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## **Fresh Produce Donations in California: Opportunities for and Challenges to Increasing Volume and Reducing Food Insecurity**

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### **Abstract**

This study explores opportunities for increasing access to fresh produce by the emergency food system. Results of extensive interviews of managers of farming operations, food bank distributors, food banks, and food pantries were analyzed using thematic analysis to gain insights into the major challenges to increasing access to fresh produce by the emergency food system. The principal recommendations focus on the need to increase the availability of fresh produce in order to meet expected future growth in demand, better utilizing and communicating grower tax incentives, and investing in building the capacity of the food bank system.

**Keywords:** food security, food loss, thematic analysis, food banks

## **Introduction**

Approximately 1 out of every 9 U.S. households experience food insecurity at some time during the year (Coleman-Jensen et al., 2019). Food insecurity is defined by the U.S. Department of Agriculture (USDA) as having difficulty in providing enough food for all household members at some time during the year due to a lack of resources (Coleman-Jensen et al., 2019). The unprecedented nature of the COVID-19 pandemic has made this situation increasingly worse, leading Feeding America to project that millions of Americans will be at risk of food insecurity because of the pandemic (Feeding America, 2020).

Food-insecure households are disproportionately affected by chronic health conditions, such as diabetes, obesity, and hypertension (Seligman, Laraia, and Kushel, 2009; Larson and Story, 2011). To prevent and manage these adverse conditions, it is important that food insecure households have access to healthy, nutritious foods, especially fresh fruits and vegetables (Sacks et al., 2001; Li et al., 2014). Broad Lieb et al. (2016) note that while food bank systems do not address the underlying causes of poverty that force people to rely on food donations, they address an important need by providing food-insecure households with the food, especially fresh produce, that they require for a healthy diet.

Traditionally, food banks have not provided their clients with significant amounts of fresh produce because they were largely reliant on mislabeled and/or damaged shelf-stable foods supplied by the food industry (Campbell et al., 2015). Over the last decade, this outsized reliance on shelf-stable products has become a relic of the past. Food banks are switching to more nutrition-focused food banking, with fruits and vegetables now making up more than half of the weight of total inventory (Campbell et al., 2015). According to research that focused on six case studies of California food banks, this is especially true in California where fruits and vegetables made up more than half of the total weight of product distributed by the food banks studied (Ross, Campbell, and Webb, 2013). More importantly, this switch to fruits and vegetables is also in line with the preferences of users of the food bank system (Campbell, Webb, and Crawford, 2011; Webb, Ross, and Campbell, 2013; Cooksey-Stowers, Martin, and Schwartz, 2019).

Although the emergency food system provides substantial amounts of food to food bank clients, including large amounts of fruits and vegetables, as indicated above, food insecurity remains a pervasive issue throughout the United States (Coleman-Jensen et al., 2019). While the data are limited, recent research has shown that vast amounts of edible, fresh produce are being lost at the field level. Baker et al. (2019), based on 123 in-field surveys of 20 crops in California (all hand harvested), found that an average of 33.7% of marketable fresh produce was left behind in growers' fields. A study in North Carolina, based on 68 field surveys (all hand-harvested crops, except for 2 out of 68 fields), found that an average of 42% of fresh produce was lost at the field level (Johnson et al., 2018).

It is against this backdrop of continuing high levels of food insecurity, the need for nutritious foods by food banks and their clients, and the large amount of produce left in growers' fields, that we undertook this research. We focused on three principal objectives: evaluate the current supply and demand for fresh produce in the California emergency food system; investigate the challenges to and opportunities for fresh produce donation faced by stakeholders along the fresh produce donation supply chain; and develop recommendations to increase and improve the utilization of surplus produce for emergency food services.

According to the jointly created USDA and EPA food recovery hierarchy, the best outcome for food loss is to prevent it from occurring in the first place (U.S. Department of Agriculture, 2015). Absent prevention, the second-best option is to utilize the surplus produce to provide food-insecure families with fresh fruits and vegetables. Research focusing on growers' participation in food recovery efforts provides insights into growers' perspectives. A 2019 study found that farmers often support these food donation efforts because they like to know that the food they grow gets consumed (Mount, Valentine, and Gibson, 2019). However, the researchers learned that farmers often do not have the time or resources to support these efforts. Researchers in North Carolina interviewed large, commercial vegetable growers and found that a majority of farmers found current donation practices to be unfavorable (Johnson et al., 2019).

Other studies discuss the major barriers to increasing the flow of surplus produce into the emergency food system. These include the cost of harvesting and packing, liability concerns, fragmented regulation, transportation and storage costs, inadequate refrigerated transportation, and capacity limitations within the emergency food system (Berkenkamp and Meehan, 2016; ReFED, 2016).

Research that focuses on the broader emergency food recovery system provides a more complete perspective on the issue. Wetherill et al. (2018) interviewed food bank executives and identified pick and pack-out (PPO) fees, transportation to food banks, regional variations in production that make it difficult to maintain a stable supply, competition for the surplus product from other, non-donation, outlets, and the prevalence of inedible donations as significant challenges to increasing produce donations.

A study by Meagher et al. (2020) took a different approach and examined the relational strategies that might overcome the barriers to increasing food recovery to address food insecurity. The study of California growers and food recovery organizations resulted in the development of a conceptual model of agricultural food recovery that "focuses on the intersection of economic and logistical considerations with stakeholders' social relations." They also "identified several relational strategies that successfully enabled stakeholders to overcome economic, logistical, and/or social challenges" to food recovery efforts.

Tax incentives for produce donation have been the subject of considerable research as they represent an important mechanism for growers to offset the high costs of harvesting and packing surplus produce. Broad Leib et al. (2016) examined the existing challenges surrounding food and produce donations and focused on the current tax incentives for donations. They found that many

farmers struggle to utilize the federal tax deductions for produce donations because most farms operate on small profit margins. Without much profit, these farms have low levels of taxable income that greatly reduce the value of tax deductions, which in turn largely eliminates any financial incentive to harvest, pack, and donate unharvested produce (Broad Lieb et al., 2016). They recommended that the federal tax deduction be replaced with a tax credit that would allow low-margin businesses, such as farms, to gain more of a benefit from the incentives. Another study calls into question the effectiveness of tax credits, finding that a 25% Ontario tax credit has not played a significant factor in producers' decisions to donate (Kinach, Parizeau, and Fraser, 2020). Instead of a tax credit, they recommend that more opportunities be created for producers to sell their fresh produce instead of donating it, a recommendation that was supported by producers and food bank representatives alike.

In California, some of the challenges noted above have been overcome by the establishment of food bank distributors and a state tax credit for donations. These food bank distributors act as aggregators and, in some cases, brokers of fresh produce to help food banks access more fresh produce, while occasionally assisting with the transportation. A recent study suggests that food banks are a reliable outlet for produce growers and that compensating farmers for the costs incurred in growing, harvesting, and packing produce is a "win-win" for both food banks and growers (Dunning, Bloom, and Brinkmeyer, 2020). The largest food bank distributor in California, the California Association of Food Banks (CAFB), has worked to establish a state tax credit for growers who donate produce (California Association of Food Banks, 2011). Originally, legislation for a 10% tax credit was successfully sponsored by CAFB in 2011 (California Association of Food Banks, 2011). However, CAFB found that the calculation based on the value of the inventory was difficult to estimate for many farmers. In 2017, the value of the tax credit was increased to 15%, and a new formula utilizing the wholesale value of the produce was instituted. This drastically simplified the calculations required to obtain the incentives and substantially increased the value of the credit for farmers (California Association of Food Banks, n.d).

To date, most research on food recovery for emergency food services has focused on one level or a limited portion of the food bank supply chain. Our study encompasses the entire supply chain, starting with the growers who produce the food, to the food bank distributors that aggregate donated produce, to the food banks that distribute food to food pantries, and, finally, to food pantries that distribute the produce to their clients. We conducted detailed interviews with managers from farms to food pantries to understand the situation as well as challenges to and opportunities for improving the donation and utilization of surplus fresh produce in the emergency food system. This research was conducted in California, the most populous state in the country and home to production of approximately half of the country's fruits and vegetables. We focused largely on the fresh produce supply chain in northern and central California, including growers in Monterey County and the Central Valley. Together these regions produce a substantial portion of many of the produce items in the U.S., and Monterey County produces more than half of the U.S. production of leaf lettuce. The food bank distributors, food banks, and pantries represented both large, urban areas as well as smaller, rural areas. Despite the narrow geographical focus of the study, we believe that many of the results and lessons learned will be applicable to participants in the food bank system throughout the U.S.

## **Methods**

We conducted semi-structured interviews with participants at all levels of the California emergency food system supply chain, including grower/packer/shippers, food bank distributors, food banks, and food pantries. The grower/packer/shippers we interviewed performed all three functions (i.e., growing, packing, and shipping), and we will typically refer to them as simply growers. All seven growers we interviewed had previously cooperated with us on earlier research and were known donors of produce to the food bank system. We used the snowball sampling technique to identify interview candidates for food bank distributors, food banks, and food pantries. We started with our network of contacts and identified two food bank distributors, four food banks, and six food pantries, in addition to the seven growers. We aimed to have diversity in our sample, including growers from several growing regions, the two largest food bank distributors in California, food banks in both large, urban settings as well as smaller, rural settings, and food pantries that were both large and small and located in both urban and rural settings.

The interviews were conducted with managers or directors who were engaged in activities related to our research. Growers included CEOs, CFOs, COOs, area/district managers, and harvest managers. The food bank distributors we interviewed included one Executive Director and one Director in charge of the donation program. At the food bank and food pantry levels, the interviewees were all sourcing representatives who managed incoming donations and directors or sourcing managers, respectively. The interviews were conducted both in person and by telephone from January through December 2019. The semi-structured interview process utilized predetermined questions, appropriate to each level of the supply chain, which addressed the key themes related to the research questions. Interviewers encouraged the interviewees to elaborate on their responses to the interview questions and provide more details on related topics. We took detailed notes during the interviews and immediately reviewed the notes after each interview for clarity and accuracy.

We employed semi-structured interview guides with open-ended questions that were modified to address the issues at each level of the supply chain. Interviewees were asked to describe their current fresh produce donation practices, to identify the challenges and opportunities that exist with fresh produce donation, and to talk about their capacity to handle current volumes as well as potential future volume increases.

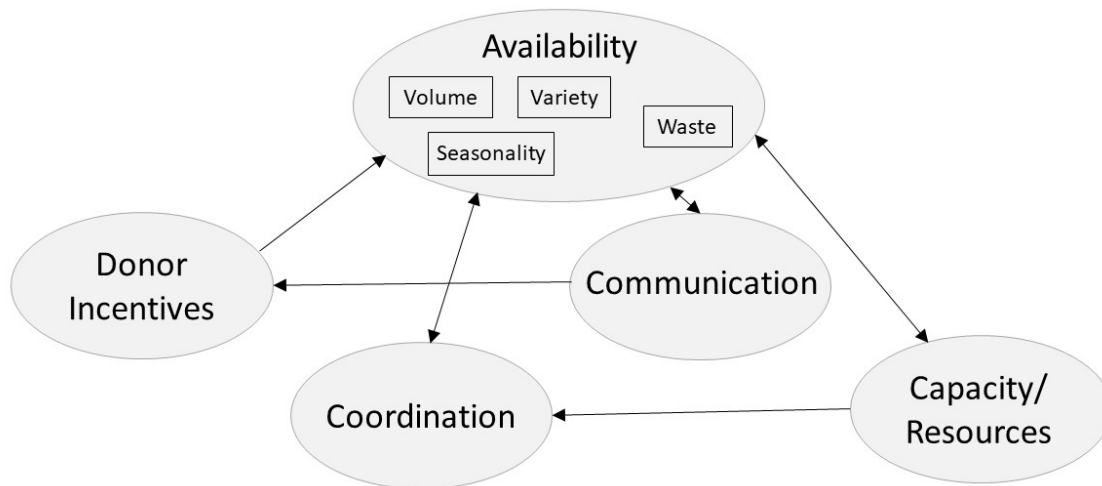
We analyzed the data using thematic analysis (Braun and Clarke, 2006; Maguire and Delahunt, 2017). The six steps included:

1. Familiarizing yourself with your data;
2. Generating initial codes;
3. Searching for themes;
4. Reviewing themes;
5. Defining and naming themes; and
6. Producing the report.

After reading and rereading the interview reports, we developed initial codes related to salient topics raised in the interviews and categorized key information by code. We then reviewed the coded data and organized it into preliminary themes. This was followed by a review of the themes and coded extracts to ensure that they adequately represented the coded extracts and the entire dataset. Themes were then refined to identify the meaning of each theme, as well as their relationships to each other, and then assigned meaningful names before writing up the analysis. Both researchers collaborated on the process but independently reviewed the work at each stage to ensure ample opportunity to independently reflect on the codes, themes, and meanings.

**Results**

The coding of interview responses and several iterations of thematic development resulted in the five themes as shown in Figure 1. Arrows indicate the major relationships and principal direction of impact among the themes. For example, donor incentives have a large impact on the availability of fresh produce to food banks but not vice versa. On the other hand, coordination, when properly executed, results in positive impacts on availability through increased efficiency. Conversely, availability issues, such as too much poor-quality product that results in high waste, call for increased coordination. We organize the results around the five major themes. However, where issues relate to multiple themes, the issue will be presented and discussed primarily under the theme that is most closely related to the issue to avoid redundancies.



**Figure 1.** Graphical Representation of Thematic Analysis of the Fresh Produce/Food Bank Supply Chain

*Availability.* Availability is shown top and center and given greater prominence in our diagram of major themes as it was a central focus of all the conversations with interviewees at all levels of the supply chain. Moreover, it had strong ties to all other themes. Availability includes four sub-themes—volume, variety, seasonality, and waste. The first three sub-themes all relate to a primary objective of the food banking system, that is, to increase fresh produce availability to meet clients' needs for a healthy and nutritious diet. The variety and seasonality sub-themes are somewhat related as the seasonality of many products means that their availability is limited at times, thereby reducing variety. Waste impacts availability because it reduces the available produce and requires scarce resources to sort and dispose of poor-quality produce.

Among managers of the food bank supply chain, availability was the most commonly mentioned issue. It is the focus of the food bank distributors, food banks, and food pantries as they attempt to meet the demand for fresh produce by food bank clients and increase volume in concert with programs to encourage greater fresh produce consumption. While growers may not be directly focused on increasing the volume of donations, every grower we spoke to was unhappy that any product was “wasted” and was a proponent of donating more produce if it made financial sense. Donor incentives play a major role in encouraging donations and will be discussed under the donor incentives' theme.

The food bank distributors play the largest role in securing produce donations and it is a major focus of their efforts. One food bank distributor specifically noted that the lack of local supply during the winter was a major concern. The other food bank distributor indicated that they could use much more product and that seasonality of many items is a major issue as demand for products is year-round. This manager also raised a long-term concern that competitive pressures, including growth in the “ugly” produce market and increasing economic incentives for growers to switch from fresh produce to nut production, may lead to reduced fresh produce production and, therefore, less surplus product.

Food banks and food pantries are the best gauges of how well client demand for fresh produce is being met as they are closest to the clients. The food banks' needs varied by location, with the two rural food banks indicating that they generally had enough produce during the production season. However, they noted that they could use much more during the off-season, approximately one and two-thirds and 9 times more than current volume. By contrast, the two urban food banks could use somewhat more produce during the production season, but they were able to supplement the lower levels of donations during the off-season with cash purchases of produce. One of the rural food bank managers quipped that the urban food banks are “cash rich but farm poor.” The food pantries echoed the concerns of the food banks. While they generally have sufficient volume, they noted a lack of variety, particularly during the off-season.

Waste was another issue that was raised by most food banks and food pantries and was a bigger problem than for the food bank distributors. This is not surprising as the distributors receive the product earlier in the products' life than do food banks and pantries. Both urban food banks noted that product that had to be thrown out was a concern with reported waste at approximately 3% and 5%. One of the rural food banks indicated that waste is as high as 30% to 40% for some produce



categories. Waste was an even greater issue for the food pantries. As with the food banks, they must sort through product and dispose of anything that is unsuitable. One pantry spends about \$1,000 per month in disposal fees. Another pantry addressed the issue of high waste by physically inspecting product at the food bank before accepting shipment.

A contributing factor to waste is that growers will often hold on to a product until it nears the end of its shelf life in the hope that they may be able to sell it, contributing to donated product that has a very short shelf life. Such product must move through the food bank system quickly and may end up in a recipient's home with little shelf life remaining.

*Donor Incentives.* One of the clearest challenges to improving the fresh produce donation system is awareness and utilization of tax incentives. In addition to the federal tax deduction, there is a state tax credit available to growers in California. Of the seven grower/packer/shippers that we interviewed, only one was fully aware of and believed that his firm had a good understanding of both tax incentives. Growers generally had much greater familiarity with the federal tax deduction as compared to the state tax credit. One food bank distributor actively promoted the use of tax incentives while the other was not very familiar with them. The former food bank distributor indicated that the lack of awareness of the current state tax credit is likely because the credit was updated in 2017, after the previous version was met with poor reception from growers and shippers. However, he went on to emphasize that one grower donates 10 to 12 million pounds of fresh produce annually, due largely to the substantial tax benefits.

A key reason for the confusion over incentives may be that donors can benefit from produce donations in several different ways and that the financial benefits of each mechanism are not easily compared. For example, some donors prefer to simply write off the product as a loss, whereas others prefer to receive a PPO fee for the donation. Still others may utilize one or both tax incentives. Understanding which option or combination of options is most beneficial is not a straightforward calculation. Furthermore, many growers find the record-keeping requirements onerous and distracting from the operation of their business.

Complicating matters further is the difficulty faced by grower/packer/shippers that receive product from multiple growers. The shipper/aggregators seemingly provide a great target for produce donation because they are a large source of culled and surplus product that does not require much additional labor and expense for harvesting, cleaning, and packing. However, these shipper/aggregators are unable to take advantage of the tax incentives for the donated product themselves because they do not have ownership of the product sourced from other owners. This serves as a major disincentive to produce donations. Product that has been comingled among several growers makes assignment of the tax benefits difficult. One grower/packer/shipper addressed this issue through an improved records system to ensure that each grower received the proper tax benefit. Another grower/packer/shipper simply apportioned the donation of comingled product to each grower.

One manager underscored the importance of increasing awareness of the tax incentives by emphasizing that their current operation has two potential destinations for culled and surplus

product—donation and processing. Without full awareness of the tax incentives for donation, culled or surplus produce will often be sold for processing even though the best financial decision may be to donate the produce and receive the tax credits or deductions and/or PPO fees.

*Communication.* Tax incentives stand out as an area where communication could be greatly improved based on responses from both growers and the lone food bank distributor that promoted the use of the incentives. Promotion is certainly needed to increase awareness of the tax incentives. However, clear and user-friendly information that explains the tax incentives and assists growers with the financial calculus they must make in order to determine whether to donate surplus produce is also needed, as evidenced by the confusion expressed by many growers.

Most growers were not aware of Good Samaritan laws that protect them when donating produce in good faith. However, this apparently was not a substantial hindrance to produce donation, as some growers indicated that their food safety protocols for donated produce were equal to those of produce that entered the market and therefore liability was not a major concern for them. Nonetheless, better promotion of the liability protections along with the tax incentives might attract more grower donations.

Communication between food banks and food pantries and by food pantries with their clientele was reported as being very good. Pantry managers indicated that they focused on educating their clients by promoting good nutrition, explaining product expiration dates, and providing recipes. Recipes are especially helpful in promoting the use of unfamiliar foods that clients have never seen prepared or consumed. Pantry managers also indicated that they work closely with other agencies, such as shelters and churches, to share surplus produce.

*Coordination.* Several areas could benefit from closer coordination among organizations. A common complaint among growers was that food bank agencies were slow to respond to their offers of donations, alienating growers and reducing the already short shelf lives of perishable products. It is not clear whether this is primarily a coordination or capacity issue. Nonetheless, growers and recipients may be able to work together to provide earlier notification and shorter response times through better planning.

Another issue is that competitive relationships among organizations may lead to suboptimal allocations of fresh produce donations within the system and to food bank clients. As an example, two of the major food bank distributors have essentially locked down regions within the state and have agreed to not source product in each other's regions. A more collaborative relationship among the food bank distributors could address some of the system's current shortcomings regarding variety and seasonal availability. Food banks also sometimes establish direct relationships with growers to improve access to produce donations. To complicate matters, a well-intentioned group will sometimes try to rescue produce and engage organizations already working with emergency food agencies. A case in point was a new organization, founded by university students, that started a new recovery effort to link growers with surplus product directly with food banks. One of the food bank distributors lamented that this was creating confusion among growers as the new

organization was essentially duplicating and competing with the established system, which had the scale and knowledge to determine where surplus product was most needed.

At the food pantry level, managers shared with us how they handle surplus product. Some pantries have developed systems designed to be compatible with their clients' shopping preferences, such as distributing produce similar to what you would see at a farmers' market instead of in prepackaged bags/boxes. Another pantry sets up a table where clients can pick up surplus produce that must be moved quickly. All but one pantry shared their excess produce with other agencies, including shelters, churches, or other food pantries. The pantry that did not share excess produce noted that they are prohibited by their food bank distributor from doing so, possibly leading to increased waste. It was clear that the short shelf life of the produce resulted in the need for a high level of coordination to move product quickly to food bank clients.

*Capacity/Resources.* Capacity issues were raised at every level of the supply chain. For growers, the largest issue was labor availability and the cost of providing donated product (harvesting and packing). Another issue was limited storage space as saleable product took priority over product destined for donation. Food bank distributors, food banks, and food pantries all indicated that they had capacity and resource constraints that prohibited them from making more product available to downstream clients.

Food bank distributors noted that the high cost of transportation, maintaining the cold chain, and access to more growers were barriers to increasing volume. One distributor indicated that they would need to increase capacity across the board, including more refrigerated trucks, cold storage, and staff if they were to substantially increase the amount of produce that they supply to food banks. Funding, which would address the above-mentioned needs, was also needed.

The two urban food banks indicated that they currently have the resources and capacity required to handle the produce they receive and to meet most of the needs of their clients. One of the food banks indicated that they would like to handle more fresh produce but that their cooler is not large enough. They are looking to lower the ambient temperature in their warehouse to accommodate more produce. Both rural food banks indicated that they lack the funds to fully accomplish their mission.

As with the food banks, the capacity and resource needs of the food pantries were mixed. Most food pantries had sufficient capacity for their current volume, including cold storage, whereas others indicated that they occasionally run out or would need additional cold storage were they to expand. One manager explained that they lack sufficient space in their warehouse and sometimes must leave pallets of produce outside. Other issues included access to transportation for fresh produce, running out of fresh produce, especially at the end of the month when demand is at its greatest, and insufficient funds to purchase fresh produce or for other needs.

## Discussion

The thematic analysis results of the interviews of participants in the fresh produce emergency food supply chain yielded several key themes. The theme raised by almost every organization was produce availability, a key research objective of the study. Increasing overall volume, improving variety, and reducing the impact of seasonal production, along with waste reduction were central aspects impacting the availability of fresh produce that reaches food bank clients. Four supporting themes were identified, including improved coordination within the system, better communication among supply chain participants, increased capacity at each tier of the supply chain, and improving the utilization and communication of donor incentives, particularly tax incentives. All four themes supported the primary goal of increasing the availability of fresh produce to food insecure families.

Three themes emerged as being critical to efforts to improving the utilization of surplus fresh produce to reduce food insecurity. Participants at every level of the supply chain, from growers to food bank distributors, to food banks, and finally food pantries, believed that it was important to increase the availability of produce for emergency food distribution. We found that donor incentives, especially tax incentives, are important to incent growers' produce donations, but that growers often lack awareness of the benefits, find the record-keeping requirements complicated and onerous, and frequently either underutilize or fail to utilize the tax incentives. A third theme that plagues the system from beginning to end is capacity limitations and underinvestment in the resources needed to better meet the needs of organizations within the food bank system.

Many of the challenges that we identified are symptomatic of a system where the individual actors act largely to pursue their own objectives. For example, it appeared that some produce that was of inferior quality or which had insufficient shelf life was delivered to food bank distributors, food banks, and food pantries, necessitating costly sorting and disposal. There was also evidence of a lack of coordination among the different levels of the distribution system as well as among organizations operating at the same level. As an example, one food pantry was prohibited from sharing surplus produce with other pantries that could have used this produce to distribute to their clients.

Effectively coordinating a distributed network of organizations with differing objectives represents a substantial challenge. None of the individual organizations have the size, funding, or influence to restructure the supply chain or to coordinate activities. One such organization that might have the resources and capability to take on such a task is Feeding America, the largest hunger relief agency in the U.S., with a network of more than 200 food banks. Such an effort would be a good fit with the objectives of Feeding America, food banks, and other organizations in the supply chain, which focus on providing healthy and nutritious foods to food-insecure people.

The goal of reducing food insecurity and improving nutrition is also a worthy social policy goal and one that would result in improvements in emergency food recipients' health. While such policies can be costly to develop and implement, the long-term benefits of a healthier population are sizable, including children who are better able to focus and succeed in school, a more productive workforce, and a healthier population that is more productive with reduced health care

needs and expenses. Funding for produce donations and development of a coordinated system for the produce donation supply chain would fit well with the USDA, which already spends the great majority of its budget on food and nutrition programs.

## **Concluding Remarks**

The large amount of edible produce that is left in California farmers' fields or which goes unsold in packing houses presents an opportunity to reduce food insecurity, improve the nutrition and health of families receiving food assistance, and increase the sustainability of the food system. Through semi-structured interviews at all levels of the food bank distribution system, including growers, food bank distributors, food banks, and food pantries, we assessed the perceived need for additional produce donations and identified opportunities for increasing such donations to people in need of food assistance. We found that participants in our study mostly believed that the emergency food system in California worked well. The people closest to the clients, the food pantry managers, largely felt that they had sufficient produce to meet current client demand. However, there was a widespread belief that increased volume and variety, as well as greater seasonal availability, are needed to meet expected future growth as well as nutritional goals for food-insecure food bank clients. We suggest two potential strategies for increasing produce availability, including increasing the utilization and awareness of grower tax incentives and investing in building the capacity of the food bank system.

It is important to note that our interviews were conducted in 2019, before the COVID-19 pandemic disrupted the economy and drastically increased the incidence of food insecurity. The heightened need provides an increased sense of urgency to add capacity to the emergency food system.

A major limitation of this research is the geographical scope of the study, which focused largely on northern and central California. While this may limit the study's applicability, given the concentrated nature of crop production in the U.S., many of the study's findings may be applicable to other crop production regions. Another limitation is the relatively small sample size of the groups in the supply chain and the identification of organizations based largely on targeted sampling and referrals. While this might introduce some biases into our results, this strategy was necessitated by the difficulty in gaining access to people willing to be interviewed, particularly at the farm level. Interviewees were chosen to represent growers in several growing regions, two food bank distributors in different growing regions, urban and rural food banks, and food pantries that were geographically diverse. The purposeful sampling strategy was well suited to the qualitative analytical technique we employed to identify major issues.

Future research might focus on other regions of the country with different characteristics than those in the current study. This focus could provide a broader perspective of the produce donation system across the country as well as the challenges and opportunities faced by organizations in those regions. Moreover, a study with a larger sample size and more representative sampling would be useful to either confirm the results of this research or provide additional insights. Finally, research that investigates policies that address the potential feasibility of mechanisms to address the challenges and opportunities identified in this study, such as donor tax credits, could provide

insights into growing and improving the fresh produce donation system as well as the impact on food security and nutrition for food-insecure households.

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