



**2022**



**NOPREN**  
Nutrition & Obesity  
POLICY RESEARCH & EVALUATION NETWORK

**SPECIAL COLLECTION**

# About the 2022 NOPREN Special Collection

The NOPREN Special Collection features peer-reviewed publications authored by NOPREN members in 2022. This curated collection showcases the impact of NOPREN's collaborative research and evaluation activities and spotlights the many ways in which NOPREN researchers have partnered to improve the nation's nutrition policy research capacity and brought about awareness of policies and practices that work to catalyze national, state and local actions. Included in the collection are articles on early childhood and breastfeeding, drinking water access, healthy food retail, federal nutrition assistance programs (including school meals, SNAP, and WIC), and the effects of the pandemic on food and nutrition security.

## Article Key Words

*COVID-19 Food & Nutrition*



*Drinking Water & Healthy Beverages*



*Early Childhood*



*Food Security*



*Healthy Food Retail*



*Rural Food Access*



*School Wellness*



# Articles

## 1. ADOLESCENT HEALTH RISK BEHAVIORS, ADVERSE EXPERIENCES, AND SELF-REPORTED HUNGER: ANALYSIS OF 10 STATES FROM THE 2019 YOUTH RISK BEHAVIOR SURVEYS

Krupsky, K. L., Sliwa, S., Seligman, H., Brown, A. D., Liese, A. D., Demissie, Z., & Barnidge, E. (2022). Adolescent health risk behaviors, adverse experiences, and self-reported hunger: Analysis of 10 states from the 2019 youth risk behavior surveys. *Journal of Hunger & Environmental Nutrition*, 1-17. <https://doi.org/10.1080/19320248.2022.2088263>

### Abstract:

We examined associations between adolescent self-reported hunger, health risk behaviors, and adverse experiences during the 2018–2019 school year. Youth Risk Behavior Survey data were pooled from 10 states. Prevalence ratios were calculated, and we assessed effect measure modification by sex. The prevalence of self-reported hunger was 13%. Self-reported hunger was associated with a higher prevalence of every health risk behavior/adverse experience analyzed, even after adjusting for sex, grade, and race/ethnicity. Sex did not modify associations. Findings underscore needs for longitudinal research with more robust measures of adolescent food insecurity to clarify the temporality of relationships.



## 2. A RANDOMIZED CONTROLLED TRIAL OF A RESEARCH-TESTED MOBILE PRODUCE MARKET MODEL DESIGNED TO IMPROVE DIET IN UNDER-RESOURCED COMMUNITIES: RATIONALE AND DESIGN FOR THE VEGGIE VAN STUDY

Vermont, L. N., Kasprzak, C., Lally, A., Claudio, A., Tumiel-Berhalter, L., Haynes-Maslow, L., Ammerman, A., Raja, S., & Leone, L. A. (2022). A randomized controlled trial of a research-tested mobile produce market model designed to improve diet in under-resourced communities: Rationale and design for the veggie van study. *International Journal of Environmental Research and Public Health*, 19(16), 9832. <https://doi.org/10.3390/ijerph19169832>

### Abstract:

Mobile produce markets are increasingly popular retail vendors used for providing access to fresh fruits and vegetables (F&V) in under-resourced communities; however, evaluation is limited due to design and implementation challenges. This protocol presents the original design of a randomized control trial aimed at assessing the effectiveness of the evidence-based Veggie Van (VV) mobile market model. Nine US community partner organizations were asked to partner with four community sites serving lower-income areas. Sites are randomized to either intervention or control. Intervention sites will host a mobile market for one year while the control sites will host planning events, with the goal to open a market afterward. Eligible participants are aged  $\geq 18$ , the primary household shopper, live nearby/regularly frequent the site, and have expressed interest in learning about a mobile market. The primary outcome, F&V consumption, will be assessed via dietary recall at baseline and 12 months and compared between the intervention and control sites. This research advances work on the VV model and methods for mobile market evaluation with the addition of more robust measures and the study design. Determining the effectiveness of the VV model is imperative to justify taking it to scale to enhance the impact of mobile markets.



### 3. BALANCING MISSION AND MARGINS: WHAT MAKES HEALTHY COMMUNITY FOOD STORES SUCCESSFUL

John, S., Winkler, M. R., Kaur, R., DeAngelo, J., Hill, A. B., Sundermeir, S. M., Colon-Ramos, U., Leone, L. A., Dombrowski, R. D., Lewis, E. C., & Gittelsohn, J. (2022). Balancing mission and margins: What makes healthy community food stores successful. *International Journal of Environmental Research and Public Health (Special Issue "Healthy Food Businesses: Models for Improving Diet and Healthy Food Access in Under-Resourced Communities")*, 19(14), 8470. <https://doi.org/10.3390/ijerph19148470>

#### Abstract:

Mission-driven, independently-owned community food stores have been identified as a potential solution to improve access to healthy foods, yet to date there is limited information on what factors contribute to these stores' success and failure. Using a multiple case study approach, this study examined what makes a healthy community food store successful and identified strategies for success in seven community stores in urban areas across the United States. We used Stake's multiple case study analysis approach to identify the following key aims that contributed to community store success across all cases: (1) making healthy food available, (2) offering healthy foods at affordable prices, and (3) reaching community members with limited economic resources. However, stores differed in terms of their intention, action, and achievement of these aims. Key strategies identified that enabled success included: (1) having a store champion, (2) using nontraditional business strategies, (3) obtaining innovative external funding, (4) using a dynamic sourcing model, (5) implementing healthy food marketing, and (6) engaging the community. Stores did not need to implement all strategies to be successful, however certain strategies, such as having a store champion, emerged as critical for all stores. Retailers, researchers, philanthropy, and policymakers can utilize this definition of success and the identified strategies to improve healthy food access in their communities.

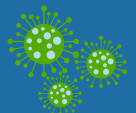


### 4. CALIFORNIA WIC PARTICIPANTS REPORT FAVORABLE IMPACTS OF THE COVID-RELATED INCREASE TO THE WIC CASH VALUE BENEFIT

Martinez, C. E., Ritchie, L. D., Lee, D. L., Tsai, M. M., Anderson, C. E., & Whaley, S. E. (2022). California WIC participants report favorable impacts of the COVID-related increase to the WIC cash value benefit. *International Journal of Environmental Research and Public Health*, 19(17), 10604. <https://doi.org/10.3390/ijerph191710604>

#### Abstract:

The United States Department of Agriculture approved an increase to the Cash Value Benefit (CVB) for the purchase of fruits and vegetables issued to participants receiving an eligible Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) food package. In order to understand satisfaction, perceptions, and the overall impact of additional benefits for fruits and vegetables at the household level, a qualitative study consisting of structured phone interviews was conducted with families served by WIC in Southern California from November to December 2021 (n = 30). Families were selected from a large longitudinal study sample (N = 2784); the sample was restricted by benefit redemption and stratified by language and race. WIC participants were highly satisfied with the CVB increase, reporting increased purchasing and consumption of a variety of fruits and vegetables. Respondents noted the improved quality and variety of fruits and vegetables purchased due to the increased amount. Findings are expected to inform policy makers to adjust the CVB offered in the WIC food package with the potential to improve participant satisfaction and increase participation and retention of eligible families with benefits from healthy diets supported by WIC.



## 5. DISPARITIES IN DIETARY PRACTICES DURING THE COVID-19 PANDEMIC BY FOOD SECURITY STATUS

Byker Shanks, C., Houghtaling, B., Shanks, J., Grocke-Dewey, M., Webber, E., Andress, L., Hardison-Moody, A., Patton-Lopez, M., & Haynes-Maslow, L. (2022). Disparities in dietary practices during the COVID-19 pandemic by food security status. *Preventive Medicine Reports*, 28, 101830. <https://doi.org/10.1016/j.pmedr.2022.101830>

### Abstract:

Little is known about the differences in dietary practices among food secure and food insecure populations during the early COVID-19 pandemic restrictions. The purpose of this study was to examine differences in dietary practices the early COVID-19 pandemic restrictions between adults reporting food security versus food insecurity. An online cross-sectional survey using validated measures was administered between April and September 2020 to explore both dietary patterns and practices and food security status among persons residing in five U.S. states from different regions of the country during the COVID-19 pandemic. Between-group differences (food secure versus food insecure) were examined for dietary practice outcomes using Pearson's Chi-Square test statistic, with Fisher's Exact test for cell counts less than five. There were 3,213 adult respondents. Food insecurity increased among the survey sample from 15.9% before the COVID-19 pandemic to 23.1% during the onset of the COVID-19 pandemic ( $p < 0.01$ ). Compared to food secure respondents, those experiencing food insecurity reported more group gatherings for meals during the pandemic, decreased fruit and vegetable intake, and a need for more nutrition support resources than food secure respondents ( $p < 0.05$ ). Food secure individuals reported increasing alcohol consumption, more frequent take-out or delivery ordering from fast food or restaurants, and more interest in supporting the local food system ( $p < 0.05$ ). Results indicate a clear risk of disparities in dietary practices based on food security status during the early COVID-19 pandemic restrictions. Public health research, practice, and policy efforts should tailor specific efforts towards both food secure and food insecure groups.

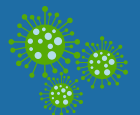
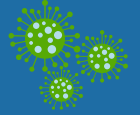
---

## 6. ESTIMATES OF THE NUTRITIONAL IMPACT OF NON-PARTICIPATION IN THE NATIONAL SCHOOL LUNCH PROGRAM DURING COVID-19 SCHOOL CLOSURES. NUTRIENTS

Hecht, A. A., Dunn, C. G., Kinsey, E. W., Read, M. A., Levi, R., Richardson, A. S., Hager, E. R., & Seligman, H. K. (2022). Estimates of the nutritional impact of non-participation in the national school lunch program during COVID-19 school closures. *Nutrients*, 14(7), 1387. <https://doi.org/10.3390/nu14071387>

### Abstract:

The COVID-19 pandemic resulted in widespread school closures, reducing access to school meals for millions of students previously participating in the US Department of Agriculture (USDA) National School Lunch Program (NSLP). School-prepared meals are, on average, more nutritious than home-prepared meals. In the absence of recent data measuring changes in children's diets during the pandemic, this article aims to provide conservative, back-of-the-envelope estimates of the nutritional impacts of the pandemic for school-aged children in the United States. We used administrative data from the USDA on the number of NSLP lunches served in 2019 and 2020 and nationally representative data from the USDA School Nutrition and Meal Cost Study on the quality of school-prepared and home-prepared lunches. We estimate changes in lunchtime calories and nutrients consumed by NSLP participants from March to November 2020, compared to the same months in 2019. We estimate that an NSLP participant receiving no school meals would increase their caloric consumption by 640 calories per week and reduce their consumption of nutrients such as calcium and vitamin D. Because 27 to 78 million fewer lunches were served per week in March-November 2020 compared to the previous year, nationally, students may have consumed 3 to 10 billion additional calories per week. As students return to school, it is vital to increase school meal participation and update nutrition policies to address potentially widening nutrition disparities.



## 7. FACTORS RELATED TO WATER FILTER USE FOR DRINKING TAP WATER AT HOME AND ITS ASSOCIATION WITH CONSUMING PLAIN WATER AND SUGAR-SWEETENED BEVERAGES AMONG U.S. ADULTS

Park, S., Onufrak, S. J., Cradock, A. L., Hecht, C., Patel, A., Chevinsky, J. R., & Blanck, H. M. (2022). Factors related to water filter use for drinking tap water at home and its association with consuming plain water and sugar-sweetened beverages among U.S. adults. *American Journal of Health Promotion, 36(5)*, 813–822.

<https://doi.org/10.1177/08901171211073304>

### Abstract:

**Objective:** To examine factors associated with water filter use (WFU) for drinking tap water at home and its association with consuming plain water and sugar-sweetened beverages (SSBs).

**Design:** Quantitative, cross-sectional study.

**Setting:** The 2018 SummerStyles survey data.

**Subjects:** U.S. adults (≥18 years; N=4042).

**Measures:** Outcomes were intake of plain water (tap/bottled water) and SSBs. Exposure was WFU (yes, no, not drinking tap water at home). Covariates included sociodemographics, weight status, Census regions, and home ownership status.

**Analysis:** We used multivariable logistic regressions to estimate adjusted odds ratios (AOR) and 95% confidence interval (CI) for consuming tap water, bottled water, or total plain water >3 cups/day (vs. ≤3 cups) and SSBs ≥1 time/day (vs. <1 time) by WFU.

**Results:** Overall, 36% of adults reported using a filter for drinking tap water at home; 14% did not drink tap water at home. Hispanics had significantly higher odds of using a water filter (AOR=1.50, 95% CI=1.14-1.98) vs non-Hispanic White. Factors significantly associated with lower odds of WFU were lower education (AOR=.69, 95% CI=.55-.86 for ≤high school; AOR=.78, 95% CI=.64-.95 for some college, vs college graduate), not being married (AOR=.81, 95% CI=.66-.98, vs married/domestic partnership), and lower household income (AOR=.68, 95% CI=.68-.90 for <\$35,000, vs ≥\$100,000). Using a water filter was associated with higher odds of drinking >3 cups/day of tap water (AOR=1.33, 95% CI=1.13-1.56) and lower odds of SSBs ≥1 time/day (AOR=.76, 95% CI=.62-.92). Not drinking tap water at home was associated with higher odds of drinking >3 cups/day bottled water (AOR=3.46, 95% CI=2.70-4.44).

**Conclusions:** WFU was associated with higher tap water intake and lower SSB intake among U.S. adults. WFU was higher among Hispanics, but lower among those with lower education and income and not married adults. Although WFU was associated with healthful beverage habits, additional considerations for WFU may include source water quality, oral health, cost, and proper use.



## 8. FOOD INSECURITY AND SUICIDAL BEHAVIORS AMONG US HIGH SCHOOL STUDENTS

Brown, A. D., Seligman, H., Sliwa, S., Barnidge, E., Krupsky, K. L., Demissie, Z., & Liese, A. D. (2022). Food insecurity and suicidal behaviors among us high school students. *Journal of School Health, 92(9)*, 898–906.

<https://doi.org/10.1111/josh.13199>

### Abstract:

**Background:** Food insecurity (FI) rates in the United States are particularly high among households with children. This research set aims to analyze if high school students experiencing FI had higher risk for mental health and suicidal behaviors.

**Methods:** Using combined data from 11 states that conducted the 2017 Youth Risk Behavior Survey, a total of 26,962 and 24,051 high school students were used to estimate race/ethnicity and sex-stratified prevalence ratios (PRs) from Poisson regression models. A single-question was used to measure the exposure of FI and outcomes of mental health and suicidal behaviors.

**Results:** Overall, 10.8% of students reported FI. Students experiencing FI had increased risk for all mental health and suicide behavior outcomes, regardless of their race/ethnicity or sex. PRs ranged from 1.9 (95% confidence interval [CI]:1.8, 2.0) to 3.1 (CI: 2.7, 3.6). Among males, PRs for the association between FI and all outcomes were highest among non-Hispanic black students (PRs ranged from 2.4 [CI: 1.7, 3.2] to 5.5 [CI: 2.3, 13.3]). Among females, PRs were highest among non-Hispanic white students (PRs ranged from 1.9 [CI:1.7, 2.1] to 3.6 [CI:2.9, 4.5]).

**Conclusions:** FI is consistently associated with mental health and suicidal behaviors among different subgroups of students.



## 9. FORMS OF COMMUNITY ENGAGEMENT IN NEIGHBORHOOD FOOD RETAIL: HEALTHY COMMUNITY STORES CASE STUDY PROJECT

Kaur, R., Winkler, M., John, S., DeAngelo, J., Dombrowski, R., Hickson, A., Sundermeir, S., Kasprzak, C., Bode, B., Hill, A., Lewis, E., Colon-Ramos, U., Munch, J., Witting, L., Odoms-Young, A., Gittelsohn, J., & Leone, L. (2022). Forms of community engagement in neighborhood food retail: Healthy community stores case study project. *International Journal of Environmental Research and Public Health (Special Issue "Healthy Food Businesses: Models for Improving Diet and Healthy Food Access in Under-Resourced Communities")*, 19(12), 6986. <https://doi.org/10.3390/ijerph19126986>

### Abstract:

Community engagement is well established as a key to improving public health. Prior food environment research has largely studied community engagement as an intervention component, leaving much unknown about how food retailers may already engage in this work. The purpose of this study was to explore the community engagement activities employed by neighborhood food retailers located in lower-income communities with explicit health missions to understand the ways stores involve and work with their communities. A multiple case study methodology was utilized among seven retailers in urban U.S. settings, which collected multiple sources of data at each retailer, including in-depth interviews, store manager sales reports, store observations using the Nutrition Environment Measures Survey for Stores, public documents, and websites. Across-case analysis was performed following Stake's multiple case study approach. Results indicated that retailers employed a wide variety of forms of community engagement within their communities, including Outreach, Building Relationships through Customer Relations, Giving Back, Partnering with Community Coalitions, and Promoting Community Representation and Inclusiveness. Strategies that built relationships through customer relations were most common across stores; whereas few stores demonstrated community inclusiveness where members participated in store decision making. Findings provide a more comprehensive view of the ways local food retailers aim to develop and sustain authentic community relationships. Additional research is needed to evaluate the impact of community engagement activities on improving community health.

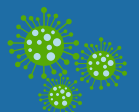


## 10. IMPLEMENTATION OF UNIVERSAL SCHOOL MEALS DURING COVID-19 AND BEYOND: CHALLENGES AND BENEFITS FOR SCHOOL MEALS PROGRAMS IN MAINE

Cohen, J. F. W., Polacsek, M., Hecht, C. E., Hecht, K., Read, M., Olarte, D. A., Patel, A. I., Schwartz, M. B., Turner, L., Zuercher, M., Gosliner, W., & Ritchie, L. D. (2022). Implementation of universal school meals during COVID-19 and beyond: Challenges and benefits for school meals programs in Maine. *Nutrients*, 14(19), 4031. <https://doi.org/10.3390/nu14194031>

### Abstract:

School meals play a major role in supporting children's diets and food security, and policies for universal school meals (USM) have the potential to contribute to positive child health outcomes. During the COVID-19 pandemic, schools provided free school meals to all students in the United States, but this national USM policy ended in school year (SY) 2022–2023; however, a few states have adopted policies to continue USM statewide for SY 2022–2023. Research examining the challenges and strategies for successful continuation of USM is essential, along with studying pandemic-related challenges that are likely to persist in schools. Therefore, we conducted a study in Maine (with a USM policy) to evaluate the impact of COVID-19 and the concurrent implementation of USM, as well as examine differences in implementation by school characteristics, throughout the state. A total of  $n = 43$  school food authorities (SFAs) throughout Maine completed surveys. SFAs reported multiple benefits of USM including increased school meal participation; reductions in the perceived stigma for students from lower-income households and their families; and no longer experiencing unpaid meal charges and debt. SFAs also experienced challenges due to the COVID-19 pandemic, particularly regarding costs. When considering future challenges, most respondents were concerned with obtaining income information from families, product and ingredient availability, and the costs/financial sustainability of the school meal programs. Overall, USM may have multiple important benefits for students and schools, and other states should consider implementation of a USM policy.



## 11. LEAD CONCENTRATIONS IN US SCHOOL DRINKING WATER: TESTING PROGRAMS, PREVALENCE, AND POLICY OPPORTUNITIES, 2016-2018

Cradock, A. L., Barrett, J. L., Poole, M. K., Flax, C. N., Vollmer, L., & Hecht, C. (2022). Lead concentrations in us school drinking water: Testing programs, prevalence, and policy opportunities, 2016–2018. *American Journal of Public Health, 112*(S7), S679–S689. <https://doi.org/10.2105/AJPH.2022.306961>

### Abstract:

**Objectives:** To detail baseline drinking water sample lead concentrations and features of US state-level programs and policies to test school drinking water for lead in 7 states' operating programs between 2016 and 2018.

**Methods:** We coded program and policy documents using structured content analysis protocols and analyzed state-provided data on lead concentration in drinking water samples collected in public schools during initial testing phases.

**Results:** We analyzed data from 5688 public schools, representing 35% of eligible schools in 7 states. The number of samples per school varied. The proportion of schools identifying any sample lead concentration exceeding 5 parts per billion varied (13%–81%). Four states exceeded 20%. Other program features varied among states. Instances of lead above the state action level were identified in all states.

**Conclusions:** In 2018, many US public school students attended schools in states without drinking water lead-testing programs. Testing all drinking water sources may be recommended.

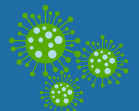


## 12. “LET’S USE THIS MESS TO OUR ADVANTAGE”: CALLS TO ACTION TO OPTIMIZE SCHOOL NUTRITION PROGRAM BEYOND THE PANDEMIC

Katz, B. N., Soldavini, J., Grover, K., Jilcott Pitts, S., Martin, S. L., Thayer, L., Ammerman, A. S., & Lane, H. G. (2022). “Let’s Use This Mess to Our Advantage”: Calls to action to optimize school nutrition program beyond the pandemic. *International Journal of Environmental Research and Public Health, 19*(13), 7650. <https://doi.org/10.3390/ijerph19137650>

### Abstract:

School nutrition programs mitigate food insecurity and promote healthy eating by offering consistent, nutritious meals to school-aged children in communities across the United States; however, stringent policy guidelines and contextual challenges often limit participation. During COVID-19 school closures, most school nutrition programs remained operational, adapting quickly and innovating to maximize reach. This study describes semi-structured interviews with 23 nutrition directors in North Carolina, which aimed to identify multi-level contextual factors that influenced implementation, as well as ways in which the innovations during COVID-19 could translate to permanent policy and practice change and improve program reach. Interviews were conducted during initial school closures (May–August 2020) and were deductively analyzed using the Social Ecological Model (SEM) and Consolidated Framework for Implementation Research (CFIR). Analysis elicited multiple relevant contextual factors: director characteristics (motivation, leadership style, experience), key implementation stakeholders (internal staff and external partners), inner setting (implementation climate, local leadership engagement, available resources, structural characteristics), and outer setting (state leadership engagement, external policies and incentives). Findings confirm the strength and resilience of program directors and staff, the importance of developing strategies to strengthen external partnerships and emergency preparedness, and strong support from directors for policies offering free meals to all children.





### 13. ONLINE PILOT GROCERY INTERVENTION AMONG RURAL AND URBAN RESIDENTS AIMED TO IMPROVE PURCHASING HABITS

Gustafson, A., Gillespie, R., DeWitt, E., Cox, B., Dunaway, B., Haynes-Maslow, L., Steeves, E. A., & Trude, A. C. B. (2022). Online pilot grocery intervention among rural and urban residents aimed to improve purchasing habits. *International Journal of Environmental Research and Public Health*, 19(2), 871. <https://doi.org/10.3390/ijerph19020871>

#### Abstract:

Online grocery shopping has the potential to improve access to food, particularly among low-income households located in urban food deserts and rural communities. The primary aim of this pilot intervention was to test whether a three-armed online grocery trial improved fruit and vegetable (F&V) purchases. Rural and urban adults across seven counties in Kentucky, Maryland, and North Carolina were recruited to participate in an 8-week intervention in fall 2021. A total of 184 adults were enrolled into the following groups: (1) brick-and-mortar “BM” (control participants only received reminders to submit weekly grocery shopping receipts); (2) online-only with no support “O” (participants received weekly reminders to grocery shop online and to submit itemized receipts); and (3) online shopping with intervention nudges “O+I” (participants received nudges three times per week to grocery shop online, meal ideas, recipes, Facebook group support, and weekly reminders to shop online and to submit itemized receipts). On average, reported food spending on F/V by the O+I participants was USD 6.84 more compared to the BM arm. Online shopping with behavioral nudges and nutrition information shows great promise for helping customers in diverse locations to navigate the increasing presence of online grocery shopping platforms and to improve F&V purchases.



### 14. OPERATIONAL CHALLENGES THAT MAY AFFECT IMPLEMENTATION OF EVIDENCE-BASED MOBILE MARKET INTERVENTIONS

Kasprzak, C. M., Lally, A. E., Schoonover, J. J., Gallicchio, D., Haynes-Maslow, L., Vermont, L. N., Ammerman, A. S., Raja, S., Tumieli-Berhalter, L., Tirabassi, J. N., & Leone, L. A. (2022). Operational challenges that may affect implementation of evidence-based mobile market interventions. *BMC Public Health*, 22(1), 776. <https://doi.org/10.1186/s12889-022-13207-8>

#### Abstract:

**Introduction:** Mobile produce markets are becoming an increasingly prevalent, accepted, and effective strategy for improving fruit and vegetable (F&V) access and consumption across underserved and lower-income communities. However, there is limited published research on mobile market operations. The goal of this research is to identify the challenges mobile markets face and ways to potentially mitigate those challenges. We will also discuss implications of our findings for future implementation of evidence-based food access interventions.

**Methods:** We conducted 21 semi-structured key informant (KI) interviews to assess common practices of mobile market organizations that had been operating for 2+ years. We asked KIs about their organizational structure, operations, procurement and logistics, evaluation efforts, marketing and community engagement, success and challenges. A primary qualitative analysis involved deductive coding using qualitative software. A secondary qualitative analysis identified subthemes related to common challenges and remedial practices. A deductive coding process was applied to match identified challenges to the appropriate Consolidated Framework for Implementation Research (CFIR).

**Results:** The leading challenges cited by KIs correspond to the CFIR domains of inner setting (e.g., funding and resources), outer setting (e.g., navigating regulations), and process (e.g., engaging community partnership). Practices that may mitigate challenges include maximizing ancillary services, adopting innovative volunteer and staffing structures, and formalizing agreements with community partners.

**Conclusion:** Common and persistent challenges ought to be addressed to ensure and enhance the positive public health impacts of mobile produce markets. Contextual factors, particularly organizational factors, that impact implementation should also be considered when implementing an evidence-based intervention at a mobile market. Further research is needed to determine which innovative solutions are the most effective in mitigating challenges, improving implementation, and enhancing sustainability of mobile markets.



## 15. PATTERNS OF FOOD ASSISTANCE PROGRAM PARTICIPATION, FOOD INSECURITY, AND PANTRY USE AMONG U.S. HOUSEHOLDS WITH CHILDREN DURING THE COVID-19 PANDEMIC

Harper, K., Belarmino, E. H., Acciai, F., Bertmann, F., & Ohri-Vachaspati, P. (2022). Patterns of food assistance program participation, food insecurity, and pantry use among U.S. households with children during the COVID-19 pandemic. *Nutrients*, 14(5), 988. <https://doi.org/10.3390/nu14050988>

### Abstract:

This study aims to describe differences in participation in the Supplemental Nutrition Assistance Program (SNAP), Special Supplemental Nutrition Program for Women and Children (WIC), and school meal programs by household characteristics prior to and during the pandemic, and to examine the association of program participation with food security status and food pantry use. We analyze secondary data ( $n = 470$ ) from an online survey collected in July/August 2020 using weighted multiple logistic regression models. Participation in SNAP declined among households with children in the first four months of the pandemic, while participation in WIC increased slightly, and participation in school meals remained unchanged. There were significant differences in SNAP, WIC, and school meal programs use by race/ethnicity, income, and urbanicity before and during the pandemic. Food insecurity prevalence was higher among SNAP participants at both periods but the gap between participants and non-participants was smaller during the pandemic. Pantry use and food insecurity rates were consistently higher among federal nutrition assistance program participants, possibly suggesting unmet food needs. These results highlight the need for increased program benefits and improved access to food, particularly during periods of hardship.

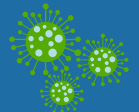
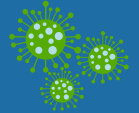
---

## 16. PROVIDING SCHOOL MEALS TO ALL STUDENTS FREE OF CHARGE DURING THE COVID-19 PANDEMIC AND BEYOND: CHALLENGES AND BENEFITS REPORTED BY SCHOOL FOODSERVICE PROFESSIONALS IN CALIFORNIA

Zuercher, M. D., Cohen, J. F. W., Hecht, C. E., Hecht, K., Ritchie, L. D., & Gosliner, W. (2022). Providing school meals to all students free of charge during the COVID-19 pandemic and beyond: Challenges and benefits reported by school foodservice professionals in California. *Nutrients*, 14(18), 3855. <https://doi.org/10.3390/nu14183855>

### Abstract:

Universal school meals (USM) have the potential to increase access to healthy food for millions of U.S. students. This study evaluated school food authorities' (SFA) perspectives of federal USM in response to COVID-19 (school year (SY) 2021–22) and California's upcoming USM policy in the SY 2022–23. In February 2022, all SFAs in California ( $n = 1116$ ) were invited to complete an online survey. Descriptive statistics and logistic regression examining differences by school demographic characteristics were used. Five hundred and eighty-one SFAs completed the survey; 63% of them first implemented USM during the COVID-19 pandemic. Reported benefits included increased student meal participation (79.2%) and reduced stigma (39.7%). Top challenges included staffing (76.9%) and meal packaging/solid waste (67.4%). Nearly all SFAs reported pandemic-related challenges procuring the necessary types (88.9%) and amounts of foods (85.9%), and non-food supplies/equipment (82.6%). Over 40% reported that federal reimbursements were insufficient to cover costs. SFAs with <40% FRPM-eligible students and/or higher student enrollment reported more current challenges and future concerns than those with ≥40% FRPMs and lower student enrollment. The top resources requested to implement CA's USM included additional facilities/equipment (83.8%), communications/marketing (76.1%), increasing meal participation (71.5%), and financial management (61.5%). Most California SFAs reported that implementing federal USM had the intended effect of feeding more children. This study's findings may be useful to the several other U.S. states implementing universal school meals in the SY 2022–23, and to other states or countries considering adopting a USM policy in the future.



## 17. THE RELATIONSHIP BETWEEN BREASTFEEDING AND INITIAL VEGETABLE INTRODUCTION WITH VEGETABLE CONSUMPTION IN A NATIONAL COHORT OF CHILDREN AGES 1-5 YEARS FROM LOW-INCOME HOUSEHOLDS

Thompson, H. R., Borger, C., Paolicelli, C., Whaley, S. E., Reat, A., & Ritchie, L. (2022). The relationship between breastfeeding and initial vegetable introduction with vegetable consumption in a national cohort of children ages 1–5 years from low-income households. *Nutrients*, *14*(9), 1740. <https://doi.org/10.3390/nu14091740>

### Abstract:

Compared to other food groups, vegetable intakes are lowest relative to recommendations. Breastfeeding and initial introduction to vegetables may help infants establish long-lasting taste preferences. We examined the relationship between breastfeeding and initial vegetable introduction and vegetable intake in early childhood (ages 13–60 months). This repeated cross-sectional study used data from the national WIC Infant and Toddler Feeding Practices Study-2 collected from low-income mother/caregivers about infants from around birth through age 5 (60 months; n = 3773). Survey-weighted adjusted regression models assessed associations between breastfeeding and vegetable introduction measures with vegetable consumption at child ages 13, 24, 36, 48, and 60 months. Longer breastfeeding duration was associated with a slightly, but significantly, greater variety of vegetables consumed/day in early childhood. There was also a small but positive statistically significant association between the number of different types of vegetables consumed on a given day at 9 months and the amount and variety of vegetables consumed/day in early childhood. Age of initial vegetables introduction and whether vegetables were the first/second food introduced were not consistently related to the amount or variety of vegetables consumed later in childhood. Longer breastfeeding and introduction to a greater variety of vegetables at 9 months may be behaviors to target to increase consumption of a greater variety of vegetables by young children.



*Support for this product was provided in part by Cooperative Agreement Number (U48DP006374/ACL/ACL HHS/United States) funded by the Centers for Disease Control and Prevention's Division of Nutrition, Physical Activity, and Obesity (DNPAO) and Prevention Research Centers Program, which includes the Nutrition and Obesity Policy Research and Evaluation Network (NOPREN). The findings and conclusions in this product are those of the author(s) and do not necessarily represent the official position of the CDC or DHHS.*

*NOPREN infrastructure supported all or part of the collaboration for the included studies. In addition, many received financial support from other sources.*

