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INTRODUCTION

What have we learned from the COVID-19 pandemic to strengthen the health and resilience of California communities and the food system?

In this special issue, *California Agriculture* features articles on lessons learned during the COVID-19 "natural experiment" to inform Cooperative Extension programming and local, state and federal policy to improve population health, food security, economic resilience, equity and sustainability throughout the state and food system.

by Lorrene Ritchie, Marcel Horowitz and Gail Feenstra

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On February 11, 2020, the World Health Organization announced a novel virus outbreak called coronavirus disease 2019, or COVID-19. In the months that followed, youth organizations, schools, food banks, farmers markets, community gardens and farmers adapted and thrived by developing strategies to overcome immediate challenges posed by the pandemic and establishing new alliances and practices to enhance future resilience. In this special issue of *California Agriculture*, we highlight some of the lessons learned during the COVID-19 pandemic to strengthen California communities and food systems. From adapting youth development programs for online delivery to implementing safety measures for agricultural workers, the studies in this issue demonstrate new strategies that can help to improve the health of communities and the food system in California into the future.

When COVID-19 was declared a public health emergency in the state of California on March 4, 2020, all but essential service providers were required to stay home. Children could no longer attend school or childcare in person, and many households lost jobs or wages. Due to the initial lockdown and physical distancing required to mitigate the spread of infection, food and agricultural businesses and communities suffered economically and socially. The crisis exacerbated existing inequities from farm to fork, exposing the most vulnerable and resource-limited to the greatest challenges.

In response, organizations big and small across the state mobilized in new ways to deliver programs and services in the face of unprecedented challenges. What was learned from this experience that can help better serve Californians? How could partnerships be more effective with diverse organizations and new constituents to improve public health and the food system moving forward? This special issue includes research and evaluation studies conducted during the first two years of the pandemic that help us answer that question. The collection includes articles identifying new ways to empower youth, deliver nutrition education, mitigate food



The pandemic impacted the food system from farm to fork. *Photo*: fermate, iStock.

insecurity, and improve agricultural resilience. The lessons learned can help us better prepare for future crises as well as serve Californians more efficiently and effectively over the long term.

The first article, by Espinoza et al., features an innovative 4-H program designed to help overcome the lack of information and widespread misinformation about the causes, consequences and prevention of COVID-19 and other infectious diseases. The University of California 4-H Healthy Living Team adapted resources from the Centers for Disease Control and Prevention to deliver education to teens in 15 counties across the state. The online trainings promoted evidence-based behaviors for 4-H clubs, families and communities to adopt to reduce COVID-19 transmission. Pre-post training surveys showed that 4-H youth improved their knowledge, skills, behaviors and most importantly, their ability to advocate for disease prevention, demonstrating that teens can be empowered to address public health issues. As one teen said, "I learned how I can help my community."

Meng et al. employed a mixed-methods approach to assess the effectiveness of youth-led participatory action research (YPAR) programming delivered online instead of in person. YPAR engages youth in identifying, implementing and advocating for health-related policy and environmental change. While both nutrition educators and youth said they missed in-person interactions and faced challenges with internet connectivity and technology, certain aspects of virtual meetings, such as convenience, document sharing, online activities, and capturing youth input, were found to be easier online. Half of the educators and youth favored a hybrid approach of combining in-person and online YPAR activities in the future. As Meng et al. summarized, "They expected the tools and techniques that they learned will 'enhance the in-person class,' whether these new activities and tools are only used 'every once in a while' or 'infused in to the daily activities.'"

Plank et al. evaluated another aspect of children's lives affected by the pandemic: access to the National School Lunch and School Breakfast Programs. Children rely on school breakfast and lunch to provide healthy meals in accordance with the Dietary Guidelines for Americans. Fortunately, the U.S. Department of Agriculture quickly implemented pandemic waivers to address physical distancing mandates, staffing issues and supply chain shortages. For instance, families were permitted to collect meals from schools and bring them home to prevent students from going hungry. Surveys conducted among fourth and fifth grade students in 67 CalFresh Healthy Living (CFHL) income-eligible schools revealed that students who continued to consume school meals had better fruit and vegetable intakes than those who did not. However, students who consumed school meals also had higher intakes of sugar-sweetened beverages (SSBs), which can only partially be explained by the allowance of flavored milk in school meals. Reducing SSB consumption remains a public health objective for enhancing child nutrition. The authors wrote, "To ensure consistency in meal quality and access during emergency school closures, CFHL and similar programs could initiate or expand partnerships with schools and other stakeholders to develop nimble food procurement systems; provide professional training and logistical support to school staff; and deliver nutrition education to students and their families."

Meagher et al. conducted a study on the emergency food system, another critical resource for mitigating COVID-19 and other economic impacts on food insecurity. Interviews were conducted to understand the strategies employed to address the significant increases in food requests. They found that government support at the federal, state and local levels was key for food banks to adapt to an unprecedented surge in demand. As one respondent stated, "We were grateful at the speed and the scale of the state's response. Honestly, it's government at its finest." To address staffing shortages, food banks enlisted the assistance of the National Guard and county disaster service workers or hired laid-off restaurant staff. They transitioned from client-choice models to drive-through distribution boxes to facilitate the rapid and safe distribution of large quantities of food. With food donations declining, food banks also increased food purchases, thereby gaining greater control over nutritional quality. The authors described these efforts during the pandemic as "an exemplary model of what bureaucratic agencies and community networks can achieve when they work together."

A common thread across these studies is the necessity of making infrastructure investments, ensuring the availability of resources that can be rapidly mobilized in times of adversity, and the ongoing need for flexible policies.

Diekmann et al. conducted a survey of California home and community gardeners about gardening during crises. Their findings revealed that gardens played a crucial role in ensuring food security and fostering a sense of self-sufficiency, especially during times of concern about COVID-related disruptions and shortages in the food supply. Additionally, gardens provided a serene outdoor space for social connection and solace with nature. One participant even described their garden as an essential "part of (their) emergency supply kit" during the pandemic. Many gardeners not only increased their knowledge of gardening and produced more to eat for themselves, but also shared their harvest with others. The most substantial challenge was the difficulty obtaining gardening supplies due to supply chain issues. The authors concluded, "These findings suggest the importance of providing garden space, resources, and support, especially to populations with the least access to green space, so that gardens can be a resource to improve community health, food security, and resilience during future disasters."



UC Master Gardener volunteers in Santa Clara County prepare to distribute seedlings during the pandemic. *Photo*: Henry Morales.

Farmers markets are another source of fresh produce which offered a viable distribution chain for local farmers throughout the pandemic. Van Soelen Kim et al. found that CalFresh and Market Match purchasing increased from 2018 to 2022 in Sonoma and Marin counties. This reflects the rise in Supplemental Nutrition Assistance Program (SNAP) enrollment, as well as temporary increases in SNAP allotments and Pandemic-EBT to compensate families for reduced access to school meals and income. Thus, the pandemic presented a unique opportunity to raise awareness about farmers markets and encourage their beneficial use by low-income households. As one person expressed, shopping at a farmers market " . . . feeds the soul: to work with plants and to eat fresh food and to see the person [who is growing your food] . . . The farmers market is just filled with that kind of energy."

Ory et al. surveyed organic farmers in California's Central Coast region about the challenges they encountered during the pandemic. Their study revealed that mid-sized and larger-scale farmers, particularly those distributing to wholesale markets, were less affected by retail closures, demonstrated better adaptability, and were more resilient in the face of pandemic-related disruptions. Shifting to direct-to-consumer markets through web sales, collaborating with food hubs, and distributing through community supported agriculture organizations were techniques used. The authors emphasized that " . . . farmers who can quicky shift what they grow, where they sell, and who they sell to have an advantage over those trapped in rigid growing contracts or unable to enter new marketing channels." The study findings underscore the need to provide smaller organic farmers with additional technological, marketing and financial support to enhance their resilience.

Rachel Callahan investigated the response of agritourism operators to the pandemic. Agritourism is defined by UC as "any income-generating activity conducted on a working farm or ranch for the enjoyment and education of visitors, including on-farm sales, educational activities, accommodations, special events, and outdoor recreation." A series of trainings aimed at expanding agritourism during the pandemic were held in Butte, Solano and Sonoma counties. The study identified the need for more technical assistance in areas such as e-commerce, food safety protocols, and business planning. Including farmers from diverse backgrounds and small farms would help to ensure the viability of agritourism. Nevertheless, agritourism, particularly through expansion of direct-to-consumer sales, contributed to the resilience of most farmers as other market channels diminished. Many farmers acquired new skills, such as utilizing online reservation systems and new point of sales technology, which they plan to benefit from in the future.

A common thread across these studies is the necessity of making infrastructure investments, ensuring the availability of resources that can be rapidly mobilized in times of adversity, and implementing flexible policies. Whether the challenges are regional or global, arising from climate change, wildfires, economic downturns, or infectious diseases, we can anticipate that disasters will occur. However, armed with the knowledge and skills acquired through adaptation and collaborative efforts, we are now better positioned as a state to weather future storms. Moreover, these studies collectively demonstrate new strategies — from hybrid delivery of education to agritourism — that can help to improve the health of communities and the food system in California into the future. CA

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