 0 for the "farm market," "food/product," and "human health" codes was used because these codes were not present in the tweet. After initial coding, the codes were reevaluated and the codebook was adjusted to assure consistency, then all tweets were coded again. The goal of this coding procedure was to identify thematic patterns. Thus, the last step was to record the frequency of each coded theme and to summarize the themes as a percentage of the coded tweets. Tweets counted as LFSI were those that specifically referenced nearby farms, farmers, or community supported agriculture (CSA); urban agriculture; farmers markets or specialty markets that aggregate local and/or regional foods; processing or manufacturing businesses that claimed to make foods from locally sourced ingredients (e.g., butcher, baker); and farm-to-table restaurants or special menus at restaurants created to highlight local foods.

FINDINGS

Google Trends Data

The Google Trends data shows a clear pivot to local food issues. Google Trends measures searches "scaled on a range of 0 to 100 based on a topic's proportion to all searches on all topics" (Google, 2021) over a specified period of time. **Figure 1** reflects these data over the period from December 4, 2016 to December 1st, 2021, with the goal of showing change overtime. Each graph emphasizes a few years prior to the pandemic and searches occurring during the COVID-19 pandemic. As the figure shows, searches for terms associated with local and food peaked at or around the date of the state and federal lockdowns for most of the search terms of interest. The exception is "community supported agriculture" (E) which tends to peak cyclically during the CSA signup season in the spring and "Local Restaurant" (C), which peaked both during lockdown and as restaurants re-opened. "Local" (A), "Local Food" (B), "Local Farm" (D), and "Food Bank and Pantry" (F) all peaked during the initial lockdown. "Local Farm" (D) searches continued to be high over time as the food supply chain crisis developed. Because the effect on farmers was covered in the news during that time period, we infer that the rise in searches indicates that the local pivot did occur among consumers, including a turn to local farms and local food, as well

as, to some extent, local restaurants. Interestingly, "Food Bank and Pantry" (F) searches peaked quickly and then stabilized at a somewhat normal rate for this time period.

Twitter Data

Our examination of Twitter data provides a more granular set of evidence on the local pivot. Because our Twitter data is geolocated, we can also examine data by state. We find that, nationwide, Twitter data did not reflect a substantial pivot to the local. When comparing 2015–2020 data, nationwide there was an overall decline in references to Local and Food (30.2% in 2015 and 23.4% in 2020) and Local and Farm (15.9% in 2015 and 12.2% in 2020). In contrast there was an increase in references to Local and Restaurants (14.9% in 2015 and 28.4% in 2020). Not shown in the data tables are data associated with Community Supported Agriculture, Food Hubs, Food Bank, and Food Pantry. These data are not reported because we did not see a percentage change in tweets that reference Community Supported Agriculture or Food Hubs (<0.0% for 2015 and 2020) and the terms Food Pantry and Food Bank appear <1% of the time in both 2015 and 2020.

To understand whether or not states with higher LFSI were more likely to pivot, we grouped states into low, medium, and high LFSI based on the Union of Concerned Scientists (2018) rankings (split equally with 16 states in each stratum). Focusing on all local tweets within each state, we then compared low, medium and high LFSI states. We find a general trend toward states that have higher LFSI tweeting more about local farms in 2020, while states lowest in LFSI were more likely to tweet about local restaurants (see **Table 1**). To ensure no one state in a grouping was an outlier in tweeting excessively about local, we analyzed the percentage of Local Restaurant/Food/Farm tweets by state. The range of Local Food related tweets was 0.5% to 3.5%, with the median being 1.6% of all tweets within each state. In total across all states there were 3,980 (64%) Local Food/Restaurant/Farm tweets out of a possible 6,218 tweets that mention Local (excluding Washington, D.C.) in 2020. However, Local Food/Restaurant/Farm tweets make up only 1.7% of all 233,122 geocoded tweets in 2020.

For the three states in our analysis, 2.7% of Alabama tweets (32 out of 1,195), 2.4% of New York tweets (567 out of 23,275), and 2.6% of Pennsylvania tweets (279 out of 10,844) referred to local. When focusing on the tweets that reference local within each state (see **Table 2**), the smallest percentage of tweets was related to LocalFarm. New York had the largest percentage of LocalFarm tweets at 15.9% in 2020, compared to 19.9% in 2015. LocalFarm was tweeted 12.5% in Pennsylvania, compared to 16.1% in 2015. Only 3.1% of Alabama tweets were LocalFarm, which declined from 12.1% in 2015. Alabama had 37.5% of local tweets focused on restaurants in 2020 compared to 7.6% in 2015, while New York had 24.7% of local tweets focused on restaurants (vs. 15.3% in 2015), and Pennsylvania had 20.4% of local tweets focused on restaurants (vs. 12.6% in 2015). LocalFood represented 28.1% of the 2020 Alabama tweets, compared to 33.3% in 2015. Similarly, 26.5% of tweets from Pennsylvania focused on LocalFood, but this was a slight increase from 24.6% in 2015. The lowest percent of LocalFood tweets among the three states in 2020 were from New York at 22.9%, compared to 24.5% in 2015. Looking more deeply at the 2020 LocalFood tweets, we find differences in the context.

LFSI and the Local Pivot: Content Analysis in More Detail

To further understand the data presented above, we did a more detailed, thematic, analysis of the Local tweets in New York, Pennsylvania, and Alabama. Our goal was to determine the context in which word Local was used, particularly when combined with words associated with LFSI. As shown in **Table 3**, of the Local tweets, AL had the highest percentage of combined restaurant, food, and farm tweets (68.8%, $n = 22$). However, AL also had a far lower percentage (3.1%, $n = 1$) of combined LFSI tweets compared to the other states. The highest percent of combined LFSI tweets were from NY (18.9%, $n = 107$), followed by PA (13.6%, $n = 38$). Surprisingly, there were virtually no LFSI tweets focused on food banks and pantries or CSAs (**Table 4**) and there were no references to "food hubs" in any of the three states (not shown).

Local Restaurant Tweets by State

Across the three states, Alabama had the highest percent (37.5%, $n = 12$) of LocalRest tweets, but none of them were associated with LFSI. Instead, most of these tweets called for supporting local restaurants and to do so via take-out and delivery. One tweet focused on restaurants feeding health care providers. Among all Local tweets from Pennsylvania, 20.4% ($n = 57$) focused on LocalRest. Many of these tweets (65.0%, $n = 37$) focused on supporting local restaurants, primarily via take out. Several others mention a "Support Local Sunday" campaign while another noted the founding of a new NGO, the Independent Restaurant Coalition, which claims to represent independent restaurants and chefs and aims to lobby local, state and federal governments to save local restaurants and their impacted employees from the financial impacts of COVID-19. Support for local breweries was 14.0% ($n = 8$) of the LocalRest tweets. Only two of the Local Pennsylvania tweets (0.7%) mentioned LFSI; a co-op and a cottage bakery noted their connection to local farmers. Of New York's Local tweets, 24.7% ($n = 140$) focused on restaurants. More than half (52.1%, $n = 73$) of these LocalRest tweets were calls for support, particularly via takeout and delivery. None of the LocalRest tweets from New York mentioned local farms, farmers, or any other aspect of LFSI. Instead, 15.7% ($n = 22$) of the LocalRest tweets focused on health-related conditions of restaurant patronage (e.g., masks, social distancing) and meals supplied to health care and frontline workers.

Local Food Tweets by State

Alabama also had the highest percent of LocalFood (28.1%, $n = 9$) tweets, but only one was associated with LFSI. This tweet referenced farms associated with the USDA Farmers to Families Food Box program. These food boxes were authorized with the passage of the 2020 Families First Coronavirus Response Act, and were a response to reports of farm-level food waste coupled with increasing food insecurity. The Act authorized the US Secretary of Agriculture to buy fresh produce, dairy, and meats, and to distribute these products to food banks and non-profits

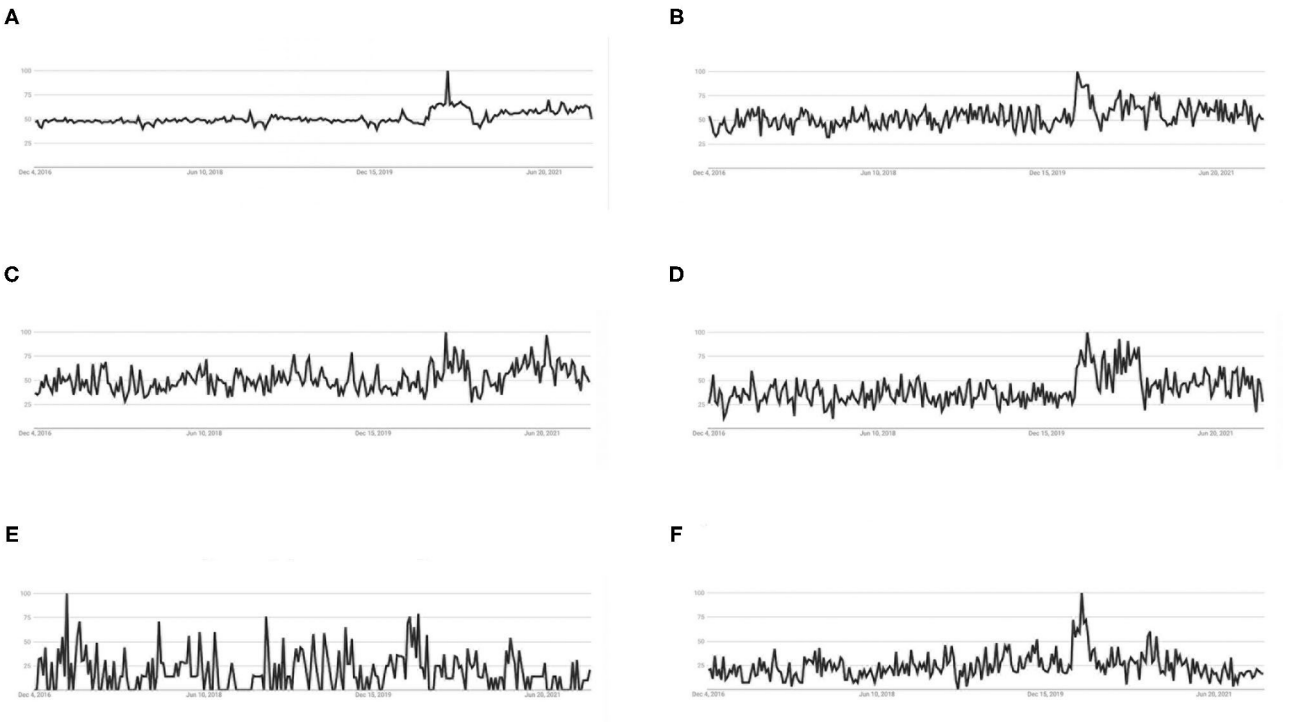

FIGURE 1 | Google Trends Local Food Related Searches between December 4, 2016 and December 1, 2021. **(A)** Local. **(B)** Local food. **(C)** Local restaurant. **(D)** Local farm. **(E)** Community supported agriculture. **(F)** Food bank and food pantry.

TABLE 1 | 2020 Results for local restaurant/food/farm tweets out of all local tweets (n = 6,218) for states ranked low, middle, and high in local food system infrastructure (LFSI)[a].

State rankings	States (UCS LFSI ranking)	LocalRest	LocalFood	LocalFarm
Lowest LFSI	NH, ND, GA, SC, AZ, IN, MS, LA, KY, AL, TN, UT, TX, AR, SD, OK	34.2%	25.4%	9.2%
Middle LFSI	FL, VA, MT, NE, OH, MI, WI, MN, PA, NJ, NM, WY, WV, MO, IL, ID	28.3%	22.7%	10.9%
Highest LFSI	VT, ME, OR, WA, CA, DE, CO, NC, KS, IA, MA, MD, NY, CT, NV, RI	25.5%	23.0%	15.1%

[a] *Data excludes Washington, D.C. because UCS does not include D.C. in their rankings.*

TABLE 2 | Results of local restaurant/food/farm tweets out of all local tweets within the state.

State	UCS LFSI* score	LocalRest		LocalFood		LocalFarm	
	2018	2015	2020	2015	2020	2015	2020
AL	44th	7.6%	37.5%	33.3%	28.1%	12.1%	3.1%
PA	26th	12.6%	20.4%	24.6%	26.5%	16.1%	12.5%
NY	14th	15.3%	24.7%	24.5%	22.9%	19.9%	15.9%

* *Union of concerned scientists local food system infrastructure.*

who would provide the Boxes to families in need (Agricultural Marketing Service, 2020). Of the remaining eight tweets, one focused on food security broadly (i.e., a food drive competition between two major universities) whereas the remaining tweets focused on restaurants. Of these six restaurant tweets, half ($n = 3$) supported a specific establishment because it was owned and/or operated locally.

Of the Local tweets from Pennsylvania, 26.5% (n = 74) were LocalFood tweets, 9.5% (n = 7) of which mentioned food associated with LFSI including farmers, farmers markets,

TABLE 3 | Results of thematic analysis of local restaurant/food/farm tweets out of all 2020 local tweets within the state to identify tweets that reference local food system infrastructure (LFSI).

State	LocalRest		LocalFood		LocalFarm		Combined Tweets	
	Total	LFSI	Total	LFSI	Total	LFSI	Total	LFSI
AL	37.5% ($n = 12$)	0.0% ($n = 0$)	28.1% ($n = 9$)	3.1% ($n = 1$)	3.1% ($n = 1$)	0.0% ($n = 0$)	68.8% ($n = 22$)	3.1% ($n = 1$)
PA	20.4% ($n = 57$)	0.7% ($n = 2$)	26.5% ($n = 74$)	2.5% ($n = 7$)	12.5% ($n = 35$)	10.4% ($n = 29$)	59.5% ($n = 166$)	13.6% ($n = 38$)
NY	24.7% ($n = 140$)	0.0% ($n = 0$)	22.9% ($n = 130$)	7.4% ($n = 42$)	15.9% ($n = 90$)	12.5% ($n = 71$)	63.5% ($n = 360$)	18.9% ($n = 107$)

TABLE 4 | Results of thematic analysis of all 2020 food bank, food pantry, and community supported agriculture (CSA) tweets in the state to identify tweets that reference local food system infrastructure (LFSI).

State	Food bank/pantry		CSA	
	Total	LFSI	Total	LFSI
AL	0.3% ($n = 4$)	0.0% ($n = 0$)	0.1% ($n = 1$)	0.1% ($n = 1$)
PA	0.3% ($n = 29$)	0.0% ($n = 1$)	0.0% ($n = 0$)	0.0% ($n = 0$)
NY	0.2% ($n = 42$)	0.0% ($n = 1$)	0.0% ($n = 0$)	0.0% ($n = 0$)

and community gardens. Another 28.4% ($n = 21$) of the Pennsylvanian LocalFood tweets called for supporting a local business regardless of type. Overall, the highest percent (40.5%, $n = 30$) of LocalFood tweets referred to an unspecific food business or event (e.g., wine and food festival, food photographer, unnamed establishment), six of which focused on locally crafted beer. None of the latter noted the source of the ingredients brewed. A specific restaurant was mentioned in 31.1% ($n = 23$) of LocalFood tweets, including food trucks ($n = 6$) and food delivery ($n = 2$). Food security was the next most common topic, but it represented only 8.1% ($n = 6$) of the LocalFood tweets in the state.

The lowest percent of LocalFood tweets were from New York (22.9%, $n = 130$), but the state also had the highest percent of Local tweets related to LFSI (7.4%, $n = 42$). More than a third of New York's LocalFood (34.6%, $n = 45$) tweets focused on restaurants and other food related businesses such as bars and other unspecified food related establishments. More than a third of the LocalFood tweets (36.2%, $n = 47$) also made a direct plea to support local businesses, more than half of which were specific to restaurants (51.1%, $n = 24$). Food delivery and food trucks were noted in 2.9% ($n = 17$) of the New York LocalFood tweets. New York LFSI tweets focused on farms and farmers (31.0%, $n = 13$), specialty grocers or markets that sold local foods (21.4%, $n = 9$), and various food businesses associated with food and beverage production using locally sourced ingredients (e.g., soup maker, micro-bakery, tasting room) (19.0% $n = 8$). In addition, 11.9% ($n = 5$) of the LFSI tweets focused on waste composting including references to Flower City Pickers, an NGO focused on food recovery and Happy Scraps, a business that supplies local farms. New York LFSI tweets also noted supplies for community or urban gardens; a business taking orders for "organic farm to table local food;" a complaint about the "phalanx of regulatory hurdles" faced by local food systems actors; and an online service, Phrankly, that tracks the source of foods that are claimed to be local. Food security was the topic of 10.8% ($n = 14$) of the New York LocalFood tweets and of those, three specifically noted a collaboration among local farmers and a food pantry, whereas the others centered on the efforts of non-profits or faith-based organizations. In contrast, one stated that "Local food shops are our food security." There were also a small number (1.4%, $n = 8$) of LocalFood tweets that focused on feeding essential workers, particularly hospital personnel.

Local Farm Tweets by State

LocalFarm yielded a smaller percent of Local tweets from all three states. Only one of these tweets came from Alabama and it was specific to food security. In contrast, LocalFarm represented 12.5% ($n = 35$) and LFSI was 10.4% ($n = 29$) of the Local tweets from Pennsylvania. None of the Pennsylvanian LocalFarm tweets referenced food security, but one noted the importance of helping students make good food choices. Instead, LocalFarm tweets from Pennsylvania tended to focus on LFSI (82.9%, $n = 29$), naming a specific farm or farm stand (62.9%, $n = 22$), and to a lesser extent, a farmers' market (20.0%, $n = 7$). Many of the LocalFarm tweets that called for "support local" or "buy local" (31.4%, $n = 11$) also referenced a specific farm, although a few were general statements such as "Please support the local non-profits [sic] that give your community its heart." Many of the LocalFarm tweets from Pennsylvania also noted specific foods or locally produced items such as small batch cheese, Amish pies, and various forms of artwork (60%, $n = 21$). Of the LocalFarm tweets that were food focused, five concerned "burgers" or breakfast that was served at a pub or restaurant.

Of the Local tweets from New York, 15.9% ($n = 90$) were LocalFarm and 12.5% ($n = 71$) of Local were about LFSI. Like Pennsylvania, most LocalFarm tweets focused on a specific farm or farm stand (55.6%, $n = 50$), more than half of which (52.0%, $n = 26$) concerned specific foods that could be purchased—fruits, vegetables, meats. While farmers' markets received less attention than farms, when combined with specialty grocers that

aggregated local foods, it represented 23.3% ($n = 21$) of New York LocalFarm tweets. Nearly a quarter of the LocalFarm tweets (23.3%, $n = 21$) specifically requested support for local farms or farmers. One, stated, however, "We are an open air farmers market providing an ESSENTIAL service to this city…." Food was the context of 15.6% ($n = 14$) of New York LocalFarm tweets; promoted were special meals, foods, or wines made with locally sourced ingredients. Only three of the New York LocalFarm tweets referenced food security, two of which said, "Pay the Farmer, Feed the People," an effort by the NGO, World Central Kitchen. World Central Kitchen was founded by celebrity chef José Andrés in 2010 to provide meals post-disaster. Some of the LocalFarm (16.7%, $n = 15$) tweets appeared to be health related as they referenced, for instance, protective measures—masking, social distancing, drive-thru farm tours—and operating according to a "new normal."

Food Pantry/Bank and CSA by State

All states had <1.0% of Local tweets that referenced food banks and food pantries. Of Local tweets that focused on a Food Bank/Pantry in Alabama (0.3%, $n = 4$) none of them were relevant to LFSI. Instead, these Local tweets focused on groups that supplied donations, as well as general bank/pantry operations. Pennsylvania had the same percent (0.3%, $n = 29$) of Local tweets relevant to Food Bank/Pantry, and only one was about LFSI. The latter tweet mentioned farmers and it appeared to be associated with the USDA Farmers to Families Food Box program. Like Alabama, the Pennsylvanian Food Bank/Pantry tweets concerned operations (e.g., hours, location), especially volunteerism (38.5%, $n = 10$) and donations (30.8%, $n = 8$). The lowest percent (0.2%, $n = 42$) of Local tweets that focused on food banks or pantries was from New York. Again, only one of these tweets reflected LFSI, a specific reference to eggs. The most common topic among the New York Food Bank/Pantry tweets was donations (40.5%, $n = 17$), nearly half of which (47.1%, $n = 8$) were related to actual meals; tweets about volunteerism were secondary (19.0%, $n = 8$).

Of all Local tweets from across the three states, CSA (community supported agriculture) yielded only one and it was from Alabama (0.1%). None of the three states had tweets referencing food hubs.

Summary of Local Tweets by State

Overall, the tweets from each state have somewhat different concerns. In Alabama, "local" was generally limited to supporting place-based businesses, particularly restaurants. Saving local businesses, including restaurants, was important to Pennsylvanian tweeters, but there was also an emphasis on events, activities, and especially products associated with the character or culture of state (e.g., craft beer, Amish foods). New York tweeters also showed a commitment to the well-being of restaurants, but they expressed a wider range of concerns, many of which were focused on LFSI, and to a lesser extent, food security, and public health.

Among all Local tweets, restaurants including pubs and food trucks was the most common topic. Very few of these tweets referred to either a chain or a farm-to-table restaurant. Instead, many focused on supporting specific neighborhood and/or family-owned businesses. Tweets about LFSI tended to focus on a specific business, as well. Surprisingly, food security including food banks and pantries, received relatively little attention via Twitter, even though the Farmers to Families Food Box program was a major policy initiative at the national level and the CARES Act provided important state and local level resources [HFPP (Health Food Policy Project), 2021].

DISCUSSION

We analyzed Google Trends and Twitter discourse to examine the extent to which consumers pivoted to the local during the 2020 COVID-19 food supply chain crisis. While Google Trends data showed a strong, although brief, pivot to local, the comparison of tweets pre- and during the food supply chain crisis did not reveal a major pivot to local. In fact, a smaller percentage of tweets included local as a topic in 2020 compared to 2015. There could be three reasons for our results: first, it may be the case that Twitter does not reflect the behavior we are seeking to examine. LFSI and consumers looking to provision themselves during the pandemic may not mention their concerns on this form of social media. Twitter is a very public form of communication and people looking to provision themselves may not find Twitter to be useful for this purpose. Secondly, despite massive lines at food banks early on in the pandemic, Twitter is an unlikely communication choice for the food insecure, both because Twitter users tend to be younger and over-represented among professional occupations and because the public nature of Twitter is not a place where people are likely to publicize something as private as hunger. However, we did find that people used Twitter to support local restaurants, indicating that Twitter is used by communities for local purposes beyond provisioning. In that case, tweets supported a local food business rather than a local food system. It is interesting, however, that Twitter was used more sparingly to support local farmers who had lost markets, particularly during the shutdown, even in rural areas. This is particularly important to note given that tweeters tend to be demographically similar—younger, professional, Democrats—to those who engage in local food movements (Wojcik and Hughes, 2019). Because people did use Twitter to talk about local restaurant issues, we believe that the lack of Tweets on local food systems provides some evidence that "the local pivot" was not a nationwide phenomenon.

This leads to the question of whether LFSIs have the capacity to respond to food supply chain crises. We did find that states with a strong LFSI had a somewhat higher percentage of tweets referring to local in general and to locally related to AFNs in particular, confirming previous case studies of the role of LFSI coordinating local pivots.

Our analysis of Twitter data also indicates that social media was used by some LFSI during the crisis. New York tweets about local food systems included World Central Kitchen (WCK). As previously mentioned, WCK was initiated by José Andrés as an extension of DC's Central Kitchen. Similar to Central Kitchen's mission, the goal of WCK is to provide emergency food relief,

but with a focus on sustainable, locally sourced foods, and strengthening LFSI. Given that one of Twitter's features is its global reach (Leetaru et al., 2013) it might be WCK, as a global actor, was more likely to use this form of social media. Takhteyev et al. (2012) did find that two-fifths of all tweets are tied to the local. However, they also note that compared to other social media, Twitter forges weaker social ties.

Our findings indicate that using Twitter data to discover LFSI activity needs to be treated with caution. Except for World Central Kitchen, LFSI members do not appear to be using Twitter to inform communities about food availability, need for volunteers, or participating farms. People without food also did not appear to engage with Twitter to find food. Instead, Google Trends indicates that people were more likely to do a google search.

One major finding from our analysis is that "local" is not solely the provenance of the relocalization movement. "Local" can mean many things not related to AFNs (see Hendrickson and Heffernan, 2002). In particular, people can support local businesses even if they are not familiar with or part of AFNs. Tweets indicate that people were more concerned about getting their local restaurants over the hump of the crisis than they were with local food systems resilience or local farmers. Local farms, farmers, and farm markets were hardly mentioned, although they were mentioned the most in states with higher LFSI. The idea of supporting local restaurants in general was high across all locations, but contextually, states higher in LFSI were more likely to engage with topics related to supporting LFSI, indicating some overlap in the idea of maintaining local economies as alternatives to global food supply chains, even if those restaurants were dependent on global food providers. Concomitantly, there was little indication that residents of local places were concerned about the survival of chain restaurants in their cities and towns, despite the fact that many chain restaurants experienced a rise in drive-in customers during this period (Northfield, 2021). In other words, we learned that local means different things to different people. And yet, states with higher LFSI do have a higher percentage of tweets focused on farms or locally sourced foods. This may indicate that places with strong social infrastructure may be overlapping, but not entirely congruent with, alternative local food system infrastructure.

Research on responses to the COVID-19 food supply crisis indicates that LFSI can play a strong role in maintaining food system resilience. However, as our data show, the role that LFSI may have played so far has been spotty and varied from one place to the next. This does not mean that tweeters are uninterested in local issues: a deep dive into the tweets found strong support for local businesses and presumably the local community. We found that only through a deeper dive into the tweets were we able to understand what people were talking about when they mentioned local food. Keywords mean different things in different tweets. Thus, it was necessary, we found, to analyze tweets through a manual content analysis. What we found was informative. For example, reference to "local farm" is as likely to refer to a wedding venue as to a food source.

The literature on LFSI contributions to food system resilience during supply chain crises indicates a strong potential role for AFNs to strengthen LFSI to respond to crises. It makes sense that maintaining active shorter food chains function as insurance to protect from potential future global food chain crises. It remains to be seen as to whether the places that did pivot to the local will maintain a strong LFSI between crises. However, it is important to note the critical role of local, state, and federal policies in not only maintaining food supplies during the crisis, but also ensuring a resilient food system (Darnhofer, 2014; Béné, 2020). Critical perspectives on relocalization remind us that placing the burden on small local organizations to "fix" the food system may be asking too much of these actors. Instead, some agri-food scholars have called for a "multi-actor" approach (e.g., Morgan et al., 2006; Sachs, 2021) to a more resilient food system. Such multi-actor engagement is something not reflected in Twitter discourse. However, the results of our analysis of Twitter suggests that a multi-scalar approach during moments of crises or food system disruption may be necessary to support LFSI. Recognizing that Twitter is not generalizable to the entire U.S. population, further studies need to explore in a more systematic manner a more multi-scalar approach. Additional studies should further explore questions surrounding the types of "local" that consumers seek to support.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article. Further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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