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Farmers markets' transition to online sales during the COVID-19 pandemic: Case study of Sonoma and Marin counties, California

Edna Ely-Ledesma [a] * and Hanbing Liang [b]
University of Wisconsin-Madison

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Abstract

In 2020, food supply chains faced unprecedented challenges due to the COVID-19 pandemic. Supply chain disruptions interfered with existing organizational habits in local farmers markets and other direct-to-consumer (DTC) market channels. For some producers, DTC sales at farmers markets, roadside stands, and community supported agriculture (CSAs) increased, while others, such as restaurants, distributors, and institutions, lost their wholesale clients. Online platforms helped increase the reach of farmers markets during the COVID-19 pandemic. Using a mixed methods approach, and connecting a variety of datasets, this study aims to understand the market landscape for Sonoma and Marin counties in California. Findings contrast with parallel trends at the national level. The paper makes policy recommendations for how online sales platforms can serve as assets to increase farmers markets' customer pool and resilience of local food systems across communities.

[a] * *Corresponding author:* Edna Ely-Ledesma, PhD, Associate Professor, Department of Planning and Landscape Architecture, University of Wisconsin–Madison; 925 Bascom Hill; Madison, WI 53706 USA; eledesma@wisc.edu; https://orcid.org/0000-0002-7095-0090

[b] Hanbing Liang, Doctoral Candidate, Department of Planning and Landscape Architecture, University of Wisconsin–Madison; 925 Bascom Hill; Madison, WI 53706 USA; hliang8@wisc.edu; https://orcid.org/0009-0007-3392-8330

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Data available upon request.

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Introduction

The COVID-19 pandemic disrupted the food system and impacted all levels of the food supply chain, including production, distribution, and access (Canada, 2020; Morales, 2020a; Weinkauf, 2023). Disruptions manifested in major bottlenecks in the food chain, panic buying, and stockpiling, which exacerbated limitations in production capacity and influenced a demand for certain staple foods such as dried goods (Hobbs, 2020; Weinkauf, 2023). During the unprecedented start of the COVID-19 pandemic in spring 2020, supply chain disruptions interfered with existing organizational habits in local farmers markets and other direct-to-consumer (DTC) market channels (Pesci et al., 2023). In places like Sonoma and Marin counties, a series of wildfires and rising operating costs also impacted many local producers. DTC channels pivoted to meet consumers in a new, unexpected way, by expanding access to and engaging with consumers who may not have previously had access to these sales opportunities.

Prior to the pandemic, DTC online sales had seen 70% growth (Botting, 2020), a trend that continued to increase during the pandemic at farmers markets, roadside stands, and community supported agriculture (CSA) operations. Others, such as farmers, experienced a decrease in DTC sales due to the loss of wholesale clients such as restaurants, distributors, and institutions. Even markets that did not see a drop in DTC sales experienced an increase in operational costs due to required personal protective equipment (PPE) and other public health measures (O'Hara et al., 2021). According to a 2020 Farmers Market Coalition survey of members, 93% of respondents reported added operational costs to manage the impacts of COVID-19 at their markets (Feldman, 2020).

Nationwide, farmers markets remained open throughout the pandemic, and market managers worked quickly to update COVID-19 safety policies, pivot market operations, and offer support to vendors impacted by the pandemic (Morales, 2020a, 2020b, 2020c). Many market organizations launched contact-free online sales platforms and curbside pickup for immunocompromised and medically fragile customers. For many consumers, the convenience of online ordering and food delivery were already high priorities. While e-commerce platforms and food delivery services had grown over the past 10 years, these services exploded during the pandemic. For example, Instacart saw three years' projected growth —500%—take place during March 2020 alone (Wiggers, 2020). For others, online farmers markets with delivery options and that allowed consumers to pay with a Supplemental Nutrition Assistance Program (SNAP)/electronic benefits transfer (EBT) card (also known as CalFresh in California) made farmers markets accessible for the first time (Van Soelen Kim et al., 2024). In an effort to reach more low-income consumers, farmers markets began to adopt EBT machines to process SNAP and Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) benefits. Despite growing interest and support for EBT use (Parsons & Morales, 2013a, 2013b), adoption at some farmers markets remains underwhelming (Wetherill & Gray, 2015). Only 40% of farmers markets offer SNAP/EBT payment options at the market, and many cite barriers such as the lack of internet access, increased burden for processing payments, and increased need for bookkeeping as the top barriers to doing so (Kellegrew et al., 2018). In Sonoma and Marin counties, approximately 19,000 households (4.8% of the Marin County and 7.3% of Sonoma County population) are SNAP-eligible.

DTC does not require the transaction be face-to-face. However, there is limited research on how farmers markets can successfully leverage the trends of online sales models for their local advantage and as a form of resilience. Resilience has four useful definitions (Woods, 2015), two of which are relevant here: (1) the capacity to withstand shocks or pressures to maintain a basic structure or process (Schipanski et al., 2016); and (2) in the context of food systems, the ability to maintain food production and security (Kuhmonen, 2020; Weinkauf, 2023). In particular, resilience is adaptability and "graceful extensibility" (Woods, 2015). Following Woods (2015), our research posits resilience as a trait in producers who are technologically

literate or are willing to learn and adapt to avoid losing potential sales (Weinkauf, 2023).

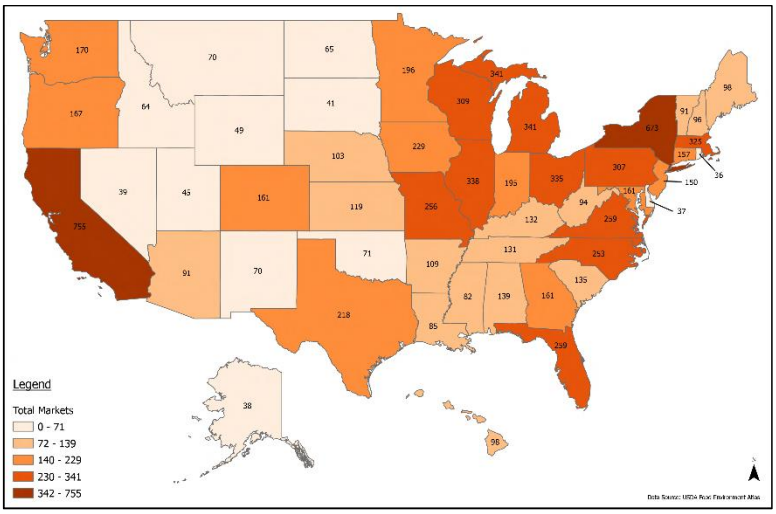
The primary goals of this research are to gain a holistic understanding of farmers markets operations using online sales platforms, best online sales practices, and how these sales increases consumers' access to farmers markets. Additionally, this study aims to identify how online sales models at the national, regional, and local levels served to increase community resilience through the adoption by farmers markets of online sales platforms during the COVID-19 pandemic. A sales platform is defined as the website or software used for conducting sales; the sales model is the combination of sales platforms, membership, and associated fee structures selected by the market.

California is an ideal state to study regionally due to the scale of farming operations and DTC sales. According to the U.S. Department of Agriculture (USDA) Food Environment Atlas USDA Economic Research Service, 2025), California was the state with the greatest number of farmers markets in 2019 (see Figure 1a). While the number of markets dropped across the U.S. during and after the pandemic (see Figure 1b), California rose as the state with the highest number of markets (583), outnumbering New York. Additionally, in 2022, California's direct sales of $2.9 billion[1] accounted for 33% of the U.S. total, making it the top-ranked U.S. state for direct farm sales (Pesci et al., 2023; U.S. Department of Agriculture, National Agicultural Statistics Service [USDA NASS], 2022). Based on the results from the Local Food Marketing Practices Survey in 2020 (USDA NASS, 2022), California was the top state in direct farm sales in the U.S., accounting for 16% ($1.4 billion) of the total sales nationwide.

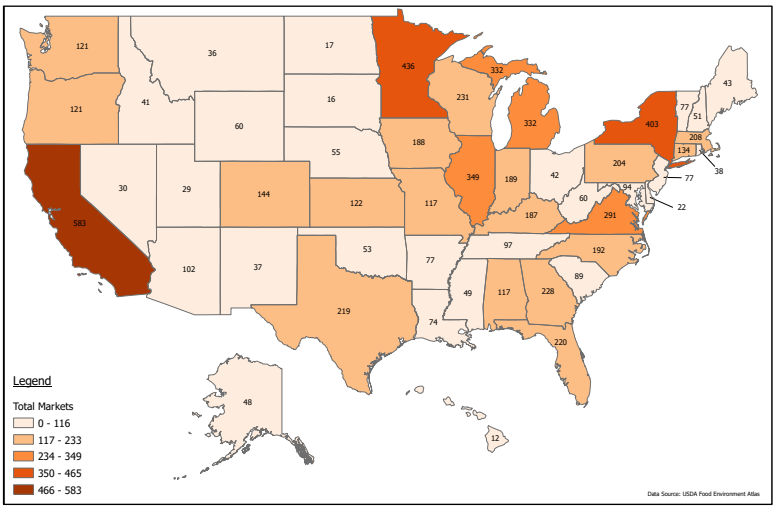
Using a mixed methods approach, the paper connects a variety of datasets to understand the local and regional market landscapes and online sales models used during the COVID-19 pandemic in Sonoma and Marin counties in California and contrasts these findings with parallel trends at the national level. The paper then presents a discussion emphasizing the potential long-term impacts for

Figure 1. Farmers Markets in the United States per State: Pre- and Post-COVID-19 Pandemic

(a) Farmer Markets per State, 2019



(b) Farmer Markets per State, 2020–2024



Source for both maps: USDA Economic Research Services (2025).

[1] All amounts in this article are in US dollars.

use by marginalized communities. The paper concludes by making policy recommendations to support online sales platforms as a strategy to increase both farmers markets' customer pool and the resilience of local food systems across communities.

Literature Review

The paper begins with a review of current literature on food access to understand barriers to shopping at farmers markets, and the rise of challenges for markets and DTC to transition to online sales platforms.

Dynamics of Food Access at Farmers Markets

Marketplaces, and farmers markets in particular, create public places and community anchors that foster economic opportunities and social interactions (Ledesma & Giusti, 2021; Ledesma et al., 2021; Morales et al., 1995). More directly, farmers markets connect consumers and community groups to local food systems (Warsaw et al., 2021). Farmers markets offer shoppers more than access to healthy food; for many consumers, factors outside the cost of food influence their decision to shop there (Brown & Miller, 2008). Since Brown and Miller's 2008 study, a broad list of benefits identified include the desire to support local producers, contribute to social justice, and spread awareness of agroecological practices (Giampietri et al., 2016; Thilmany et al., 2008; Warsaw et al., 2021). According to recent studies, pandemic-related disruptions to local food systems reinforced the perception that farmers markets are a means of increasing local community support (Weinkauf, 2023).

Yet, structural barriers, such as affordability, racialized market dynamics, and accessibility challenges, shape who benefits from farmers markets and how effectively farmers markets serve diverse communities (Alkon & Agyeman, 2011; Born & Purcell, 2006; Guthman, 2008; Guthman et al., 2006; Morales, 2011; Roubal et al., 2016). Research has found that perceptions of these markets often differ along racial and socioeconomic lines. Low-income customers, particularly those who identify as Black, Indigenous, or People of Color (BIPOC)[2] who receive nutrition assistance, sometimes feel excluded from or stigmatized while shopping at farmers markets (Freedman et al., 2016; Lambert-Pennington & Hicks, 2016; Misyak et al., 2015; Russomanno & Jabson Tree, 2021).

Studies suggest that some White vendors and customers may hold biased assumptions about low-income BIPOC shoppers, particularly regarding their attitudes toward environmental issues (Larimore, 2018; Oths et al., 2016). These vendors often perceive such customers as prioritizing affordability and practicality over environmental concerns. Research, however, shows that low-income BIPOC consumers share comparable environmental values with their wealthier White counterparts (Larimore, 2018; Oths et al., 2016). An affluent customer may view shopping at farmers markets as a cultural practice, while low-income and BIPOC shoppers tend to see them as essential sources of food access (Larimore, 2018). This divergence is also reflected at the market level. Predominantly White-led farmers markets frequently emphasize sustainability and organic farming. In contrast, Black-led markets center their missions around racial identity and food justice (Alkon, 2008). These differences underscore how farmers markets are not just economic or environmental spaces but are also sites of social and cultural negotiation, where inclusion and accessibility remain ongoing challenges.

In addition, while farmers markets have expanded in number, their locations are often concentrated in more affluent neighborhoods with better infrastructure and higher socio-economic status (Freedman et al., 2016; Sage & McCracken, 2017; Schupp, 2019, 2016). As a result, this uneven distribution contributes to the prevalence of low-income and low access (LILA) zones as defined by the USDA (Johnson & Stewart, 2021). These zones are in critical food insecurity locations.

Some communities with a small number of resources have attempted to establish farmers mar-

[2] The BIPOC acronym—standing for Black, Indigenous, and People of Color—aims to address the unique challenges faced by these communities due to systemic oppression. This focus underscores a need for targeted measures to dismantle entrenched forms of discrimination specific to these groups.

kets to increase access to fresh food. These efforts frequently receive less funding and institutional support than those in wealthier, predominantly White, middle-class areas (Lambert-Pennington & Hicks, 2016; Larimore, 2018). Challenges such as limited financial and social capital, lack of knowledge and networks, competition with surrounding businesses, and difficulty attracting and retaining vendors—who tend to see higher profits in more affluent areas—make long-term success difficult (Larimore, 2018; Lowery et al., 2016).

Adoption of Online Sales Platforms

The use of the internet for marketing and sales has increased since the 1990s (Basu & Chakraborty, 2011) but has accelerated in the last decade. In the context of local food, 2015 marked the first time the USDA's Local Food Marketing Practice survey collected and published data on online sales as a direct-to-consumer market channel (Pesci et al., 2023; USDA NASS, 2016). That year, a study found that online sales accounted for 6% of DTC sales by U.S. farmers (Pesci et al., 2023), and 8% of DTC farmers had an online marketplace (O'Hara & Low, 2020).

Online grocery sales are trending upward, a change which the COVID-19 pandemic accelerated. Prior to the pandemic, in 2019, an estimated 43% of Americans purchased groceries online; 21% did so monthly and 10% biweekly (Cohen et al., 2020; Younes et al., 2022). In 2020, online grocery sales grew by at least 54% (Editors, 2021; Pesci et al., 2023). By March 2020, at least 31% of U.S. households purchased groceries online (Pesci et al., 2023; Thakker, 2020). Total online grocery sales rose from $96 billion in 2020 to $112 billion in 2021 (EMARKETER Editors, 2021; Pesci et al., 2023).

Many producers and farmers markets increased their marketing and media efforts during the pandemic. Many expanded their distribution channels to include online marketplaces as a way of adapting to pandemic-related challenges (Mesa Manzano, 2023; Nichols et al., 2022; Pesci et al., 2023). For farmers markets, online sales platforms became an essential distribution stream during the COVID-19 pandemic (Pesci et al., 2023; Weinkauf, 2023). A recent study on online sales at California farmers markets during the pandemic found that the majority of farmers (73%) who used online sales platforms saw an increase in overall profitability. Meanwhile, only 15% of farmers who did not use online sales platforms saw an increase in profits (Pesci et al., 2023).

Rise in Resilience

Recent studies have assessed how COVID-19–related disruptions and adaptations among local producers signal the need for adaptation (Morales, 2020a, 2020b, 2020c) and contributed to resilience in local food systems (Weinkauf, 2023). Some argue that adapting their businesses to meet the challenges of the COVID-19 pandemic through online sales, producers contributed to the resilience of local food systems (Weinkauf, 2023). For example, increasing the use of online sales and marketing between March and December 2020 was positively and significantly associated with California farmers' increase in overall profitability, reduced concerns about the pandemic's impacts on their farms, and a greater ability to respond to the disruptions of the pandemic (Durant et al., 2023; Pesci et al., 2023). Online sales and marketing thus became tools that helped farmers withstand shocks and become more resilient during the pandemic.

Rise in Inequities

The need to adapt to changes during the COVID-19 pandemic exacerbated existing inequities at markets. It was well established prior to the pandemic that people with limited English proficiency do not perceive farmers markets as appealing or culturally relevant (Cotter et al., 2017) and are less likely to enroll in SNAP (Smith et al., 2017). The increased marketing costs of new online distribution channels, and their subsequent online fees, resulted in challenges for both producers and consumers (Pesci et al., 2023; Weinkauf, 2023). Key challenges for customers included technology skills and language barriers. A study looking at online SNAP/EBT sales at farmers markets between March and April 2020 found that reaching older, more rural SNAP users at farmers markets was challenging. Customers who used online SNAP/EBT sales platforms at farmers markets tended to be younger,

more technologically savvy, and from urban settings (Hingle et al., 2020). Transiting to online sales platforms posed the unintentional challenge of increasing access issues for customers with limited or no English proficiency (Hingle et al., 2020). During the pandemic, the percentage of Spanish-speaking SNAP/EBT users dropped by 55% when the platforms went online (Hingle et al., 2020).

The digital divide was also a salient inequity for producers who did not feel sufficiently tech-savvy to use online sales platforms (Nichols et al., 2022; Pesci et al., 2023). Some rural producers have limited broadband access (Salemink et al., 2017), which reduces potential online sales and profits (Detre et al., 2011; Low & Vogel, 2011; Uematsu & Mishra, 2011; Pesci et al., 2023; Reddy, 2018). Finally, a transition to online sales required time and resources that some producers lacked (Schreiber et al., 2022).

Gap in the Literature

Studies have shown that farmers markets produce economic impact through a multiplier effect, which measures the number of times money circulates at the local level and through the resulting jobs these activities create (Umbrella, 2017; Warsaw et al., 2021). A higher multiplier effect indicates greater economic benefit to communities, job creation, income stabilization, and, most importantly, promotion and investment in the growth and development of human capital (Warsaw et al., 2021).

There remains, however, more to learn about DTC marketing channels. Studies on topics such as online sales platforms can support both farmers and customers (Pesci et al., 2024; Rahe et al., 2023). In a recent study on online DTC sales during the COVID-19 pandemic in California, researchers highlight that certain online tools may contribute to enhancing sales more than others and, for some farmers, there are significant barriers to adoption (Pesci et al., 2024). The present study addresses barriers to adaptation and explores online sales platforms at the national, regional, and local levels during the COVID-19 pandemic with an emphasis on their potential long-term impacts for use by marginalized communities.

Methodology

The primary goals of this research are to gain a holistic understanding of of how farmers markets in Sonoma and Marin counties adapted to online sales platforms during the COVID-19 pandemic, to compare these trends with national patterns, and to identify best practices that can inform more accessible and equitable online sales models for marginalized communities. This study analyzes farmers markets' online sales presence at the national, regional, and local levels. At the national level, the study relies on content analysis conducted in April 2022. Using the Google search engine, we identified farmers markets that were actively operating online at the time. The search used a combination of keywords including *farmers market, farmers' markets, CSA, online sales, curbside pick-up,* and *delivery*. Variations in spelling and phrasing (e.g., use of apostrophes) were included to ensure broader coverage. Terms like *delivery, online sales,* and *curbside* were paired with farmers market–related keywords to capture content on online sales models. Farmers markets identified with active online stores were analyzed based on their fee structure, mode of delivery, nutrition incentive programs, SNAP/EBT acceptance, and type of online sales platforms used.

At the regional level, we conducted a second content analysis in July 2022 focused on the state of California. A list of 352 WIC-authorized farmers markets was obtained from California WIC Authorized Farmers Market List, maintained by the California Department of Public Health as part of the federally administered Farmers Market Nutrition Program (FMNP) (California Department of Public Health, 2022). These markets participated in the FMNP, which allows eligible WIC participants to use FMNP coupons at designated farmers markets. Each market was searched using Google search engine and manually evaluated based on its online presence and operational model. The analysis applied five criteria that emerged from an initial round of content analysis and were subsequently used as data points for assessing each market's digital and operational characteristics: (1) affiliation with farmers market organization, (2) operation of an online sales platform, (3) maintaining a presence of a social media page (e.g., Facebook), (4) online

option for CSA, and (5) online option for donation. Markets were not required to meet all five criteria; rather, these indicators were used to document and compare the features present across markets.

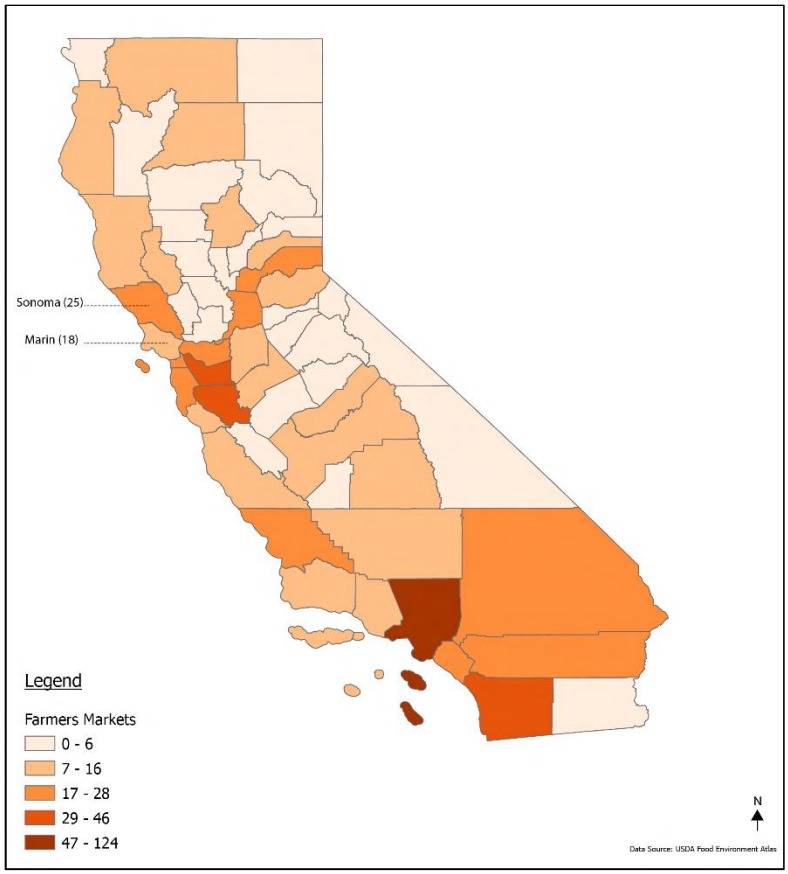
Locally, we purposefully selected Sonoma and Marin counties in California. According to the USDA Food Environment Atlas, there were 42 farmers markets operating in these two counties (see Figure 2). We obtained and analyzed online sales data from the Agricultural Community Events Farmers' Markets organization (ACE), operating in Sonoma and Marin counties in California, to understand DTC sales at a local level. ACE was overseeing 10 farmers markets in the region during our study period. At the beginning of the COVID-19 pandemic, ACE launched an online sales platform in response to the statewide stay-home order. This case study uses descriptive statistics to analyze ACE's online sales performance from April 2020 to March 2022.

Additionally, a vendor survey was conducted by ACE between November 2020 and January 2021 at three Sonoma County farmers markets to gather general information about vendor characteristics and market experiences. Vendors were recruited on-site during regular market operations. A total of 45 surveys were collected, with 38 used for analysis after excluding incomplete responses. The survey was classified as exempt from institutional review board requirements due to minimal risk.

At the local scale, the Sonoma and Marin counties of California was selected as a case study for further analysis because of its unique socio-economic condition and strong agriculture presence. According to the USDA Food Environment Atlas (USDA ERS, 2025), there were a total of 42 farmers markets operating in these two counties in 2019 (see Figure 2). These counties are known for their strong commitments to sustainable agriculture, organic farming, and community-driven food systems. While both regions have a significant presence of small-scale and organic farms, their socio-economic and demographic compositions differ. Marin County, with a median household income of approximately $142,785, is one of the wealthiest counties in the state, featuring an older, predominantly White population (U.S. Census Bureau, 2024b). Sonoma County, while still relatively affluent with a median household income of around $100,707, has a more diverse population, with a growing Hispanic community making up nearly 30.3% of residents (U.S. Census Bureau, 2024c).

Despite its affluence, Marin County is also one of the most racially disparate counties in California, ranking second statewide in racial inequities as of 2021 across indicators such as life expectancy, homeownership, and per-capita

Figure 2. Farmers Markets in California per County in 2019



Source: USDA Economic Research Services (2025).

income. This marks a slight improvement from 2017, when it was ranked the most racially disparate county in the state. In terms of income disparities, White residents earn a per-capita income of $86,045, compared to $29,893 for Latine residents. The high cost of housing exacerbates this divide, with the median home value in Marin County at approximately $995,800 and a median rent of $2,069, making affordable housing inaccessible to many lower-income residents. This affordability crisis has resulted in displacement, with BIPOC communities being disproportionately affected. The COVID-19 pandemic further exacerbated these disparities, underscoring the need for targeted efforts to address racial and economic inequities (Marin County, 2022).

In Sonoma County, food insecurity remains a persistent issue. A recent study indicated children, marginalized communities, and households led by single mothers are disproportionately affected in Sonoma County, with food insecurity rates "worse than the national average and worse than in previous years" (Sonoma County, 2024, p. 27). Additionally, both Sonoma and Marin counties have faced repeated natural disasters—including wildfires, floods, and high winds—even before the emergence of the COVID-19 pandemic. These disruptions significantly affected local food supply chains. In response, farmers markets in the region took proactive steps to meet community needs, launching an online platform to enhance accessibility and resilience amid ongoing challenges.

Findings

Several key findings emerged from this study. At the national level, research found that farmers markets and farms of varying scale used different online sales models. The online sales platforms were actively used during the COVID-19 pandemic as an additional channel to maintain sales and marketing activities. The platforms' fees depended on their capacity and the services offered. For example, markets serving smaller populations or regions tended to charge higher service fees, while those offering greater variety and serving larger areas were able to offer lower fees and more flexible delivery options. The research study identified a nationwide pattern of fees for online farmers market platforms. At the state level, 54 of the 352 WIC-certified farmers markets in California utilized different online platforms for the purpose of marketing, as an additional sales channel, or both (see Table 1).

Locally, the online sales data from ACE farmers markets during the height of the pandemic in 2020 showed a significant increase in use of online sales platforms, which helped sustain vendor sales and maintain access for customers during a period of restricted in-person shopping. Monthly online sales peaked at nearly $10,000 for the month of May 2020 (see Figure 3). Online sales declined in 2021 and 2022 as in-person market operations resumed. The following sections provide details on the national, regional, and local level analyses and findings.

National Analysis

The results indicated farmers markets used a wide variety of online operation models and market organizations nationwide. In total, 32 markets nationwide were identified and analyzed by their fee structure, mode of delivery, nutrition incentive program, SNAP/EBT acceptance, and market sales platform.

Service area

Farmers market online sales platforms vary in their service areas, with some operating nationally, others focusing on specific regions, and many serving localized city or county markets. Of the 32 platforms reviewed, two platforms—WhatsGood and Market Wagon—operate across the country, connecting consumers to vendors in their local area through a single, unified platform. Although these platforms function nationally, they tailor access to vendors and services based on the customer's geo-

Table 1. Total Number of California Farmers Markets by Type of Online Presence

Online Presence	Online Sales Platform	Online CSA	Facebook Page	Online Donation
Number of farmers markets	54	27	316	70

graphic location. The remaining 30 platforms show differences in their service areas. The majority of market platforms are concentrated in metropolitan and urban regions: 63% served metro or urban regions (e.g., Good Eggs in San Francisco, Farm to People in New York, Milwaukee Farmers United in Milwaukee, Wisconsin), 20% operate at the intersection of urban areas and nearby agricultural zones (e.g., Feed Sonoma, Marin's Bounty Box), and 17% are based in predominantly agricultural regions (e.g., in California, Full Belly Farm in Yolo County, California, and Valley End Farms in Sonoma County).

Fee structure

Markets or producers charged fees primarily to cover additional expenses for personnel, packaging, transport, and online platform operation. Among the 32 markets, five fee structures were identified as employed by individual markets: membership; minimum order requirement; flat delivery or pick-up fee; delivery or pick-up fee by location or order value; and other miscellaneous fees (e.g., processing fee, tips, etc.) (see Table 2). Some markets combined these fee structures, for example, by combining membership and processing fees.

Membership

Eight of the 32 platforms required membership enrollment to order online. Markets typically charged a recurring weekly, monthly, seasonal, six month, or annual membership fee with any-time cancellation. At three platforms, customers paid no additional fee other than the membership required for delivery and/or pick up services while enrolled. The average membership cost was approximately $13 per month, or $80 per year. The remaining five platforms charged additional fees on top of the membership, such as delivery or pick-up service fees, one-time enrollment fees, or order-based processing fees.

Minimum order

Seven markets required a minimum order value for delivery or pick-up service eligibility. The minimum value ranged from $20 to $50, and one market required an additional minimum order surcharge of $10 for purchases under $50. With one exception, markets also charged an additional delivery fee for orders below a certain threshold. For example, one market (Farm to People) with a minimum order value of $20 charged a flat fee of $4.99 for orders between $20 and $50, and free delivery for orders over $50. Delivery cost on platforms such as Good Eggs varied according to order value on the day of the week. Delivery cost on other platforms mainly differed by location.

Delivery or pick-up fee

Among the 32 markets, 24 had options for local delivery service and 23 had options for curbside or community pick-up. Fourteen had options for both delivery and pick-up services. Eleven platforms required a delivery fee for orders. The order value determined delivery and pick-up fee charges. The four modes of pricing for delivery and/or pick-up fees included rates varied by order value (9.3%), rates by location/distance (12.5%), flat rate (31.25%), and free delivery for orders exceeding a certain value (28%). One market offered temporary promotions for free shipping; 43.75% of markets (n = 14) offered curbside or community pick-up for free, with 18.75% of markets (n = 6) charging an additional pick-up fee. The pick-up fees had three types of pricing: flat rate, rates by location, and rates by order value.

Other fees

Among the 32 markets, five had additional fees categorized as processing fees, tips, donations, or enrollment fees. As previously stated, the enrollment fee is a one-time charge for market membership. Processing and enrollment fees are mandatory, in addition to other charges such as delivery and pick-up fees. Tips and donations are optional and suggested before submitting the order.

Nutrition incentive programs

Among the identified markets and producers, 31.25% (n = 10) offered nutrition incentive programs. These programs varied widely, including donation models (e.g., Farm Fresh to You, Fall Line Farms & Local Roots, Mendo Lake Food Hub), sliding-scale pricing (e.g., Brooklyn Grange, Radical Family Farms), targeted discounts for

Table 2. Online Sales Models Identified at 32 Farmers Markets, Direct Market Farms, and Virtual Food Hubs

Fee Structure	Market Platform	Service Area	Frequency and Rate (all US$)
Membership	WhatsGood	National	$15/month; $125/year
	Market Wagon	National	$14.95/month; $89.95/year
	Blacksburg Farmers Market	Blacksburg, Virginia	Weekly $3.50; monthly $11.50; three month $24.50; annually $45.50
	Fall Line Farms & Local Roots	Richmond, Virginia	Weekly $3; monthly $12; three month $20; six month $35; annually $60
	Tara Frima Farms	Bay Area, California	Must have some type of recurring Full Meat Share at least every 8 weeks
	Tiara Vegetables	Bay Area, California	4 weeks = $100; 13 weeks = $312 ($24/week); 26 weeks = $624 ($24/week)
	Mandela Distribution	West Oakland & East Bay Area, California	Subscription to CSA boxes; available for 1, 2, 4, or 12 weeks
	Farm Fresh to You	Capay Valley, California	Subscription to CSA boxes; weekly, every other week, every 3 or 4 weeks
Minimum Order	Farmers on Wheel	Bay Area, California	Pick up: N/A; Delivery: $30
	Milwaukee Farmers United	Milwaukee, Wisconsin	Pick up: N/A; Delivery: $30
	Farm to People	New York City, New York	Pick up: N/A; Delivery: $20
	Good Eggs	Bay Area & Los Angeles, California	Pick up: N/A; Delivery: $30
	Mendo Lake Food Hub	Lake & Mendocino Counties, California	Pick up: Free; Delivery: $35
	Feed Sonoma	North Bay Area, California	Pick up & delivery: $27.50
	Tara Frima Farms	Bay Area, California	Pick up & delivery: $50; under $50 requires a $10 minimum order surcharge
Flat Rate	Pleasantville Farmers Market	Pleasantville, New York	Pick up: $3; Delivery: N/A
	CUESA Ferry Plaza Farmers Market	Bay Area, California	Pick up: N/A; Delivery: $10.5
	Victorian Farmstead Meat Company	Bay Area, California	Pick up: Free; Delivery: $10 flat rate in Bay Area
	Green Thumb Organic Farms	New York City, New York	Pick up: Free; Delivery: $10
	Radical Family Farms	Bay Area, California	Pick up: Free; Delivery: $15/box
	Frog Hollow Farm	Bay Area, California	Pick up: Some locations charged $2/box; free at most locations; Delivery: N/A
	Mandela Distribution	West Oakland & East Bay Area, California	Pick up: Free; Delivery: $5
	JR Organics	San Diego, California	Pick up: Free; Delivery: $10
	Long Beach Farms	Long Beach, California	Pick up: Free; Delivery: $5.99
	Full Belly Farm	Bay Area and Sacramento, California	Pick up: Free; Delivery: $7/box
By Pick-up/ Delivery Location	Mendo Lake Food Hub	Lake & Mendocino Counties, California	Pick up: Free; Delivery varies by location: Free, $3, $5 or $8
	Feed Sonoma	North Bay Area, California	Pick up: Varies by location: free or $2 in Sonoma, $2 in Marin, $5 in Bay area; Delivery: Varies by location: $5 in Sonoma, $7 in Marin, $8 in Bay area

Table 2, cont.

	Tara Firma Farms	Bay Area, California	Pick up: Free; Delivery varies by location: $7, $8, $9, or $10
	Tiara Vegetables	Bay Area, California	Pick up: $5/week fee
	Valley End Farms	Sonoma County, California	Pick up: Free; Delivery varies by location: $2.5, $3.5, $4.5
By Order Value	Farm to People	New York City, New York	Pick up: N/A; Order $20–$50 = $4.99; free delivery for orders over $50
	Vitruvian Farms	Madison, Wisconsin	Pick up: Free; Delivery: Order of $0–$29.99 = $10 fee; order of $30–$59.99 = $5 fee; order of $60+ = free
	Sprouts Farmers Market	Phoenix, Arizona	Pick up (less than $35): $3.99; over $35: $1.99; Delivery (less than $35): $7.99; over $35: $3.99
By Time and Order Value	Good Eggs	Bay Area & Los Angeles, California	Orders > $80: $2.99 (Tue.–Fri.), $6.99 (Sat.–Mon. & holidays), free with All-day window; Orders <$80: $7.99 (Tue.–Fri.), $11.99 (Sat.–Mon.), $5.00 flat fee for All-day window
Other Fee	WhatsGood	National	5% + $0.30 processing fee
	Fall Line Farm & Local Roots	Richmond, Virginia	$2 per week processing fee
	Good Eggs	Bay Area & Los Angeles, California	7.5% good job fee, capped at $14.99
	Tara Frima Farms	Bay Area, California	$10 enrollment fee

CalFresh/EBT customers (e.g., Mandela Distribution, Marin Farmers Market), tiered CSA boxes, and CSA partner shares (Vitruvian Farms in Madison, Wisconsin) (see Table 3). Several programs integrated direct community-support mechanisms, such as feed bin donations or "donate a box" models, which redistribute produce to households with fewer resources. Others implemented tiered CSA pricing or harvest-sharing arrangements, which effectively expand access for lower-income households. Eight of the 32 markets or producers accepted SNAP/EBT card at pick-up, in-person purchases, or through purchases of CSA boxes. However, acceptance of SNAP/EBT online was only available through the SNAP Online Purchasing Pilot Program.[3] A content analysis revealed that many platforms do not currently offer SNAP/EBT online payments. These markets and producers posted statements noting that they hoped to have the online SNAP option in the future as the pilot program expands. This highlights an ongoing structural barrier: although SNAP benefits are critical for food security, their use remains constrained by digital infrastructure and regulatory approval.

Socio-economic patterns shed light onto to why many of the identified programs pair SNAP acceptance with alternative models such as sliding scale pricing or "donate a box." Census data indicates that households straddling the eligibility line for federal benefits often face the greatest vulnerability in high-cost regions, suggesting that local incentive programs are not merely add-ons but essential mechanisms for bridging structural gaps in food access. For example, in Marin County, the median household income is about $142,019, but typical rents exceed $2,800 per month and home values average more than $1.3 million. These pres-

[3] In 2019, the USDA launched the SNAP Online Purchase Pilot Program, which offered SNAP participants the ability to purchase groceries online. Participating retailers for the pilot included Amazon and Walmart, among other companies.

Table 3. Nutrition Incentive Programs Used by Identified Market Platforms

Market Platform	Service Area	Nutrition Incentive Programs (all US$)
Vitruvian Farms	Madison, Wisconsin	CSA Partner Shares: 25-75% of assistance, up to $350
Brooklyn Grange Farm	Brooklyn, New York	Sliding Scale
Fall Line Farms & Local Roots	Richmond, Virginia	Donation
Mendo Lake Food Hub	Lake and Mendocino counties, California	Donation
Feed Sonoma	North Bay Area, California	Feed bin donation
Radical Family Farms	San Francisco Bay Area, California	Donation for the farm, tax-deductible donation; sliding scale with two tiers ($65 and $50 per box); community farm share assistance ($30 box)
Lunavez Farm	Los Altos, California	20% of weekly harvest is donated
Mandela Distribution	West Oakland and East Bay Area, California	50% off local produce for CalFresh customers; CSA box for $15; higher tier box
Farm Fresh to You	California	Donate a box
Marin Farmers Market	Marin County, California	Bounty Box $30; CalFresh/EBT customers receive 50% discount off one box per EBT card (cost $20 starting April)

sures disproportionately affect non-White households: about 75% of Black residents and 61% of Latinx residents are considered low-income (Rooted in Marin, n.d.). In Madison, Wisconsin, the median household income is $79,254 (U.S. Census Bureau, 2024a), substantially lower than in high-cost California regions, and food insecurity affects 9.2% of the population and 12.6% of children, with significantly higher rates among Black (≈28%) and Latino (≈22%) households compared to White households (≈8%) (Heckman & Suri, 2025). Similar patterns can be observed in other service areas such as Brooklyn, New York; Richmond, Virginia; and Alameda County, California, where overall poverty rates are compounded by racial and income-based disparities in food access.

Table 4. Nutrition Incentive Programs and Market Platform Hosts Employed by Identified Online Farmers Market Sales Platforms

Nutrition Incentive Program	Donation
	Sliding Scale
	Discount for SNAP/EBT customers
	Community share assistance
Market Platform Host	Lulus Local Food
	Local Food Marketplace
	Shopify
	Delivery Biz PRO
	CSAware
	Barn2Door

Market platform hosts

In addition to individualized online platforms, some producers and market organizations opted for online shopping software or an e-commerce platform to facilitate management and enhance user experience. Local Food Marketplace, Lulus Local Food, CSAware, Barn2Door, and Shopify are some of the popular e-commerce platform hosts with which markets work. WhatsGood and Market Wagon, which operate like DoorDash and Uber Eats, are examples of producer hub platforms. Individual producers can choose to operate through the shopping system with customizable choices, and customers can access vendors nationwide with one account (see Table 4).

Regional Analysis

Analysis at the regional level focused on the online presence of 352 WIC-authorized

farmers markets in California. Of these, 316 markets maintained a Facebook page as their main outreach channel where they posted updates of news and events, shared sales information, and stayed connected with local customers. Seventy markets had an online payment option for donation. Twenty-seven markets had active CSA programs, and 54 markets had an online sales platform.

Among the farmers markets, 50% were affiliated with, or managed by, a farmers market organization. A farmers market organization generally oversees several farmers markets within the same region or county. While a mixed profile of online presence was observed from the assessment, patterns were generally consistent within the same farmers market organization. For example, Pacific Coast Farmers Market Association (PCFMA) had more than 30 member farmers markets in the Bay Area. Each member market maintained a Facebook page and a member market page under PCFMA's website, while none of the member markets had an online option for purchasing produce, making donations, or subscribing to its CSA. On the other hand, the North Coast Growers Association (NCGA), which operates 11 markets in Humboldt County, provides a more comprehensive digital infrastructure. Each NCGA market maintains its own Facebook page, and NCGA also hosts individual market webpages, an online store, CSA subscription options, and a donation platform on behalf of its member markets. In other words, NCGA supplies these online features centrally, and each market is represented within that system.

Among the 54 farmers markets that had an online sales platform, only 24 stated that they sold farmers market–related products, such as value-added goods and DTC produce. The other 30 markets with online stores only sold gift cards and farmers markets merchandise, such as bags or T-shirts. The three farmers market organizations that operate the 24 markets with DTC products have online options for delivery and/or curbside pick-up: Agricultural Community Events (ACE) Farmers Market Organization (eight out of their 10 markets), North Coast Growers' Association (10 markets), and Harbor Area Farmers Markets (six markets). Additionally, there were another six farmers markets in California that offer online service. Four individual markets use the third-party platform Farm Shoppr for online delivery and curbside services. Cal Poly Pomona operates an individual online platform for its farmers market, while the Cipponeri Family Farms operate its own online sales platform.

The 24 farmers markets that sold value-added goods and DTC produce online were located across four counties in California: Marin, Sonoma, Los Angeles, and Humboldt counties (see Table 5). Of the 24 farmers markets, four are in rural areas[4]; therefore, most markets (83%) are urban serving.

Market Organization Analysis of Online Sales Case Study

Vendors experienced direct impacts of the COVID-19 pandemic. In April 2020, ACE launched its online sales platform in response to the disruptions caused by the COVID-19 pandemic, aiming to provide vendors with an alternative channel to reach customers. Later, a vendor survey conducted between November 2020 and January 2021 at three Sonoma County farmers markets found that 19.4% of 38 (n = 7) participating vendors reported decreased sales due to COVID-19 and regional wildfires, highlighting the ongoing challenges vendors faced throughout the year.

This study examined the online sales data of ACE farmers market, specifically the eight markets that had an online sales model. ACE's online sales model did not offer SNAP/EBT. According to available data, Sonoma County residents received $4.3 million in monthly SNAP benefits (April 2021), and nearly 14,000 SNAP users live within two miles of a farmers market in the county (2016). Yet just 0.2% of SNAP benefits, or $10,041, are used at local farmers markets (April 2021).

The ACE online sales platform launched in April 2020 amid the beginning of the COVID-19 pandemic. We analyzed sales data from April 2020

[4] The U.S. Department of Commerce, Bureau of the Census defines rural areas as open country and settlements with fewer than 5,000 residents and fewer than 2,000 housing units (U.S. Census Bureau, 2024).

to March 2022. Up until the date of analysis, the total sales made through the online platform was $83,392.42 from 162 orders (see Table 6). The ranges listed for the number of orders shown in Table 4 were based on natural groupings observed in the data and reflect meaningful differences in customer engagement. For example, one-time buyers were grouped separately from occasional (2–9 orders), moderate (10–49 orders), and high-frequency (>50 orders) customers. These categories helped illustrate variation in sales volume and purchasing behavior. Key findings from this analy sis were that 40% of customers (n = 66) only made one order each, which accounted for 4.6% ($3,800.18) of the total sales, while six customers made more than 50 orders each, accounting for over half the total sales ($42,467.38).

Total monthly sales data revealed that 77% occurred in the first year from April 2020 to April 2021, while the second year accounted for the remaining 23%. The average monthly sales in the first year were $5,373.62, while the second year only averaged $1,719.00 in monthly sales (see Figure 3).

The number of monthly customers averaged 34 per month in the first year. The number

Table 5. Regional California Markets with DTC Online Sales Platforms

County	Market Organization	Market	City	Total County Population
Marin	Agricultural Community Events	Downtown Novato Community FM	Novato	51,722
		Fairfax Community FM	Fairfax	7,417
Sonoma	Agricultural Community Events	Petaluma East Side FM	Petaluma	58,800
		Petaluma Saturday CFM	Petaluma	58,800
		Petaluma Wednesday CFM	Petaluma	58,800
		Rohnert Park FM	Rohnert Park	44,546
		Santa Rosa Community Saturday FM	Santa Rosa	175,845
		Santa Rosa Community Wednesday FM	Santa Rosa	175,845
Los Angeles	Harbor Area Farmers Markets	Cerritos CFM	Cerritos	46,797
		Downtown Long Beach CFM	Long Beach	449,468
		Huntington Park CFM	Huntington Park	51,942
		Long Beach Bixby Knolls CFM	Long Beach	449,468
		Long Beach Marina CFM	Long Beach	449,468
		South Gate CFM	South Gate	90,070
Humboldt	North Coast Growers' Association	Arcata Plaza FM	Arcata	19,012
		Eureka Friday Night FM	Eureka	25,734
		Fortuna FM	Fortuna	12,285
		Garberville FM	Garberville	1,815
		Henderson Center FM	Eureka	25,734
		McKinleyville FM	McKinleyville	16,913
		Miranda FM	Miranda	656
		Old Town Eureka FM	Eureka	25,734
		Shelter Cove FM	Whitehorn	817
		Willow Creek FM	Willow Creek	1,371

Note: FM = Farmers Market; CFM = Community Farmers Market

Table 6. Sales Based on Repeated ACE Farmers Market Online Platform, April 2020–March 2022

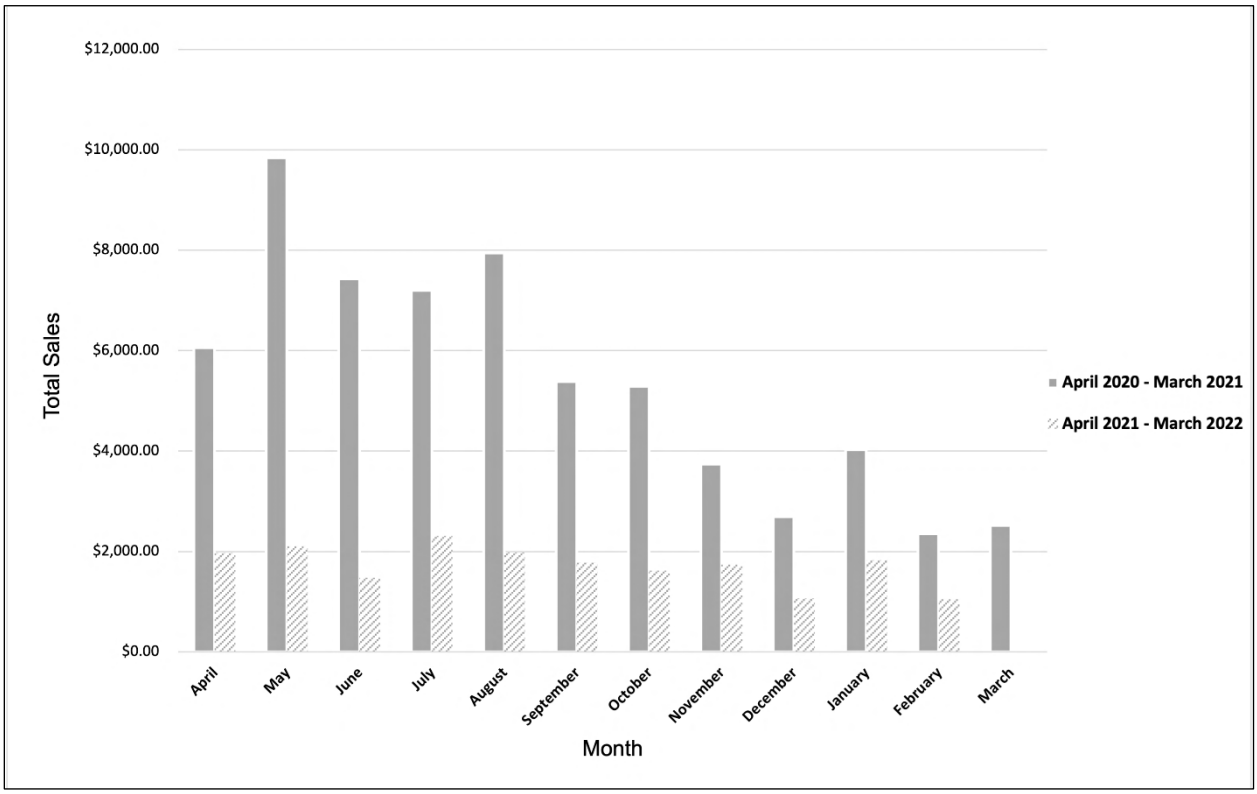
Number of Orders	Number of Customers	Total Sales
>50 orders	6	$42,467.38
10–49 orders	17	$20,144.67
2–9 orders	73	$16,980.19
1 order	66	$3,800.18
Total	**162**	**$83,392.42**

dropped significantly during the second year to an average of eight customers per month. The same pattern continued for the number of orders submitted each month. From April 2020 to March 2021, an average of 74 orders were made through the online platform each month. The number dropped to an average of 19 orders per month during the second year of operation (see Figure 4). The number of monthly orders peaked in May 2020 with 147 orders; a year later that number dropped to 27 orders in May 2022.

Another metric examined was the number of registered users and active customers on ACE Farmers Market's online sales platform. In total, 1,245 users had registered accounts on the market's online platform. According to the market manager, the users also included vendors and producers who sell through the platform, which accounts for approximately 100 users. A total of 162 customers made at least one purchase online, which classified them as active customers. Customers made 1,084 orders through the online platform. The data show 41% of customers made one order, 45% of customers made two to nine orders, 10% of customers made 10–49 orders; and 4% of customers made more than 50 orders (see Figure 5).

In addition, the 4% of customers (six total) contributed 51% of sales generated on the online platform between April 2020 and March 2022, whereas 66% of customers (66 total) who made one order on the platform contributed 5% of the total sales (see Figure 6).

Figure 3. Comparison of Monthly Total Sales at ACE Farmers Market's Online Platform, from April 2020 to March 2022



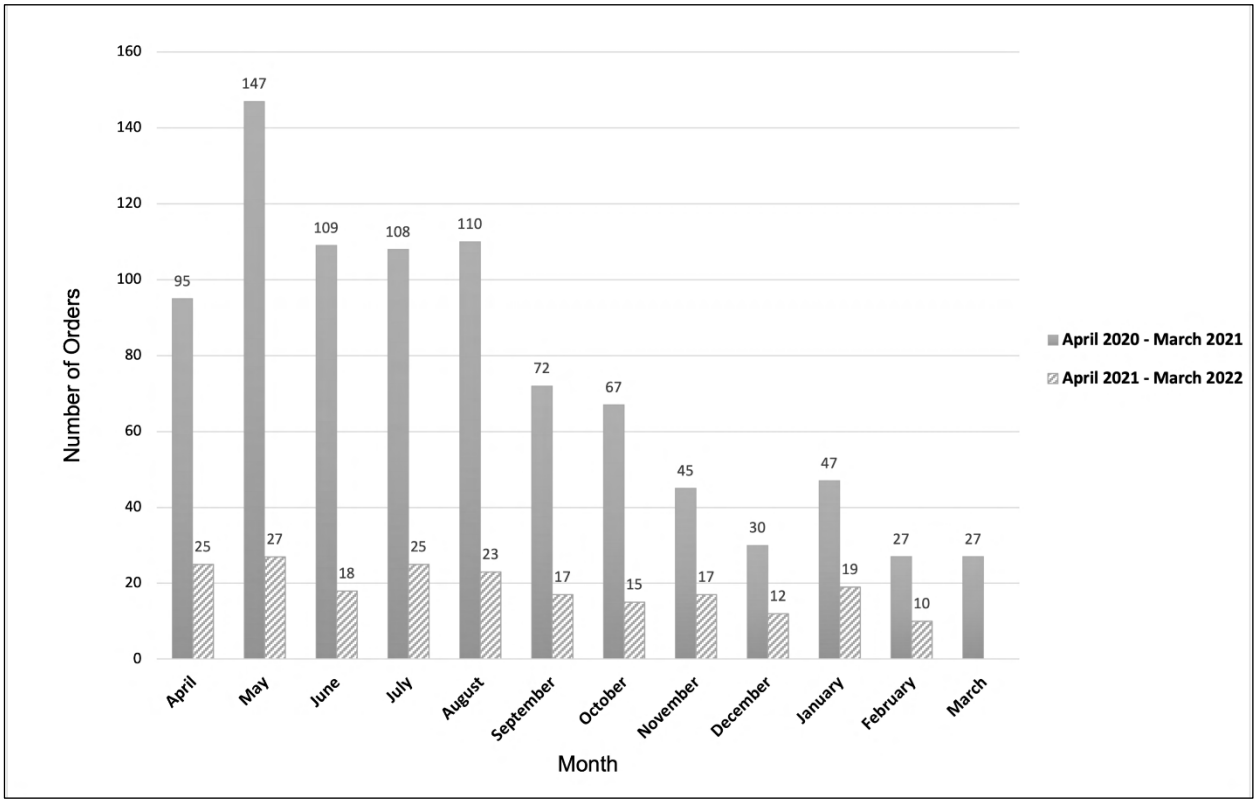
Discussion

A key goal of this research was to identify how online sales platforms at the national, regional, and local levels assisted farmers market adaptation during the COVID-19 pandemic. From the national analysis, the study found that farmers markets and farms of varying scale used different online sales models. The platforms saw active use during the COVID-19 pandemic as an additional channel to maintain sales and marketing activities. Additionally, the different models employed a variety of fee structures to offer online services. While studies have shown that using online sales may be able to help farmers generate more profit (Pesci et al., 2023; Reddy, 2018), the various fees, charged to both the seller and consumer, often allow for skewed capital accumulation for online sales companies' top executives (Muirow, 2017; Pesci et al., 2023). This challenge also presented at the local level, where 20% to 30% of farmers surveyed at three different ACE markets went out of business, discontinued production due to COVID-19 concerns, or stopped coming to market in the fall of 2020. While the platform offers a choice for farmers to continue vending, the potential cost or technology gaps could contribute to the inability of farmers to pivot to online platforms, a finding that reinforces previous studies (Nichols et al., 2022; Pesci et al., 2023).

As noted in the national analysis findings, most market platforms were concentrated in metropolitan and urban regions, while those in rural areas were typically located in agriculturally rich regions. The urban-rural divide reinforces the inequitable distribution of resources for both farmers and consumers (Schupp, 2017). This access gap of markets in rural environments for farmers could have significant impacts on the prosperity of small-scale farmers.

Although the number of farmers markets has grown significantly over the past few decades, small-scale farmers still face substantial challenges in sustaining a livelihood (Pilgeram, 2011). While these markets provide opportunities for DTC sales

Figure 4. Comparison of Monthly Number of Orders at ACE Farmers Market's Online Platform, from April 2020 to March 2022

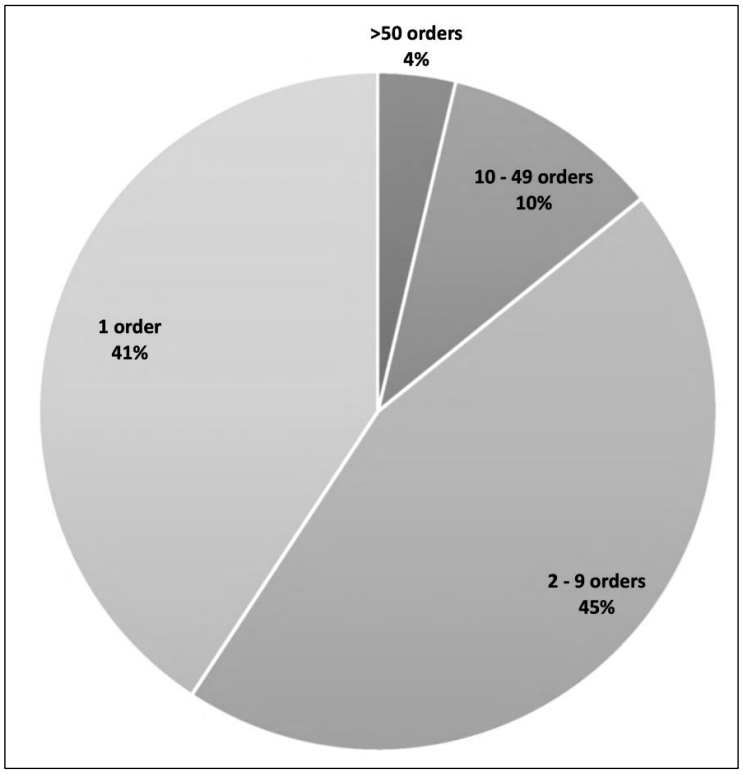


without the involvement of large corporations, studies suggest that many small-scale and organic farmers rely on secondary income sources or come from financially stable backgrounds. For those with limited resources, entering and sustaining a farming business remains difficult (Larimore, 2018; Lowery et al., 2016; Montri et al., 2021; Pilgeram, 2011; Schor, 1996). The regional analysis in California provided a case study of an agricultural landscape that sustained momentum through the COVID-19 pandemic, despite pandemic-related disruptions (see Figure 1).

The limited availability of nutrition incentive programs was another area of food access revealed in the findings of online sales at farmers markets. While most (75%) markets from the national analysis did not offer the option for purchases using nutrition incentive programs, many noted the desire to offer this option in the future. At the state level, the WIC-certified farmers markets in California utilized different online platforms for the purpose of marketing, an additional sales channel, or both. Low-income consumers—including young adults, families with young children, seniors, minorities, and individuals with disabilities or mobility limitations—hold significant market potential to grow the overall consumer base that participates in farmers markets. Not only do low-income customers represent untapped market potential, but when those on federal nutrition programs spend their benefits at local farmers markets, they bring federal dollars and matching dollars into the local community. However, as noted in the literature, technological literacy is a burden for older and rural SNAP consumers (Hingle et al., 2020).

Locally, the online sales data from ACE farmers markets indicated a strong need for online service at the height of the pandemic in 2020. As shown in the sales data analysis for ACE, the number of orders and total sales peaked between 2020 and 2021. These findings are comparable to other similar studies (such as Pesci et al., 2023). By 2022, those numbers lowered to an even rate and distribution. Studies show that scarcity can powerfully influence consumer behavior through an increase in the perceived value of items, which ultimately leads to higher willingness to pay (Fan et al., 2019; Garner & Hollenbeck, 2023; Hamilton et al., 2019). The case of ACE shows through its peak sales that customers were willing to use the service to meet their needs, but demand for online service declined as the health risks of the pandemic came under control. Adaptability and offering such services demonstrated resilience capacities such as self-organization, diversity, adaptation, and learning (Darnhofer et al., 2016; Tendall et al., 2015; Weinkauf, 2023).

Figure 5. Percentage of Orders Made by Customers at ACE Farmers Market's Online Platform, from April 2020 to March 2022



At the core of food access research is a fundamental tension: can farmers markets truly serve both the economic needs of farmers and the goal of equitable food distribution for consumers? On one hand, small-scale farmers must charge prices that reflect the real costs of sustainable farming to make a reasonable living. On the other hand, the very consumers who would

benefit most from fresh, local, and environmentally friendly produce—low-income households—often struggle to afford these prices (Guthman et al., 2006; Markowitz, 2010; Pilgeram, 2011). This creates a paradox in which farmers markets, despite their potential to promote food accessibility, may unintentionally exclude the communities with the greatest need.

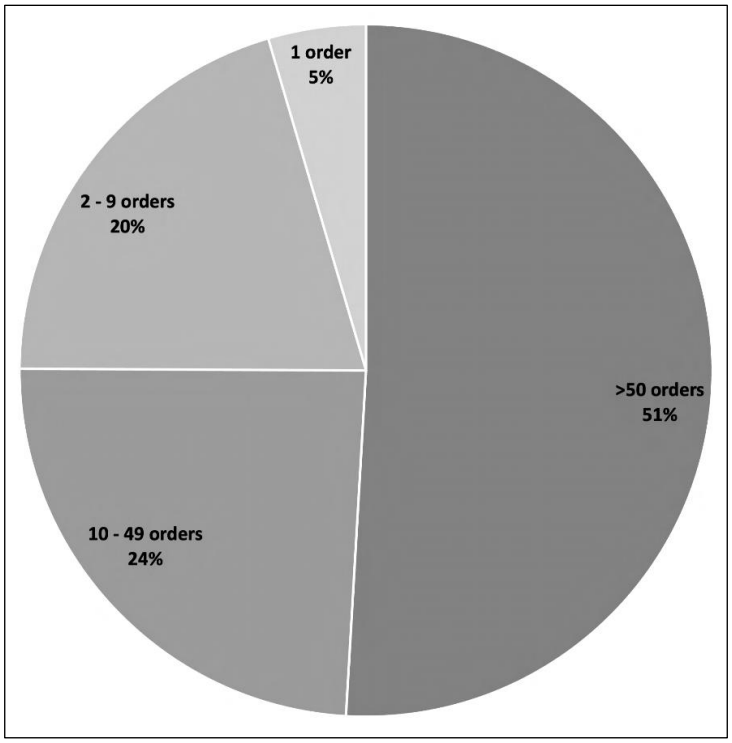
This study identified a range of strategies that farmers markets adopted to facilitate online sales, including varied delivery and pick-up options, flexible fee structures, and diverse platform formats. While the study does not evaluate which strategies are most effective, models that offer greater flexibility—such as sliding-scale pricing or multiple fulfillment options—may provide more feasible access points for consumers with differing needs. However, these models also tend to require greater organizational capacity. As shown in the regional and local analyses, many markets offered online services through coordinated efforts, enabling them to provide a wider variety of fresh produce, dairy, meat, and eggs. In contrast, CSA-based platforms—typically operated by a single farm or market—had more limited product diversity and required additional partnerships to extend delivery or pick-up reach. These findings suggest that online service platforms may benefit from operating at a certain scale or developing collaborative networks to be more sustainable and useful for both producers and consumers. Expanding nutrition incentive programs to cover online purchases could further reduce barriers for low-income consumers, particularly those with limited mobility or transportation access. Future research can explore which combinations of platform models and support mechanisms most effectively balance producer viability with equitable access.

Conclusion

The primary goals of this research were to gain a holistic understanding of farmers markets operations using online sales platforms, best online sales practices, and how online sales increases consumers' accessibility. A key form of accessibility addressed was the curbside pick-up model. The curbside pick-up model used by the majority (70%) of markets in the national study and ACE model has potential for improvement. For instance, one study conducted in Alabama showed that reaching elderly and rural SNAP-eligible customers was a challenge due to the digital divide (Hingle et al., 2020). The research also found that deliveries to remote areas was unsustainable. As a response, the farmers market partnered with local organizations to serve as drop-off and pick-up locations for grocery orders in remote areas to increase reach and reduce costs of deliveries (Hingle et al., 2020). Much like Hingle's (2020) study showed, farmers markets need to consider how services such as online sales can be more accessible to all.

However, scaffolding is important for addressing the digital divide to enable new users of online platforms. Whether rural or urban, overcoming barriers related to cost, technology, and training is required to democratize the use of digital plat-

Figure 6. Percentage of Sales Contributed by Number of Orders at ACE Farmers Market's Online Platform, from April 2020 to March 2022



forms. Efforts that integrate government and nonprofits are needed to support low-income, low-access populations, whether rural or urban. Still, even with such scaffolding in place, curbside pick-up will remain a challenge to some consumers.

Another goal of the research study was to identify how online sales models at national, regional, and local levels served to increase community resilience through the adoption of online sales platforms by farmers markets during the COVID-19 pandemic. As the study identified, online sales platforms are currently an underutilized tool to increase SNAP/EBT sales at farmers markets. While some farmers markets experienced exponential growth in SNAP and nutrition incentives sales (with 64% and 52% increases, respectively) during the pandemic, there is a need to solidify this growth trajectory beyond the pandemic. The findings highlight that nutrition incentives are not simply supplements to federal benefits.; rather, they operate as community-level responses to systemic affordability challenges. These incentives are tailored adaptations to local contexts where income, housing, race, and food access intersect. There is significant potential for increased equity and continued growth in sales by increasing SNAP purchases at farmers markets through online sales platforms. Online sales platforms could incorporate a sliding scale or discount for SNAP/EBT customers as some of the existing platforms use (see Tables 2 and 3). A recent national study found that current food assistance program participants indicated strong interest in using SNAP and WIC at farmers markets, thus underscoring the need for policy shifts that facilitate markets to accept benefits from SNAP or other food assistance programs and increase access to markets for lower income consumers (Witzling et al., 2025). Without targeted policies and interventions to bridge the gap between affordability for consumers and fair compensation for farmers, farmers markets alone may struggle to achieve both goals simultaneously.

Studies suggest that online shopping for groceries will continue to grow (Pesci et al., 2023; Samet, 2024). Alongside the pandemic and its reverberations within communities and the economy, farmers across California and the nation are experiencing repeated setbacks related to climate change and increasing natural disasters. Annual wildfires, smoke and ash taint, poor Air Quality Index days, record-breaking high temperatures, droughts, and floods are just a few of the challenges that food producers face in getting their products to markets. This, alongside labor and housing shortages due to the skyrocketing cost of living in Sonoma and Marin counties, challenge the financial viability of many small-scale growers. To mitigate these challenges and support economic viability, DTC farmers need to expand their customer base, maximize sales outlets, and minimize on-farm food waste. Online sales platforms are an important asset to increase their customer pool and resilience of local food systems across communities.

Future studies could build on this work to further understand the motivations of those farmers market customers who continued to shop online after the peak of the COVID-19 pandemic. There is also room to further explore which online shopping models could better work for rural-serving markets. Other relevant avenues for future studies are related to the disproportionate impact that online sales platforms have on small-scale farmers and other marginalized groups (Hingle et al., 2020). Further and longer-term studies are required to understand the fine-grained relationship between online technologies and their broader impact (Pesci et al., 2023).

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