

A pilot study assessing the impacts of COVID-19 on Tennessee farmer social needs and pandemic-related anxiety

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Abstract

The COVID-19 pandemic affected the U.S. food systems in unprecedented ways, from restaurant closures to supply chain disruptions. Farmers were left to discover innovative ways to market and sell their perishable products in the absence of traditional outlets like restaurants and farmers markets.

As farmers are important anchors to local food systems, the impact of the pandemic on their health needs to be explored. This pilot study explored how COVID-19 influenced Tennessee-based farmers' social needs, as well as their anxiety related to COVID-19. We conducted a cross-sectional pilot survey among Tennessee farmers to screen for social needs (e.g., financial, childcare, utilities, food, and housing security) and pandemic-specific anxiety, and to assess the utilization of farmer-specific COVID-19 relief funding opportunities. Forty farmers from all three regions in Tennessee participated. There was an increase in positive screens for all measured social needs items from pre- to during COVID-19. Respondents reported increased financial (24.9%), childcare (21.7%), food (20.7%), utility (10.4%), and housing (7.1%) insecurity during the pandemic. Most

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respondents reported some level of anxiety related to COVID-19 (mean score 20.0 ± 5.65). More than half of respondents indicated they did not apply for any farmer-specific COVID-19 relief funding (54.3%). Tennessee farmers are experiencing gaps in their social needs during COVID-19; however, many did not utilize the financial assistance programs available to them. Future studies, with larger, more representative samples, should further explore the relationship between farm household social needs and the underutilization of both farmer-specific external relief funding and other social safety net programs during and beyond the pandemic.

Keywords

COVID-19, Pandemic, Farmers, Social Needs, Mental Health

Introduction and Literature Review

Since March 2020, the U.S. agriculture system has faced numerous disruptions from the COVID-19 pandemic. Farmers have been affected by local, regional, and national shutdowns, interruptions in the food supply chain, and closures of farmers markets and restaurants. Some farmers found themselves dealing with increased short-term localized demand for products (e.g., beef and produce), while others found themselves with limited outlets in which to sell their products, resulting in food waste and product disposal (e.g., eggs and milk) (Johansson, 2021). These vulnerabilities in the food system, revealed by the COVID-19 pandemic, required farmers to adapt quickly. Farmers were forced to shift to direct-to-consumer sales, to seek alternate avenues for their products (e.g., on-farm public events), and to use online sales platforms (Broadaway & Wolnik, 2020; Gunther, 2020; Raison & Jones, 2020; White, 2021).

In response to these uncertainties and their potential ramifications for domestic farmers, the federal government instituted direct relief to farmers through nationwide programs including the

Coronavirus Food Assistance Programs (CFAP 1 & 2) (U.S. Department of Agriculture [USDA], 2021a), and statewide channels were instituted, such as the Tennessee CARES Act: Coronavirus Agricultural and Forestry Business Fund (CAFB) (Tennessee Department of Agriculture, 2020). The initial CFAP 1, launched in May 2020, provided direct financial assistance to producers of eligible commodities that suffered at least a 5% price decline due to COVID-19 (USDA, 2021b). Critics noted various flaws in the CFAP 1 structure (e.g., strict eligibility criteria, price loss payments) that limited access to funding for many farmers (National Sustainable Agriculture Coalition, 2020). Addressing these pitfalls, the second CFAP iteration was launched in September 2020 with expanded eligibility criteria (e.g., flat-rate crops¹ and sales commodities), which led to allocation of more funds to more farmers than the original program (USDA, 2021c). In conjunction with these federal efforts, the state of Tennessee launched the CAFB to aid farmers and others in the food and forestry businesses, and agriculture-based nonprofits that experienced operational disruptions brought on by COVID-19 (TDA, 2020).

Although there has been some media coverage of nationwide farmer-specific relief programs (Jackson-Smith & Veisi, 2021), additional empirical data on the impact and perceived accessibility of these federal and state programs among Tennessee farmers will strengthen the rationale to continue and expand these and similar programs. In addition, these relief programs were specifically designed to assist small- to medium-sized farms (annual incomes <\$900,000²); however, concerns about inadequate funding to relieve all farmers and unequal distribution favoring larger-scale landowners have been raised (Lioutas & Charatsari, 2021). As the production of small U.S. farms appears to be more vulnerable during COVID-19 than large farms (Haqiqi & Horeh, 2021), it is particularly important to explore small-farm utilization of these programs.

¹ Part of the expanded eligibility in CFAP2 was the inclusion of flat-rate crops. These are crops that did not meet the 5-percent price decline needed for eligibility in CFAP1 or crops that did not have available data to estimate price changes affected by COVID-19. Additionally, the list of sales commodities was expanded in CFAP2 compared to the first program iteration.

² All values mentioned in this paper are U.S. dollars.

Although the COVID-19 pandemic is not the first crisis to affect the U.S. farm sector (Alston, 2007; Sutherland & Glendinning, 2008; Thompson & McCubbin, 1987), these farmer relief funds may help to address pandemic-related gaps in social needs among farmers if fully utilized. Previous research has shown the influence of historical crises in the agricultural sector on farm household social needs (Botterill, 2007; Chang et al., 2011; Sutherland & Glendinning, 2008). In addition, various social struggles faced by farm households have the potential to negatively influence the farm business and operations (Chang et al., 2011; Inwood, 2013, 2017; Inwood et al., 2018; Mishra et al., 2010). This dynamic and complex relationship between farm household social needs and farm business and operations, and the role of COVID-19 farmer relief funds within this existing relationship during the current crisis, are yet to be fully explored.

Along with disruptions to their businesses and potential impact on household social needs, the COVID-19 pandemic may have created and/or exacerbated various health-related issues among farmers. Prior to COVID-19, a study of farmer well-being found that factors beyond farmer control (e.g., broad structural issues such as farm policy influencing prices and tariffs) were perceived as most stressful as they related to mental health status (Henning-Smith et al., 2021). As a factor outside their control, COVID-19 may have increased farmer stress and anxiety due to pandemic-related changes in their business models and in social-needs stability (e.g., financial and food security). Because prior to the pandemic the farmer population disproportionately suffered from depressive symptoms and chronic stress (Pappas, 2020; Reed & Claunch, 2020), understanding the impact of COVID-19 on the anxiety status of farmers is of growing concern. Exploring the impact of COVID-19 on the social needs and pandemic-related anxiety of farmers can help to identify and inform interventions for farmers potentially most at risk during the pandemic. To fill this gap, the primary objectives of this pilot study were to explore 1) the impact of COVID-19 on social needs, pandemic-related anxiety, and farm business, and 2) the utilization of and barriers to

accessing farmer-specific relief funding during COVID-19 among Tennessee farmers.

Methods

Study Design and Participants

The cross-sectional survey study was distributed to farmers residing in Tennessee from December 2020 to February 2021. During this time, social distancing guidelines and mask mandates were left up to local authorities across the state and COVID-19 vaccinations were only available to limited numbers of Tennesseans meeting age- and risk-based criteria (Tennessee Office of the Governor, n.d.). Participants were recruited through social media outlets and emails from regional farmers market managers, whose contacts were obtained through a publicly available regional farmers market database (Pick TN Products), using voluntary response sampling methods. Participant inclusion criteria included being at least 18 years old and owning/operating a Tennessee-based farm in the year 2020. All eligible participants completed an electronic informed consent form before proceeding to the survey. No incentive was offered for participating in the study. All study procedures were reviewed and designated as exempt by the University of Tennessee at Chattanooga Institutional Review Board (IRB) (IRB #20-169).

Data Collection and Survey Instrument

This pilot study used a questionnaire administered via an online survey platform (QuestionPro). Of 46 individuals who were eligible and consented to participate in the study, respondents who completed at least 50% of the survey questions were included in analyses ($n=40$).

The 47-item survey included six sections focused on farm characteristics (8 items), farm product marketing and sales prior to and during the pandemic (4 items), farmer-specific COVID-19 relief funding (5 items), social needs (14 items), COVID-19-related anxiety (7 items), and socio-demographics (9 items). The survey was reviewed and revised based on feedback and additions from stakeholders of a regional farmers market network (farmers and farmers market managers) before dissemination.

Social needs screening tool

The social needs screener items were adapted from the Social Needs Screening Tool compiled by the American Academy of Family Physicians (2018). This tool is composed of existing instruments validated for screening core social determinants of health (SDH), including housing (Montgomery et al., 2013), food (Hager et al., 2010), utilities (Cook et al., 2008), childcare (Children's HealthWatch, 2018), employment (Garg et al., 2007), and financial (Aldana & Liljenquist, 1998) security. Minimal adaptations (e.g., adding "prior to COVID-19" or during COVID-19 before each screener item) were made, in order to compare responses between time points.

COVID-19 Anxiety Scale

The validated COVID-19 Anxiety Scale ($\alpha=0.736$) was used to explore participant anxiety related to COVID-19 (Chandu et al., 2020). Each item on the seven-item scale ranges from 1 to 4, with lower values indicating a higher anxiety score. Individual item scores are aggregated with possible COVID-19 Anxiety Scale score totals from 7 to 28.

Data Analysis

All data analyses were performed in SPSS version 28.0. Descriptive analyses were used to calculate the frequency and percentage for categorical variables and the mean and standard deviation for continuous variables. Direct content analysis was conducted in Microsoft Excel on open-ended questions. Common responses (i.e., those reported by more than one participant) were reported in the results.

Results

Participant Sample

Farm and sociodemographic characteristics of the 40 participating Tennessee-based adult farmers are summarized in Table 1. Participants reported operating farms across all three geographic regions of Tennessee with more than half (57.5%) located in the Eastern region. Most participants (92.5%) indicated that they operated a small, for-profit farm (77.5%).

A majority identified as White (89.3%), non-

Hispanic/Latinx (96.4%) and reported having at least a college or vocational degree (71.5%). At the time of the survey, most participants indicated that they did not participate in either the Supplemental Nutrition Assistance Program (SNAP) (92.6%) or other government assistance programs (88.9%), and had active health insurance (81.4%) (private, public, or combination).

Farm Product Sales During the Pandemic

Most participants indicated no change in their gross annual farm product sales from 2019 to 2020 (65.0%); however, a few noted either an increase (17.5%) or a decrease (15.0%) in overall farm sales. Participants reported change in where and how their products were sold during COVID-19. Fewer participants sold their products at local farmers markets (68.6%) and restaurants (20.0%) during the pandemic compared to before the pandemic (77.1% and 28.6%, respectively). Conversely, more participants sold products through Community Supported Agriculture (CSA) programs (31.4%) and on their farms (62.9%) during compared to before the pandemic (28.6% and 51.4%, respectively). Although many participants reported experiencing a variety of business barriers during COVID-19, summarized in Table 2, 17.1% of participants reported that they did not encounter any barriers.

Utilization of and Barriers to Accessing Farmer-Specific Funding During COVID-19

Nearly half of the respondents (19, 47.5%) indicated that they did not apply for any COVID-19 relief funding. When pressed for reasons for not applying, respondents reported a variety of barriers, detailed in Table 3, to accessing and/or utilizing the available funding resources. Additionally, respondents provided open-ended responses which indicated that they did not apply for funding because they felt other people were more in need of funding than they were.

Of those indicating they applied for at least one type of COVID-19 relief funding (13; 32.5%), only one reported that their application was not funded. Of those funded, a majority reported receiving either between \$100–\$4,999 (5) or \$5,000–\$9,999 (5) from all sources (i.e., CFAP 1,

Table 1. Farm and Sociodemographic Characteristics of a Sample of 40 Tennessee Farmers

Characteristic	n (Valid %)	Characteristic	n (Valid %)
Farm Geographic Region in Tennessee		Gender Identity	
Eastern region	23 (57.5)	Female	14 (50.0)
Central region	10 (25.0)	Male	13 (46.4)
Western region	6 (15.0)	Prefer not to answer	1 (3.6)
Prefer not to answer	1 (2.5)	Race	
Farm Operation (years)		White	25 (89.3)
Beginning farmers (<1-10)	20 (50.0)	Prefer not to answer	3 (10.7)
Established farmers (11->20)	18 (45.0)	Ethnicity	
Prefer not to answer	2 (5.0)	Non-Hispanic/Latinx	27 (96.4)
Primary Farm Ownership^b		Hispanic/Latinx	0 (0.0)
Male-owned	22 (55.0)	Prefer not to answer	1 (3.6)
Female-owned	20 (50.0)	Education	
Non-binary-owned	2 (5.0)	High school diploma/GED	2 (7.1)
Racial or ethnic minority-owned	0 (0.0)	Some college	6 (21.4)
Prefer not to answer	6 (15.0)	College/Vocational degree	20 (71.5)
Farm Size (based on average gross annual sales)		SNAP Participant	
Small (<\$350,000 annual income)	37 (92.5)	Yes	2 (7.4)
Medium (\$350,000-\$999,999 annual income)	0 (0.0)	No	25 (92.6)
Large (>\$1 million annual income)	1 (2.5)	Other Government Assistance Program Participation^c	
Prefer not to answer	2 (5.0)	Yes	3 (11.1)
Farm Production Acreage		No	24 (88.9)
<1	4 (10.0)	Health Insurance Status	
2-9	15 (37.5)	Private health insurance	13 (48.1)
10-49	9 (22.5)	Public health insurance	5 (18.5)
>50	10 (25.0)	Private and public health insurance	4 (14.8)
Prefer not to answer	2 (5.0)	No health insurance	4 (14.8)
Farm For Profit or Not-For-Profit Status		Prefer not to answer	1 (3.7)
For profit	31 (77.5)	^a Sample size varies due to missing responses	
Not-for-profit	2 (5.0)	^b Participants had the option to select more than one response option	
Prefer not to answer	7 (17.5)	^c Other government assistance programs included Medicare, Medicaid, Supplemental Security Income, Temporary Assistance for Needy Families, Children's Health Insurance Program, housing assistance	
Age (years)			
26-35	2 (7.1)		
36-45	9 (32.1)		
46-55	4 (14.3)		
55-64	5 (17.9)		
>65	8 (28.6)		

CFAP 2, and CAFB), and only two participants were granted more than \$10,000. When asked what other resources helped support product sales during COVID-19, respondents reported utilizing online sales outlets (40.0%), forming partnerships with other farms or community organizations

(25.7%), and utilizing wholesale markets (17.1%). Respondents provided additional open-ended responses, stating that “less government involvement,” “less restrictive COVID-19 regulations at farmers markets and restaurants,” “more USDA processing facilities,” “increased assistance with

marketing of products and locations,” and “increased funding/grant opportunities” would be helpful resources now or in the future to support product sales. The remaining respondents (8) did not indicate whether they applied for funding.

Social Needs Prior To and During COVID-19

Participant social needs screener results before and during the pandemic are summarized in Table 4. The results indicated an increase in the number of positive screens for all measured social needs items during COVID-19 compared to before the pandemic.

Anxiety Related to COVID-19

Overall, respondents reported some level of anxiety related to COVID-19 (mean score 20.0 ± 5.65). Only four participants had no indicators of anxiety related to COVID-19. These results are summarized in Table 5.

Discussion

Our results indicated that the social needs of Tennessee farmers, including financial, childcare, food, utilities, and housing security, were negatively impacted by COVID-19. These social determinants of health are conditions that can affect a wide range of risk factors and health outcomes among farmers (Braveman et al., 2011).

Table 2. Barriers to Grow, Raise, Market, and/or Sell Products Experienced During COVID-19 by a Sample of Tennessee Farmers

Farm Business Barrier ^b	n ^a (Valid %)
Limited outlets for products	15 (42.9)
Restrictive safety measures enforced at farmers markets	12 (34.3)
Restaurant closures	11 (31.4)
Difficulty locating seeds, animal feed or other supplies	10 (28.6)
Issues finding reliable labor	8 (22.9)
Long wait times for processing meat products	7 (20.0)
Inability to pay staff	4 (11.4)
Limited funds for required PPE equipment	2 (5.7)
Did not encounter any barriers during COVID-19	6 (17.1)

^a Sample size varies due to missing responses.

^b Participants had the option to select more than one response option.

Table 3. Barriers to Utilization of and/or Access to Farmer-Specific Funding During COVID-19 of a Sample of Tennessee Farmers

Farmer-Specific Funding Barrier ^a	n=19 (Valid %)
Unaware of funding sources	6 (31.6)
Not meeting the application requirements	6 (31.6)
Difficulties with application process	3 (15.8)
Not needing funding at the time	3 (15.8)
Missing application deadline	1 (5.3)
No internet access to apply for funding	1 (5.3)
Other	3 (15.8)

^a Participants had the option to select more than one response option.

While the widening of SDH disparities has been noted in other U.S. populations during the pandemic (Ku & Brantley, 2020), considering the vital role of farmers in local food systems, to

Table 4. Comparison of Positive Social Needs Screener Results Prior to and During COVID-19 Among a Sample of Tennessee Farmers

Social Needs Screener Item	Positive Screen Prior to COVID-19 n (Valid %)	Positive Screen During COVID-19 n (Valid %)	Difference in Positive Screen (During - Prior to COVID-19) n (Valid %)
Housing	1 (3.2)	3 (10.3)	2 (7.1)
Food Insecurity	4 (13.8)	10 (34.5)	6 (20.7)
Utilities	1 (3.4)	4 (13.8)	3 (10.4)
Child Care	2 (6.9)	8 (28.6)	6 (21.7)
Finances	5 (17.9)	12 (42.8)	7 (24.9)

Table 5. Item-Level and Overall Mean, Standard Deviation, and Range of COVID-19 Anxiety Scale Scores Among a Sample of Tennessee Farmers

COVID-19 Anxiety Scale Item	Mean (\pm SD)	Range ^a
How afraid are you of acquiring COVID-19 when going into the public?	2.7 (\pm 1.02)	1-4
How frequently are you feeling worried that you have acquired COVID-19?	3.1 (\pm 0.91)	1-4
How frequently is your sleep getting affected because of thoughts relating to COVID-19?	3.2 (\pm 0.97)	1-4
How frequently are you avoiding conversations on COVID-19 related information out of fear/anxiety?	3.3 (\pm 1.02)	1-4
How worried are you of acquiring COVID-19 when an unknown person is coming closer to you?	2.6 (\pm 1.05)	1-4
How anxious are you getting when knowing information on COVID-19?	2.8 (\pm 0.96)	1-4
How concerned are you when people cough or sneeze because of the fear that you may acquire COVID-19?	2.4 (\pm 1.05)	1-4
Overall COVID-19 Anxiety Scale Score	20.0 (\pm5.65)	10-28

^a Scale: 1=always, or extremely afraid, worried, anxious, or concerned; 4=never, or not at all afraid, worried, anxious, or concerned
 SD: Standard Deviation

address their social need gaps first may result in a more robust pandemic response that better serves other vulnerable communities. The identification of existing social need gaps, exacerbated by the pandemic, among Tennessee farmers found in this pilot study warrants larger-scale studies that explore SDH disparities among farmers across the nation.

Without these social needs in place, existing health disparities among farmers may widen, such as anxiety-related mental health issues (Reed & Claunch, 2020). Although most participants in this sample indicated pandemic-related anxiety at some level, higher levels of COVID-19-related anxiety have been noted in the general population (Twenge & Joiner, 2020). This may potentially be explained by underreporting due to perceived negative stigma accompanying mental health issues and associated treatment, as previously noted among farmers (Judd et al., 2006). With farmers already experiencing high levels of stress prior to the pandemic, it may be hard to differentiate between pandemic-related and non-pandemic-related anxiety. Moreover, farmers operating in Tennessee may not view the risks related to COVID-19 through the same lens as farmers operating in states with different political environments. Furthermore, the COVID-19 Anxiety Scale (Chandu et al., 2020) used in the study measured participant anxiety directly related to COVID-19. This instrument did not consider

stress and anxiety indirectly related to COVID-19 and, when used alone, may not provide a comprehensive assessment of the stress-related mental health status of farmers during the pandemic. In future studies, multiple instruments to measure various mental health conditions would be warranted.

Many Tennessee farmers in this sample also faced disruptions to their businesses during the pandemic. Due to limited sales outlets and restrictive COVID-19 safety measures, many participants reported shifting from traditional sales outlets like farmers markets and restaurants to direct-to-consumer and online sales, which has been noted in previous research (Gunther, 2020). Despite these barriers and shifts in their business models, nearly two-thirds of the farmers in this study indicated no change in their gross annual farm product sales from 2019 to 2020. This finding may be explained, in part, due to the resilience in local food supply chains (Thilmany et al., 2021). Increased demand in direct-to-consumer farm sales, increased use of online sales platforms, and the rise in consumer support for locally sourced products that has been noted before and during the pandemic may have provided opportunities for farmers to meet their pre-pandemic product sales (O'Hara & Low, 2016; Thilmany et al., 2021). Additional technical assistance for farmers to build upon and maximize these acquired business

adaptation strategies (e.g., expansion to online sales outlets) could promote continued farmer resilience during and beyond the pandemic.

Although the participating farmers indicated an increase in social hardships during the pandemic, similar to farmer experiences in other crises (Sutherland & Glendinning, 2008), few utilized the available financial assistance programs to bridge pandemic-related gaps. While previous challenges in the farm sector have been shown to impact the social needs of farm households (Botterill, 2007; Chang et al., 2011), many agricultural policies have not focused on these household-levels needs. These historical shortcomings of farm policy to address the well-being of farm households (Becot & Inwood, 2020) may help to explain the underutilization of COVID-19 farmer relief programs in this sample. With this historical farm policy context in mind, farmers in this study may not have recognized their eligibility for the various funding opportunities, as many did not report changes in their annual product sales related to the pandemic. Moreover, participant comments such as that they “felt others needed the funding more” and that “less government involvement [would be helpful for product sales]” highlight the potential stigma associated with government funding/assistance noted previously among farming communities (Martinez-Brawley & Blundall, 1991). Due to the local political environment surrounding COVID-19, this existing stigma may have been heightened among Tennessee farmers, potentially leading to a lower uptake of the pandemic-specific financial resources.

These findings, along with a previously outlined research agenda by Becot & Inwood (2020), highlight the need for additional, larger and more representative research studies exploring the interplay between farm household social needs and the normalization and destigmatization of both farmer-specific pandemic-related relief programs and other social safety net programs and policies, as they could be effective avenues to address social needs and stress concerns among farmers.

Limitations

Although results from this study are not generalizable beyond the scope of our sample, this pilot

study has highlighted the need for larger-scale studies to better understand the impact of COVID-19 on social needs of diverse farmers. Most study participants identified as non-Hispanic/Latinx, White farmers. There may be greater gaps in social needs and financial inequities among socially disadvantaged farmers—defined by the USDA as farmers “belonging to groups that have been subject to racial or ethnic prejudice” (USDA Economic Research Service [USDA ERS], 2021a, para. 4)—that were undetectable due to underrepresentation in the sample. Although socially disadvantaged farmers make up a much smaller proportion of farmers in Tennessee and nationwide compared to farmers who have not experienced racial or ethnic prejudice (USDA National Agricultural Statistics Service [USDA NASS], 2019), this pilot will inform enhanced recruitment efforts to ensure participation of historically underrepresented farmers in larger-scale national studies to explore if COVID-19 has affected diverse groups of farmers in different ways.


This pilot study aimed to measure the impact of business-related COVID-19 relief programs on the farmer population; however, with the emphasis on household social needs, further exploration of household-related COVID-19 relief programs is needed to fully understand the broader impact of social policy on farm household social needs (Becot & Inwood, 2020). In addition, the farm typology (USDA ERS, 2021b) used to categorize farm size based on product sales was a limitation in this study. Most respondents (92.5%) were categorized as small farms (< \$350,000); therefore, in a future study inclusion of the hobby farm category (< \$10,000) will be beneficial for further comparisons within the small-farm category. Finally, although the social needs screener items aimed to distinguish between the time periods prior to and during COVID-19, these data were collected during the pandemic and may not provide the same level of accuracy as a pre- and post-survey.

Conclusion

Tennessee farmers were experiencing gaps in their social needs during COVID-19; however, many did not utilize financial assistance programs available to them. Future studies should further investigate the

dynamic interplay between farm household social needs, farm business and operations, and utilization and destigmatization of farmer-specific relief funding and other social safety net programs and policies as these may be avenues to address the social-need hardships among farmers during and beyond the pandemic.

This pilot study functions as a framework for future research. A next step is to conduct a large-scale nationwide study, including adequate representation of historically underrepresented farmers, to explore the impact of COVID-19 on social

needs among and between diverse U.S. farmers. This study will include additional instruments and items to measure mental health comprehensively and to explore the impact of other COVID-19 relief programs and other social policies on household social needs of farmers. In conclusion, as farmers are fundamental players in our local food systems, identifying ways to improve access to, and utilization and normalization of federal and state funds and programs to support the business and social needs of farmers is vital in the effort to build sustainable food systems for us all. 

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