



Published in final edited form as:

J Sch Nurs. 2025 December ; 41(6): 719–730. doi:10.1177/10598405241267020.

Challenges With School Meal Provisions in K-12 Public Schools: Findings From the National School COVID-19 Prevention Study

India Rose¹, Caitlin Merlo², Cherrelle Dorleans¹, Luke McConnell¹, Colleen Murray¹, Sanjana Pampati², Sarah Lee², Margaret Applebaum³

¹Public Health Solutions Portfolio, ICF, Atlanta, GA, USA

²CDC Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, Atlanta, GA, USA

³Food and Nutrition Service, United States Department of Agriculture, New Alexandria, VA, USA

Abstract

School meals play a vital role in supporting student health. Access to school meals was disrupted during COVID-19-related school closures, impacting student nutritional intake and household food insecurity. Data from the National School COVID-19 Prevention Study Survey and school staff focus groups were used to examine challenges to school meal provision in K-12 public schools. Data were analyzed using R and MAXQDA. Survey data indicated that most schools served breakfast and lunch in the cafeteria or classroom during the 2021–2022 school year. City schools were less likely to experience challenges with receiving the foods and supplies needed for school meal programs. Qualitative data revealed that school meal participation increased during the COVID-19 pandemic, however schools encountered challenges when implementing the program including staff shortages and supply chain issues. Findings from this study can help strengthen the K-12 school meal system to equitably serve students in future public health emergencies.

Keywords

COVID-19; food insecurity; K-12 students; mixed-methods research; school meals; school

Corresponding Author: India D. Rose, ICF, 2635 Century Center Parkway NE, Suite 1000, Atlanta, GA 30345, USA, India.Rose@icf.com.

Author contribution(s)

India Rose: Conceptualization; Data curation; Formal analysis; Formal analysis; Investigation; Methodology; Project administration; Supervision; Writing – original draft; Writing – review & editing.

Caitlin Merlo: Conceptualization; Investigation; Writing – original draft; Writing – review & editing.

Cherrelle Dorleans: Data curation; Formal analysis; Methodology; Writing – original draft; Writing – review & editing.

Luke McConnell: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Writing – review & editing.

Colleen Murray: Conceptualization; Data curation; Formal analysis; Formal analysis; Investigation; Methodology; Project administration; Supervision; Writing – original draft; Writing – review & editing.

Sanjana Pampati: Conceptualization; Investigation; Methodology; Supervision; Validation; Writing – review & editing.

Sarah Lee: Conceptualization; Investigation; Methodology; Supervision; Writing – review & editing.

Margaret Applebaum: Conceptualization; Data curation; Methodology; Writing – review & editing.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Introduction

School meals play a vital role in supporting student health, addressing food security, and combating childhood obesity in the United States (Jowell et al., 2021; Meier et al., 2022). School-aged children are at critical stages for physical and cognitive development, and nutrition plays a key role in facilitating these processes. School meals increase students' access to healthy food options and facilitate students' healthy food practices, which can help to support lifelong health (Corkins et al., 2016). School meals have been associated with several benefits for students, including improved dietary intake and nutrition, food security, and academic performance (Askelson et al., 2022; Cohen et al., 2021). The United States Department of Agriculture (USDA) administers child nutrition programs that play an essential role in addressing food insecurity through the National School Lunch Program (NSLP), School Breakfast Program (SBP), Summer Food Service Program, and Child and Adult Care Food Program. NSLP, the largest of USDA's child nutrition programs, allows eligible children living in low-income households to receive free or reduced-rate school meals (Ralston et al., 2017). In 2022, approximately 94% of public schools participated in the school lunch program (US Department of Education, 2022). For many students, school meals make up almost one-half of their caloric intake in a day, which highlights the impact of federal nutrition assistance programs on overall student health and well-being (Story et al., 2009).

Provision of school meals requires a collaborative approach led by school staff, including administrators, food services staff, and school nurses (Holmes et al., 2016). School nurses encourage healthy eating and assist schools in increasing the availability of healthy food options for students (Muckian et al., 2017). While school meal provision is not the primary responsibility of school nurses, they often play a vital role in emergency management, monitoring school nutrition practices, and addressing food insecurity in schools (McDonald, 2020; Rothstein & Olympia, 2020). School nurses are aware of the many disparities students face, especially during public health emergencies, including access to healthcare services, safe housing, transportation, and nutrition (Combe, 2020).

Ensuring students in the United States have access to food during public health emergencies is paramount. Beginning in March 2020, schools across the United States were closed for in-person instruction due to COVID-19 (coronavirus disease 2019). The COVID-19 pandemic brought unprecedented challenges to schools, impacting their ability to provide nutritional and reliable school meals to students (McLoughlin et al., 2020). School closures meant that millions of K-12 students would no longer have access to free or reduced-priced lunch at their school, meals they rely on for their primary nutritional needs, and household food security. This was especially concerning among student populations who received free or reduced-priced meals (FRPM), as research shows that those students are more likely to be disadvantaged by nutrition shortfalls (Dunn et al., 2020). To ease program operations, the Families First Coronavirus Response Act gave USDA the authority to issue nationwide waivers to school meal regulations, which provided flexibility in how and where school meals were served. Additionally, this waiver allowed all K-12 students to receive free school meals at the height of the COVID-19 pandemic, regardless of household income (Bennett et al., 2023; Kinsey et al., 2020; USDA, 2023; Zuercher et al., 2022). While these

federal waivers ensured students were able to receive school meals, little is known about the challenges schools experienced with having to modify their operation and implementation of the school meal programs due to the COVID-19 pandemic.

The purpose of this study was to use a mixed-methods approach to explore practices and challenges in school meal provision in a nationally representative sample of K-12 public schools in the United States during the COVID-19 pandemic. Gaining a better understanding of challenges and practices for school meal provision can help to strengthen the K-12 school meal system to equitably serve students in future public health emergencies.

Methods

National School COVID-19 Prevention Study

The National School COVID-19 Prevention Study (NSCPS) is a mixed-method evaluation that explored the implementation of COVID-19 prevention strategies among a representative sample of U.S. K-12 public schools (Centers for Disease Control and Prevention, 2021). The NSCPS comprised a series of five longitudinal web-based surveys administered from June 2021 to May 2022 to better understand COVID-19 prevention strategies in schools. Survey waves 2 to 5 focused on the 2021–2022 school year. In addition to the longitudinal surveys, the NSCPS also included focus groups with school staff to further examine challenges schools experienced during the COVID-19 pandemic. Additional details about the NSCPS are published elsewhere (Pampati et al., 2022, 2023; Rose et al., 2023; Spencer et al., 2023).

Participants

NSCPS Survey (Waves 2 and 3). The sampling frame for the NSCPS included 1602 public K-12 schools representing all 50 states and the District of Columbia. The sample was stratified based on school level (elementary, middle, and high), National Center for Education Statistics (NCES) school locale (city, suburb, town, and rural), and region (Northeast, South, Midwest, and West). One school administrator or a school-level designee completed the survey at each survey wave. Data from survey wave 2 (437 schools; response rate = 27%) and survey wave 3 (423 schools; response rate = 26%) were included in this analysis and weighted to account for nonresponse and design strata.

School Staff Focus Groups. Respondents who completed at least two surveys of waves 2 to 5 ($n = 448$) were asked if they would be interested in participating in the qualitative portion of the NSCPS, which included key informant interviews with school administrators and school staff focus groups. Individuals who expressed interest in participating ($n = 45$) in the qualitative portion comprised the basis of our recruitment sample for the school staff focus groups. Characteristics (i.e., school level, school region, and school size) for the 45 schools were assessed and a smaller sample of 33 was invited to participate in interviews based on school level, school size, and geographic location. This sampling strategy was employed to ensure a diverse and representative sample of schools across those key characteristics. Administrators who completed an interview ($n = 21$) were then asked to identify potential staff to participate in a focus group discussion. The school staff identified represented the following five occupations: (1) school or district nurse, (2) school counselor

or mental health professional, (3) custodian or district facilities manager, (4) teacher, and (5) food service/nutrition director or food service assistant. School staff were sent an email inviting them to participate in a focus group discussion. The inclusion criteria for this study included: (a) school staff currently working in an elementary, middle, or high school; (b) their school must have completed at least two NSCPS surveys; and (c) must be familiar with their school's implementation of COVID-19 prevention strategies. Due to the low response rate to the invitation to participate in the focus groups, schools that were not selected for participation in key informant interviews but expressed interest in additional data collection were contacted and invited to participate in focus groups. The final focus group sample included 18 school-level staff. Of the 18 school-level staff who participated in this study, 11 were elementary school, five were middle school, and three were high school staff members. Four school staff served as food service directors or assistants, six were teachers, five were school nurses, and three were school counselors. This article presents results from the focus group questions that examined challenges to implementation of school meal programs during the COVID-19 pandemic.

Instrumentation

NSCPS Survey (Waves 2 and 3). Survey wave 2, administered October to November 2021, assessed COVID-19 prevention strategies implemented at the start of the 2021–2022 school year and included questions about school meal distribution. Specifically, questions were asked about where and how breakfast and lunch were served at schools. Survey wave 3 assessed practices that were currently in place at the time of the survey, December 2021 to January 2022, and examined challenges with school meal provision, including challenges with receiving the type and quantity of foods, beverages, or supplies needed for school meal programs. Table 1 presents sample questions from the NSCPS survey waves 2 and 3 related to school meal provisions. Survey waves 2 and 3 were selected because they included questions specific to school meal provision.

School Staff Focus Groups. The school staff focus group guide was developed through an iterative process of reviewing existing measures and extant literature. The semistructured focus group guide included 32 open-ended questions with additional probes about COVID-19 prevention measures, support, and self-efficacy related to participant experiences working in schools while implementing the prevention measures. Focus group questions assessed how school meal programs were impacted by the COVID-19 pandemic, challenges with school meal distribution, and factors that facilitated the implementation of school meal programs. Table 2 presents sample focus group questions related to implementation and challenges with school meal provisions.

Procedures

All study activities were reviewed by the Centers for Disease Control and Prevention (CDC) and conducted in a manner consistent with applicable federal law and CDC policy. The study was also reviewed and approved by ICF International's Institutional Review Board. A web-based survey was administered to school administrators (e.g., principals) or school-level designees familiar with COVID-19 prevention strategies (e.g., nurses). In addition, four virtual focus groups were conducted in Spring 2022 with school staff using Microsoft

Teams. Video was used during focus groups when possible, to establish rapport, but was not always used due to network connectivity problems or participant preferences. Consent forms were emailed to participants for their records. Participants were required to provide verbal consent at the start of each focus group. Focus groups were audio-recorded and lasted 60 to 90 min. Participants received an electronic gift card valued at \$75 as a token of appreciation for their time in focus groups and \$50 for completing each survey.

Data Analysis

NSCPS Survey (Waves 2 and 3). Weighted percentages (with 95% confidence intervals [CIs]) of school meal provision challenges among K-12 public schools, including by locale and school poverty level, were estimated. The percentage of students eligible for FRPM during 2019–2020 served as a proxy for the school poverty level. Chi-square tests were used to test for differences in the percentage of schools reporting each challenge by school-level characteristics; p -values $< .05$ were considered statistically significant. Additionally, multinomial logistic regression was used to determine if schools with higher levels of FRPM were more likely to experience challenges with school meal provision. There were no other covariates included in the models. To help account for nonresponse bias and produce estimates representative of K-12 public schools, we calculated weights for this analytic sample. Analyses were conducted using R (R Core Team, 2021).

School Staff Focus Groups. Audio files were transcribed, cleaned, deidentified, and quality checked by the study team. Qualitative data were managed and analyzed using MAXQDA 2022 (VERBI Software, 2021). An initial codebook was developed by the lead author using the discussion guide and relevant literature. To achieve intercoder reliability, 20% of the transcripts were coded independently by two coders to assess consistency, coder agreement, and application of developed codes. Discrepancies were addressed, and intercoder reliability was achieved at Cohen's Kappa = 0.89. Two coders then used an inductive open and axial coding approach to identify relationships among coded segments and salient categories of information representing themes.

Results

NSCPS Survey Findings

Table 3¹ presents characteristics of the school meal programs during the COVID-19 pandemic during different time points during the 2021–2022 school year. At the start of the 2021–2022 school year, the majority of students ate breakfast in the cafeteria (50.8%), classroom (47.2%), outside (12.4%), or gymnasium (3.1%). Few schools (8.1%) noted that students do not eat breakfast at school. The majority of schools reported students ate lunch in the cafeteria (83.6%), followed by schools reporting schools ate lunch outside (27.1%) or in the classroom (23.1%). At the start of the 2021–2022 school year, schools indicated that school meals were served individually plated (e.g., entire meal plated and served by a cafeteria staff) (75%) or served grab and go style (e.g., individually packaged items that students can grab themselves) (55.9%). The majority of schools (91.7%) reported

¹Some questions on the NSCPS Survey allowed for multiple responses to be selected resulting in percentages greater than 100%.

that students picked up their meals in a cafeteria line. Few schools reported that school meals were delivered to individual classrooms (12.4%). When schools were asked about challenges they encountered receiving foods, beverages, and/or meal supplies for the school meal programs, 34.7% indicated they did not experience any challenges receiving foods, beverages, or supplies. More than one-third (36.8%) of schools indicated that they experienced challenges receiving both the types and quantities of foods, beverages, or supplies and 18.3% of schools indicated that they experienced challenges receiving the types of foods, beverages, or supplies needed for the school meal programs, but did not have challenges receiving the quantities needed.

City schools had lower odds of facing challenges getting the quantities and types of food for the school meal programs in comparison to rural schools (odds ratio [OR] = 0.35; 95% CI 0.19–0.64, Table 4). The odds of facing challenges getting the quantities and types of food for the school meal programs were 2.12 times as high for Midwest schools compared to schools located in the South (OR = 2.12, 95% CI 1.14–3.97, Table 5). Schools located in the western United States had half the odds of having challenges getting the quantities and types of food for the school meal programs compared to schools in the South (OR = 0.53, 95% CI 0.28–1.00, Table 5). Experiencing challenges getting the quantities and types of food for the school meal programs did not significantly vary by the percent of the student population eligible for FRPM (data not shown).

School Staff Focus Group Findings

Four major themes emerged describing challenges schools faced with implementation of the school meal programs during the COVID-19 pandemic. These themes focused on expansion of the program, modification of school meal distribution, addressing food insecurity, and staffing and supply chain challenges.

Theme 1: School Meal Participation Increased Greatly During the COVID-19 Pandemic. Schools indicated a significant increase in the number of students participating in their school meal programs. One participant mentioned, *“Our participation increased like crazy. Before we had maybe a 45% student participation rate, this year we were up to 70%. Which for my little district, that’s a lot. Interestingly, it wasn’t my students receiving free meal benefits that participated more, it was my paying students.”* Another participant noted an increase in students receiving school meals, commenting, *“At the beginning of the school year, I would say we were about 30,000 meals per day. Pre-pandemic, it was probably sitting around 27,000. At the end of last school year, we were serving 40,000 students a day, and that doesn’t just happen. It takes a lot of people, effort, product, and food to make that happen.”* Several focus group participants shared that parents were unaware that free and reduced-priced breakfast was available to students, with one participant commenting, *“Breakfast participation doubled. Many of our families didn’t even know that we served breakfast.”* Participants reported that the USDA waivers allowed for increased school meal distribution stating, *“My ability to feed kids really has everything to do with the USDA regulations.”*

Theme 2: School Meal Distribution Looked Different as a Result of the COVID-19 Pandemic.

Some schools reported adding extra meal periods, delivering meals on buses, or modifying how meals were served, changing from a traditional cafeteria line to individually wrapped meals to meet the needs of students and families. The majority of school staff indicated that their school had to individually wrap all food items as their school's original meal distribution process allowed students to self-select with one participant commenting, *"We have to individually wrap things if the students are selecting it themselves. I am spending money on plastic bags and tape machines. [For example, apples], we need time to wash them and time to have somebody stand there and bag up 600 apples. We used to be able to wash them, put them in the bins when kids could self-select."* Another school staff indicated that *"everything must be pre-packaged"* and discussed how this was not how their school originally distributed meals. Schools also reported offering drive-through or walk-up meal distribution as well as using school buses to distribute meals to students and families with one participant stating, *"We went on school buses, staff members did, and provided lunch and food to people in outlying areas."* Schools expressed challenges with having to pivot and modify their school meal programs during the COVID-19 pandemic, with one participant sharing, *"In the very beginning [of the pandemic], we shifted from a cafeteria-style to in-person dining, take out and pick up. The school was never designed for in-person, take-out, and pick-up. It was not designed for this. It's hard."*

Theme 3: School Meals are Critical for Addressing Food Insecurity in Homes, Especially During the COVID-19 Pandemic.

Several school staff reported that the school meal programs are integral for addressing food insecurity among students and their families. Staff shared that students and families relied on the school meal programs during the COVID-19 pandemic for their nutritional intake. One participant commented, *"Families in poverty or in transition, they're dependent for nutrition, information, access to enrichment."* While another participant shared, *"The biggest thing is nutrition-wise, making sure that they have an adequate supply of food at their house. A lot of it is having the right food, too."* School staff noted the stark reality that some students only receive meals at school and stressed the importance of students having access to meals during the COVID-19 pandemic. One participant reported, *"If it weren't for summer school, some of our kids wouldn't be eating. The meals they get here may be the only meal they get all day long."* School staff shared that the school meal programs not only benefited students, but also their families commenting, *"We did what we could do to feed these kids and their families, like allowing them to drive up and pick up boxes of food. We did whatever we could to make sure people were eating."* Another participant shared, *"We did a lot of curbside meal service. And that was extremely beneficial to families who came to pick up boxes of food. And I think that that made our employees stronger because they knew what an impact their work was having on the community."*

Theme 4: Schools Encountered a Number of Challenges When Implementing the School Meal Programs, Including Staff Shortages, Limited Supplies, and Supply Chain Issues. Schools experienced a myriad of challenges when implementing the school meal programs during the COVID-19 pandemic. For example, schools were

not able to get the food and supplies needed for school meal preparation and distribution. One school staff member shared, *“For school nutrition, the support was not felt. We were struggling battling deficiencies in food supply and material, trying to get Styrofoam products in so we could serve students.”* Another school staff member shared how they had to improvise when they were low on supplies, commenting, *“We cut trays in half, we’re talking about clam shell trays, all those kinds of things just to survive. When it comes to support on the nutrition level, that’s what we were muddling through.”* Supply chain issues also posed a challenge for the school meal programs. Several school staff shared that deliveries were often late causing disruption to meal distribution. One school staff reported, *“I know in my district, right up until the end of school, we were having trouble finding food. We would have late deliveries or nonexistent deliveries. Our menu was constantly being adjusted due to whatever food that was available.”* Given the supply chain issues, some food directors/managers relied on local stores to purchase school meals for students. One participant commented on how their school’s food director had to go to local grocery stores to purchase some foods needed for the school meal programs, *“I know our food director was making trips to Walmart and Stop and Shop whatever grocery store USA to try to buy in bulk what he could to meet the needs he had. And then try to find the gluten-free food, dairy-free food, soy-free food, it was a lot. Nearly impossible task, I don’t know how we did it, I really don’t.”*

In addition to limited supplies and supply chain issues, staffing was noted as a major challenge to implementing the school meal programs. Several schools indicated that there was a great deal of staff turnover among their food services staff. One staff commented about the growing availability of food services positions stating, *“Our job postings are super high, there was a lot of attrition. Call it whatever you want, but a lot of people left their positions recently over the past few years. Retirement became a much more viable option for a lot of folks.”* School staff noted that it is difficult to recruit individuals for food services positions and indicated that this became even more challenging during the COVID-19 pandemic. One school staff mentioned, *“And it’s really hard to find people who want these positions. Finding people to fill our positions now is harder than ever. It’s harder than ever to fill school nutrition positions, because they’re just a hard position to fill. Service worker position is hard to fill, especially during this pandemic.”*

Discussion

Our study examined challenges with implementing the school meal programs during the COVID-19 pandemic. Jowell et al. (2021) emphasize the importance of understanding the challenges to providing school meals and indicated that best practices, particularly among under-resourced communities, can aid in building school meal systems and policies. Findings confirm that schools saw an increase in school meal participation during the pandemic, with the majority of students eating breakfast and lunch in the cafeteria or classroom. Qualitative data further affirmed that schools saw a significant increase in students eating school breakfast, especially among students who were ineligible for FRPM prior to the pandemic. This finding is consistent with previous research that noted an uptick in school meal provision, especially among students not eligible for FRPM (Zuercher et al., 2022). Recent studies show that the USDA’s federal waivers increased the number of

students receiving school meals as it lifted restrictions normally attached to school meal funding and permitted all K-12 students to receive free breakfast and lunch during the COVID-19 pandemic (Bennett et al., 2023; Kinsey et al., 2020; USDA, 2023). This finding is particularly important as it highlights the need for universal school meal programs and demonstrates the prevalence of students using this service during a public health emergency. Given the high rates of food insecurity among K-12 students, federal or local-level policies could be modified to allow universal meals for all students regardless of household income which is a recommendation consistent with previous research (Cohen et al., 2021; Fletcher & Frisvold, 2017; Hoffman & Miller, 2020; Li et al., 2020). Expanding participation in the school meal programs is a policy lever that has the potential to address food insecurity, reduce absenteeism, and improve the nutritional quality of students' diets (Community Preventive Services Task Force, 2022; Forrestal et al., 2021). Recent data shows that some states have passed legislation that allows them to continue to provide free school meals to all students regardless of household income (Bylander et al., 2024).

Our study found that school districts found innovative measures to rapidly respond to providing meals to students and their families. Data show that schools had to rely on both traditional and innovative methods to ensure young people had access to school meals. The majority of school meals were individually plated and served by cafeteria staff, but some meals were delivered to students and families by school bus. Additionally, focus group data indicated that some schools offered drive-through or walk-up meal distribution to accommodate varying schedules. Consistent with previous research, studies have shown how schools pivoted to provide meals to students during the COVID-19 pandemic (Fleischhacker & Campbell, 2020; Jablonski et al., 2021; McLoughlin et al., 2020; Shanks et al., 2020; Zuercher et al., 2022). Our findings highlight the need for school meal programs to be flexible and adaptable during public health emergencies. Schools may benefit from support at the local, state, or federal level to assist them with adapting their approach to school meal provision. This will be vital during times of school closures caused by infectious disease outbreaks or other public health emergencies.

Our study found that limited supplies and staff shortages hindered some schools' ability to distribute meals. Supply chain issues resulted in schools not receiving needed supplies, foods, and materials. Additionally, high staff turnover impacted schools' ability to implement the school meal programs. This study found that limited staff were available to handle food purchasing and meal preparation, which increased the difficulty of serving nutritious meals to students. Previous research highlights a number of barriers that schools faced during the COVID-19 pandemic and staff attrition was identified as a major challenge (Asada et al., 2020; Harper et al., 2023; Rose et al., 2023). The challenges identified in this current study are similar to those previously reported by Cohen et al. (2022), who found that staff and labor challenges, supply chain disruptions, and limited product availability due to the COVID-19 pandemic resulted in interruptions to the school meal programs. Additionally, the U.S. Department of Agriculture's Food and Nutrition Service conducted a survey on school meal operations and found that the most frequently cited challenges that schools reported were limited availability of meal services supplies as well as supply chain disruptions (Applebaum & Figueroa, 2022). This study exemplifies the need to help schools prepare for school meal distribution during public health emergencies. Schools may

consider adding contingencies to their emergency operations plans that address school meal provision, including working with external partners to assist with school meal distribution and expanding partnerships with local food producers to procure more locally and regionally grown foods (Applebaum & Figueroa, 2022).

This study examined challenges associated with the school meal programs by poverty status, locale, and geographic region. Our data indicates that challenges with receiving the quantities and types of foods, beverages, and supplies needed for the school meal programs did not vary by poverty status (i.e., FRPM). Our study found that rural schools and schools located in the South were more likely to report challenges with getting the quantities and types of foods, beverages, and supplies needed for the school meal programs in comparison to city schools and schools located in western and midwestern United States. Our study also found that schools in the west and midwest were more likely to experience these challenges than schools in the south. This finding is consistent with previous studies that have examined challenges that schools in rural communities face (Turner & Chaloupka, 2014; Turner et al., 2019). Students living in rural communities often face multiple barriers to consuming healthier diets due to limited access to healthy foods, increasing their risk of obesity in comparison to their urban and suburban peers (Johnson & Johnson, 2015; Steves et al., 2021). Not having adequate access to the quantities and types of food needed may result in increased food insecurity among students living in rural communities. Further, addressing challenges with the school meal programs in the south is paramount given that southern states in the United States have the highest rates of children experiencing overweight/obesity (Zgodic et al., 2021). It is important to note that while our study found geographical differences in challenges to school meal provision, we do not know if these challenges existed prior to the pandemic or represent a pandemic-related exacerbation of previously existing disparities.

Our study provides evidence that further supports the importance of school meal programs and how essential it is for addressing food insecurity among K-12 students and their families. School staff indicated that for some students, the breakfast or lunch served at school may be the only meal that they receive all day. Consistent with previous research (Hetrick et al., 2020), qualitative data further revealed that some schools sent boxes of food home for both students and their families as they recognized that the COVID-19 pandemic intensified food insecurity. This current study also found that students beyond those eligible for FRPM utilized the school meal programs during the COVID-19 pandemic. This highlights the importance of strengthening school meal programs to ensure equitable access to school meals for all students, especially during public health emergencies.

Study Limitations

This study's findings should be interpreted in the context of several limitations. First, the results of this study may not be applicable to earlier phases of the pandemic, given data collection occurred during a later phase of the COVID-19 pandemic (June 2021–May 2022). At the time of data collection, school staff had navigated the COVID-19 pandemic for an entire school year, which also may have impacted their responses. Second, survey respondents were primarily school principals, and their awareness of school meal

distribution may be limited. Third, the qualitative sample was limited in its size, including 18 K-12 school staff, with only four of those being food services or nutrition staff. Social desirability bias could also be present given the nature of the study. Lastly, the political climate may have impacted how schools implemented their school meals program as previous studies have highlighted the influence that politics had on schools' decision making (Collins, 2023; Houston & Steinberg, 2023; Redbird et al., 2022).

Implications for School Nursing

This study's findings are particularly relevant for school nurses who are often on the front line during public health emergencies and key decision-makers for school health initiatives. According to the National Association of School Nurses (2020), school nurses are well-positioned to take the lead in efforts aimed at improving the quality of students' dietary intake in the school setting. Blessing and Mendonca (2019) further posit that school nurses play an important role in determining nutrition for school meals and addressing childhood obesity. While school nurses may not generally be responsible for the design of the school meal programs, they are integral in communicating with families about the benefits of the program and connecting families to resources in the community should they need assistance securing meals. Schools may consider involving school nurses in the planning of the school meal programs, especially during public health emergencies, because of their extensive education and training and their role as first responders in the school environment. School nurses are trained to meet the changing needs of students, are leaders within schools, and can help make nutrition a priority. Our findings highlight the need to develop ongoing efforts to address student food insecurity and assist school professionals with ensuring student nutrition needs are met, especially during public health emergencies.

Conclusions

The findings from this study identify strategies that schools used for school meal distribution during the COVID-19 pandemic. They also provide public health, nutrition, and school professionals with an enhanced understanding of factors that hindered implementation of the school meal programs. Schools and their partners have the unique opportunity to create meaningful change to school meal programs (e.g., NSLP, SBP, etc.) by creating sustainable solutions to address food insecurity in school-aged children. Gaining a better understanding of challenges to school meal provision can help to strengthen the K-12 school meal system in an effort to equitably serve students in future public health emergencies.

Acknowledgments

The authors would like to thank the school staff for their participation in the study and willingness to provide insights on COVID-19 prevention. Additionally, we would like to thank the members of the National School COVID-19 Prevention Study Team.

Funding

The authors disclosed receipt of the following financial support for the research and/or authorship of this article: This study was supported by funding from the Centers for Disease Control and Prevention (CDC), National Center for Chronic Disease Prevention and Health Promotion, Contract #GS00F010CA, Task Order #75D30121F10577 awarded to ICF.

Biographies

India Rose, PhD, MPH, CHES, is a Senior Manager of Research Science in the Public Health Solutions Portfolio at ICF.

Caitlin Merlo, MPH, RDN, is a Health Scientist in the Division of Adolescent and School Health at the United States Centers for Disease Control and Prevention.

Cherrelle Dorleans, MPH, is a Public Health Research Scientist in the Public Health Solutions Portfolio at ICF.

Luke McConnell, MS, is a Business and Data Analyst at ICF.

Colleen Murray, DrPH, MPH, is a Senior Director of Research Science in the Public Health Solutions Portfolio at ICF.

Sanjana Pampati, MPH, is a Health Scientist in the Division of Adolescent and School Health at the United States Centers for Disease Control and Prevention.

Sarah Lee, PhD, is Branch Chief for the Community Based Solutions and Health Equity Branch in the Division of Readiness and Response Science in the Office of Readiness and Response at the United States Centers for Disease Control and Prevention.

Margaret Applebaum, is Chief of the Special Nutrition Analysis Branch at the United States Department of Agriculture.

References

- Applebaum M, & Figueroa H (2022). USDA Child Nutrition Program and Supplemental Nutrition and Safety Program also contributed to this report. Results of USDA FNS-Administered School Food Authority Survey on Supply Chain Disruptions. Prepared by the U.S. Department of Agriculture, Food and Nutrition Service, Office of Policy Support, Alexandria, VA. www.fns.usda.gov/research-and-analysis.
- Asada Y, Mitric S, & Chriqui JF (2020). Addressing equity in rural schools: Opportunities and challenges for school meal standards implementation. *Journal of School Health*, 90(10), 779–786. 10.1111/josh.12943 [PubMed: 32820533]
- Askelson N, Ryan G, Brady P, Meier CL, Delger P, & Scheidel C (2022). Middle school students' perceptions of the lunchroom: Implications for future interventions. *The Journal of School Nursing*, 38(3), 233–240. 10.1177/1059840520928504 [PubMed: 32458718]
- Bennett BL, McKee SL, Burkholder K, Chafouleas SM, & Schwartz MB (2023). USDA's summer meals during the COVID-19 pandemic: A mixed-methods examination of participants and non-participants in 2021. *Journal of the Academy of Nutrition and Dietetics*, 124(4), 495–508.e9. 10.1016/j.jand.2023.07.015 [PubMed: 37482269]
- Blessing SA, & Mendonca LL (2019). The healthy menu project: Role of the school nurse: Youth–adult shared partnerships help change a school lunch menu. *NASN School Nurse*, 34(6), 335–339. 10.1177/1942602X19852583 [PubMed: 31169058]
- Bylander A, FitzSimons C, & Hayes C (2024). The state of healthy school meals for all: California, Maine, Massachusetts, Nevada, and Vermont Lead the Way. Food Research & Action Center. <https://frac.org/wp-content/uploads/HSMFA-Report-2024.pdf>.
- Centers for Disease Control and Prevention. (2021). National School COVID-19 Prevention Study (NSCPS). Retrieved from <https://www.cdc.gov/healthyyouth/data/nscps/index.htm>

- Cohen JF, Hecht AA, McLoughlin GM, Turner L, & Schwartz MB (2021). Universal school meals and associations with student participation, attendance, academic performance, diet quality, food security, and body mass index: A systematic review. *Nutrients*, 13(3), 911. 10.3390/nu13030911 [PubMed: 33799780]
- Cohen JF, Polacsek M, Hecht CE, Hecht K, Read M, Olarte DA, & Ritchie LD (2022). Implementation of universal school meals during COVID-19 and beyond: Challenges and benefits for school meals programs in Maine. *Nutrients*, 14(19), 4031. 10.3390/nu14194031 [PubMed: 36235683]
- Collins JE (2023). The politics of re-opening schools: Explaining public preferences reopening schools and public compliance with reopening orders during the COVID-19 pandemic. *American Politics Research*, 51(2), 223–234. 10.1177/1532673X221135521 [PubMed: 38603294]
- Combe LG (2020). School nurses: Living the framework during COVID-19. *NASN School Nurse*, 35(4), 183–187. 10.1177/1942602(20929533) [PubMed: 32452274]
- Community Preventive Services Task Force (2022). Guide to community preventive services. TFFRS—Social determinants of health: Healthy School Meals for All. <https://www.thecommunityguide.org/pages/tffrs-social-determinants-health-healthy-school-meals-all.html>.
- Corkins MR, Daniels SR, de Ferranti SD, Golden NH, Kim JH, Magge SN, & Schwarzenberg SJ (2016). Nutrition in children and adolescents. *Medical Clinics*, 100(6), 1217–1235. 10.1016/j.mcna.2016.06.005 [PubMed: 27745591]
- Dunn CG, Kenney E, Fleischhacker SE, & Bleich SN (2020). Feeding low-income children during the COVID-19 pandemic. *New England Journal of Medicine*, 382(18), e40. 10.1056/NEJMp2005638 [PubMed: 32227759]
- Fleischhacker S, & Campbell E (2020). Ensuring equitable access to school meals. *Journal of the Academy of Nutrition and Dietetics*, 120(5), 893–897. 10.1016/j.jand.2020.03.006 [PubMed: 32334823]
- Fletcher JM, & Frisvold DE (2017). The relationship between the school breakfast program and food insecurity. *Journal of Consumer Affairs*, 51(3), 481–500. 10.1111/joca.12163 [PubMed: 30008484]
- Forrestal S, Potamites E, Guthrie J, & Paxton N (2021). Associations among food security, school meal participation, and students' diet quality in the first school nutrition and meal cost study. *Nutrients*, 13(2), 307. 10.3390/nu13020307 [PubMed: 33499016]
- Harper K, Bode B, Gupta K, Terhaar A, Baltaci A, Asada Y, & Lane H (2023). Challenges and opportunities for equity in us school meal programs: A scoping review of qualitative literature regarding the COVID-19 emergency. *Nutrients*, 15(17), 3738. 10.3390/nu15173738 [PubMed: 37686770]
- Hetrick RL, Rodrigo OD, & Bocchini CE (2020). Addressing pandemic-intensified food insecurity. *Pediatrics*, 146(4). Available Online First from 10.1542/peds.2020-006924. Retrieved from <https://publications.aap.org/pediatrics/article/146/4/e2020006924/79689/Addressing-Pandemic-Intensified-Food-Insecurity>
- Hoffman JA, & Miller EA (2020). Addressing the consequences of school closure due to COVID-19 on children's physical and mental well-being. *World Medical & Health Policy*, 12(3), 300–310. 10.1002/wmh3.365 [PubMed: 32904951]
- Holmes BW, Sheetz A, Allison M, Ancona R, Attisha E, Beers N, & Young T (2016). Role of the school nurse in providing school health services. *Pediatrics*, 137(6), e20160852. 10.1542/peds.2016-0852 [PubMed: 27217476]
- Houston DM, & Steinberg MP (2023). Politics, COVID, and in-person instruction during the first year of the pandemic. *Educational Policy*, 08959048231204843. Available OnlineFirst at 10.1177/08959048231204843
- Jablonski BB, Casnovsky J, Clark JK, Cleary R, Feingold B, Freedman D, & Wentworth C (2021). Emergency food provision for children and families during the COVID-19 pandemic: Examples from five US cities. *Applied Economic Perspectives and Policy*, 43(1), 169–184. 10.1002/aepp.13096 [PubMed: 33173572]

- Johnson III, & Johnson JAMA (2015). Urban-rural differences in childhood and adolescent obesity in the United States: A systematic review and meta-analysis. *Childhood Obesity*, 11(3), 233–241. 10.1089/chi.2014.0085 [PubMed: 25928227]
- Jowell AH, Bruce JS, Escobar GV, Ordonez VM, Hecht CA, & Patel AI (2021). Mitigating childhood food insecurity during COVID-19: A qualitative study of how school districts in California's San Joaquin Valley responded to growing needs. *Public Health Nutrition*, 26(5), 1–11. 10.1017/S1368980021003141
- Kinsey EW, Hecht AA, Dunn CG, Levi R, Read MA, Smith C, & Hager ER (2020). School closures during COVID-19: Opportunities for innovation in meal service. *American Journal of Public Health*, 110(11), 1635–1643. 10.2105/AJPH.2020.305875 [PubMed: 32941069]
- Li A, Harries M, & Ross LF (2020). Reopening K-12 schools in the era of coronavirus disease 2019: Review of state-level guidance addressing equity concerns. *The Journal of Pediatrics*, 227, 38–44. 10.1016/j.jpeds.2020.08.069 [PubMed: 32866501]
- McDonald CC (2020). Reopening schools in the time of pandemic: Look to the school nurses. *The Journal of School Nursing*, 36(4), 239–240. 10.1177/1059840520937853 [PubMed: 32552237]
- McLoughlin GM, McCarthy JA, McGuirt JT, Singleton CR, Dunn CG, & Gadhoke P (2020). Addressing food insecurity through a health equity lens: A case study of large urban school districts during the COVID-19 pandemic. *Journal of Urban Health*, 97(6), 759–775. 10.1007/s11524-020-00476-0 [PubMed: 32959216]
- Meier CL, Brady P, Askelson N, Ryan G, Delger P, & Scheidel C (2022). What do parents think about school meals? An exploratory study of rural middle school parents' perceptions. *The Journal of School Nursing*, 38(3), 226–232. 10.1177/1059840520924718 [PubMed: 32419580]
- Muckian J, Snethen J, & Buseh A (2017). School nurses' experiences and perceptions of healthy eating school environments. *Journal of Pediatric Nursing*, 35, 10–15. 10.1016/j.pedn.2017.02.001 [PubMed: 28728759]
- National Association of School Nurses (2020). School wellness: What the law looks like. School Wellness – National Association of School Nurses (nasn.org).
- Pampati S, Rasberry CN, McConnell L, Timpe Z, Lee S, Spencer P, Moore S, Mead KR, Murray CC, Deng X, Iachan R, Tripathi T, Martin SB Jr., & Barrios LC (2022). Ventilation Improvement Strategies Among K–12 Public Schools — The National School COVID-19 Prevention Study, United States, February 14–March 27. *MMWR Morbidity and Mortality Weekly Report*, 71, 770–775. 10.15585/mmwr.mm7123e2 [PubMed: 35679198]
- Pampati S, Rasberry CN, Timpe Z, McConnel L, Moore S, Spencer P, & Barrios LC (2023). Disparities in implementing COVID-19 prevention strategies in public schools, United States, 2021–22 school year. *Emerging Infectious Disease*, 29(5), 937–944. 10.3201/eid2905.221533
- Ralston K, Treen K, Coleman-Jensen A, & Guthrie J (2017). Children's food security and USDA child nutrition programs. *USDA ERS—Children's Food Security and USDA Child Nutrition Programs*.
- R Core Team (2021). R: A language and environment for statistical computing. R Foundation for Statistical Computing. <https://www.R-project.org>.
- Redbird B, Harbridge-Yong L, & Mersey RD (2022). The social and political impact of the COVID-19 pandemic: An introduction. *RSF: The Russell Sage Foundation Journal of the Social Sciences*, 8(8), 1–29. 10.7758/RSF.2022.8.8.01 [PubMed: 37859756]
- Rose I, Powell L, King A, Murray CC, Rasberry CN, Pampati S, & Lee S (2023). Facilitators and barriers to implementing COVID-19 prevention strategies in K-12 public schools. *The Journal of School Nursing*, 10598405231191282, Available OnlineFirst at 10.1177/10598405231191282
- Rothstein R, & Olympia RP (2020). School nurses on the front lines of healthcare: The approach to maintaining student health and wellness during COVID-19 school closures. *NASN School Nurse*, 35(5), 269–275. 10.1177/1942602X20935612 [PubMed: 32546120]
- Shanks CB, Hingle MD, Parks CA, & Yaroch AL (2020). The COVID-19 pandemic: A watershed moment to strengthen food security across the US food system. *American Journal of Public Health*, 110(8), 1133. 10.2105/AJPH.2020.305760 [PubMed: 32639921]
- Spencer P, Timpe Z, Verlenden J, Rasberry CN, Moore S, Yeargin-Allsopp M, & Pampati S (2023). Challenges experienced by US K-12 public schools in serving students with special education needs or underlying health conditions during the COVID-19 pandemic and strategies for improved

- accessibility. *Disability and Health Journal*, 16(2), 101428. 10.1016/j.dhjo.2022.101428 [PubMed: 36610820]
- Steves A, Cho C, Metin Ç, Kong X, & Boland M (2021). The food retail landscape across rural America. <https://www.ers.usda.gov/publications/pub-details/?pubid=101355>.
- Story M, Nannery MS, & Schwartz MB (2009). Schools and obesity prevention: Creating school environments and policies to promote healthy eating and physical activity. *The Milbank Quarterly*, 87(1), 71–100. 10.1111/j.1468-0009.2009.00548.x [PubMed: 19298416]
- Turner L, & Chaloupka FJ (2014). Perceived reactions of elementary school students to changes in school lunches after implementation of the United States Department of Agriculture's new meals standards: Minimal backlash, but rural and socioeconomic disparities exist. *Childhood Obesity*, 10(4), 349–356. 10.1089/chi.2014.0038 [PubMed: 25045934]
- Turner L, Guthrie JF, & Ralston K (2019). Community eligibility and other provisions for universal free meals at school: Impact on student breakfast and lunch participation in California public schools. *Translational Behavioral Medicine*, 9(5), 931–941. 10.1093/tbm/ibz090 [PubMed: 31328770]
- U.S. Department of Agriculture (2023). Child Nutrition COVID-19 waivers from previous school years. <https://www.fns.usda.gov/fns-disaster-assistance/fns-responds-covid-19/child-nutrition-covid-19-waivers-previous-school-years>.
- U.S. Department of Education. 2022. Institute of Education Sciences, National Center for Education Statistics, School Pulse Panel 2021–22. <https://nces.ed.gov/surveys/spp/results.asp#food-services-2023-chart-1>.
- VERBI Software (2021). MAXQDA 2022 [computer software]. VERBI Software. [maxqda.com](https://www.maxqda.com).
- Zgodic A, Eberth JM, Breneman CB, Wende ME, Kaczynski AT, Liese AD, & McLain AC (2021). Estimates of childhood overweight and obesity at the region, State, and County levels: A multilevel small-area estimation approach. *American Journal of Epidemiology*, 190(12), 2618–2629. 10.1093/aje/kwab176 [PubMed: 34132329]
- Zuercher MD, Cohen JF, Hecht CE, Hecht K, Ritchie LD, & 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. 10.3390/nu14183855 [PubMed: 36145229]

Table 1.
Sample NSCPS Items From Survey Waves 2 and 3 Related to School Meal Provision.

Survey wave	Survey question
Wave 2	<i>At the start of the 2021–2022 school year, where did students eat breakfast in school? Mark all that apply.</i> a. <i>Student do not eat breakfast at school</i> b. <i>Classroom</i> c. <i>Cafeteria</i> d. <i>Outside</i> e. <i>Auditorium</i> f. <i>Gymnasium</i> g. <i>Library</i> h. <i>Don't know</i> i. <i>Other, please specify</i> <i>At the start of the 2021–2022 school year, where did students eat lunch in school? Mark all that apply.</i> a. <i>Student do not eat lunch at school</i> b. <i>Classroom</i> c. <i>Cafeteria</i> d. <i>Outside</i> e. <i>Auditorium</i> f. <i>Gymnasium</i> g. <i>Library</i> h. <i>Don't know</i> i. <i>Other, please specify</i> <i>At the start of the 2021–2022 school year, how were school meals served? Mark all that apply.</i> a. <i>Individually plated (e.g., entire meal plated and served by cafeteria staff)</i> b. <i>Grab and go (e.g., individually packaged items that students can grab themselves)</i> c. <i>Self-serve stations (e.g., salad bar)</i> d. <i>We do not serve meals at school</i> e. <i>Don't know</i> f. <i>Other, please specify</i> g. <i>Not applicable, my school was all virtual at the start of the school year</i>

Survey wave	Survey question
	<i>At the start of the 2021–2022 school year, how were school meals distributed at your school? Mark all that apply.</i>
	<i>a. Meals were delivered to individual classrooms</i>
	<i>b. Students picked up meals in cafeteria line</i>
	<i>c. Drive-through and walk-up meal distribution models and meal delivery (for hybrid or virtual learning models)</i>
	<i>d. We do not distribute meals at our school</i>
	<i>e. Don't know</i>
	<i>f. Other, please specify</i>
	<i>g. Not applicable, my school was all virtual at the start of the school year</i>
Wave 3	<i>Is your school experiencing challenges receiving foods, beverages, and/or meal supplies for the school meals programs? Mark one response.</i>
	<i>a. No challenges receiving foods, beverages, or supplies we wanted</i>
	<i>b. Yes, challenges receiving the types of foods, beverages, or supplies we wanted</i>
	<i>c. Yes, challenges receiving the quantities of foods, beverages, or supplies we wanted</i>
	<i>d. Yes, challenges receiving the types and quantities of foods, beverages, or supplies we wanted</i>
	<i>e. Don't know</i>

NSCPS= National School COVID-19 Prevention Study.

Table 2.
Sample Focus Group Questions Related to Implementation and Challenges With School Meal Provision.

Focus group question	Probe
How has your school provided nutrition services to students since the start of the COVID-19 pandemic?	<i>What changes to nutrition services have occurred since the COVID-19 pandemic began?</i> <i>What changes, if any, to nutrition service occurred during the 2021–2022 school year?</i> <i>How did changes to nutrition services directly impact your role?</i> <i>How did changes to nutrition service impact students in your school?</i>
What facilitated implementation of the changes to nutrition services?	<i>What supports did your nutrition services staff receive? Additional nutrition services staff? Funding programs?</i>
Have any COVID-19 prevention strategies impacted your ability to provide school meals, such as breakfast and lunch, to students?	<i>In what ways has your school attempted to alleviate these challenges?</i>
What additional challenges has your school experienced in providing nutrition services throughout the current school year?	<i>Please tell me about any staffing challenges your school has had in relation to nutrition services.</i>

Table 3.
 Characteristics of the School Meal Programs During the COVID-19 Pandemic (N=437 for Wave 2; N=423 for Wave 3).

Characteristics of the school meal program	Frequency (N) ¹	Percent
Breakfast location ²		
Not applicable, my school was all virtual at the start of the school year	3	0.82
Students did not eat breakfast at this school	35	8.12
Classroom	190	47.24
Cafeteria	213	50.84
Outside	54	12.37
Auditorium	5	1.46
Gymnasium	14	3.12
Library	5	1.21
Other	21	5.06
Lunch location ²		
Not applicable, my school was all virtual at the start of the school year	2	0.55
Students did not eat lunch at this school	2	0.37
Classroom	93	23.1
Cafeteria	343	83.62
Outside	121	27.14
Auditorium	7	1.78
Gymnasium	29	6.62
Library	11	2.47
Other	20	4.49
Methods for school meal distribution ²		
Individually plated (e.g., entire meal plated and served by a cafeteria staff)	311	75
Grab and go (e.g., individually packaged items that students can grab themselves)	231	55.86
Self-serve stations (e.g., salad bar)	43	10.56
Meals were delivered to individual classrooms	54	12.42
Students picked up meals in cafeteria line	382	91.72
Drive-through and walk-up meal distribution models and meal delivery (for hybrid or virtual learning models)	16	4.04
We do not distribute meals at school	12	2.86

Characteristics of the school meal program	Frequency (N) ¹	Percent
<i>Challenges with school meal programs</i> ³		
No challenges receiving foods, beverages, or supplies	137	34.68
Yes, challenges receiving both the types AND quantities of foods, beverages, or supplies	157	36.77
Yes, challenges receiving the quantities of foods, beverages, or supplies	10	2.29
Yes, challenges receiving the types of foods, beverages, or supplies	73	18.26
Don't Know	36	8.0

Note. Some questions allowed for multiple responses to be selected resulting in percentages greater than 100%.

¹Table shows unweighted count and weighted percent.

²NSCPS Survey Wave 2 was administered from October 5 to November 11, 2021

³NSCPS Survey Wave 3 was administered from December 6, 2021 to January 1, 2022.

NSCPS=National School COVID-19 Prevention Study.

Table 4.
Multinomial Logistic Regression Examining Challenges to School Meal Provision by NCES Locale.

Response	Rural	City	Suburban	Town
	OR (95% confidence intervals)			
Yes, challenges receiving both the types AND quantities of foods, beverages, or supplies	Ref	0.35 (0.19, 0.64) ***	0.62 (0.34, 1.14)	1.27 (0.55, 2.91)
Yes, challenges receiving the types of foods, beverages, or supplies	Ref	0.56 (0.25, 1.25)	1.19 (0.56, 2.53)	2.13 (0.80, 5.67)

Note.
* $p < .05$,
** $p < .01$, and
*** $p < .001$; some response options were omitted from the table due to small sample size.
NCES=National Center for Education Statistics; OR=odds ratio.

Table 5.
Multinomial Logistic Regression Examining Challenges to School Meal Provision by Geographic Region.

Response	South	Midwest	Northeast	West
		OR (95% Confidence Intervals)		
Yes, challenges receiving both the types AND quantities of foods, beverages, or supplies	Ref	2.12 (1.14, 3.97)*	0.63 (0.32, 1.24)	0.53 (0.28, 1.00)*
Yes, challenges receiving the types of foods, beverages, or supplies	Ref	2.12 (0.98, 4.59)	0.79 (0.33, 1.88)	1.11 (0.54, 2.28)

Note.

* $p < .05$,

** $p < .01$, and

*** $p < .001$; some response options were omitted from the table due to small sample size.

OR=odds ratio.