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Factors and Outcomes Associated With Using Scratch-Cooked, Organic, and Locally Grown Foods in School Meals in California

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Received: 4 September 2024 | **Revised:** 14 November 2024 | **Accepted:** 24 November 2024

Funding: This research was funded by California General Fund Senate Bill (SB) 170 (2021), SB 154 (2022), and SB 101 (2023).

Keywords: child nutrition | environmental sustainability | NSLP | SBP | universal school meals

ABSTRACT

Background: Incorporating scratch-cooked, organic, and locally grown foods into school meal programs can enhance meal quality and support local food systems.

Methods: 430 California school food authorities were surveyed to (1) evaluate their use of scratch-cooked, organic, and locally grown foods in their programs; (2) identify demographic and operational characteristics related to this use; and (3) analyze the relationship between serving more of these foods and perceived barriers to student meal participation. Poisson and logistic regression models, adjusted for SFAs' demographic characteristics, were used.

Results: Most respondents reported using scratch-cooked (82%) and locally grown foods (80%) in their school meals, with one-third serving organic foods (34%). Receiving grants to buy local produce and having a larger enrollment of White students were associated with more frequent use of these foods. More scratch cooking was associated with higher use of organic and locally grown foods and fewer perceptions of student nonparticipation due to concerns over meal healthfulness, taste, and freshness. More frequent use of organic and locally grown foods was also associated with fewer perceptions of student nonparticipation due to concerns about meal healthfulness.

Conclusions: These findings highlight the potential benefits of integrating more scratch-cooked, organic, and/or locally grown foods into school meals.

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1 | Background

Nutrition is critical to support child and adolescent development, laying the foundation for good health and reducing disease risk [1]. Studies have shown that over half of youth in the United States (U.S.) have poor-quality diets and that two-thirds of their calories come from highly processed foods [2, 3]. School meals are an essential source of nutrition for U.S. children, especially those from low-income and food-insecure households [4]. On average, school meals provide almost one-half of the day's energy intake for school-aged children eating school breakfast and lunch [5]. Additionally, participation in school meal programs has been associated with higher diet quality, better academic performance and attendance, and reduced food insecurity among students [4, 6].

Although federally funded school meals had always been required to meet nutritional guidelines, the passage of the Healthy, Hunger-Free Kids Act of 2010 significantly updated the school meal patterns and nutrition standards to align with the Dietary Guidelines for Americans [7]. These changes included increasing servings of fruit, vegetables, and whole grains, eliminating high-fat milk and trans fats, and reducing sodium [7]. There is evidence that since these changes took place, school meals have become, on average, the healthiest food source for U.S. school children [8, 9]. Importantly, students from all racial/ethnic, parental education, and household income groups have equitably benefited from these improvements in diet quality at school [8]. Additional updates to the school nutrition standards that will gradually reduce sodium and, for the first time, limit added sugars were passed in April 2024 and will be implemented in the 2025–26 school year [10].

Despite these improvements, perceptions within the school community on the quality and healthfulness of school meals are mixed. Recent studies have found that while some students, parents, and teachers perceive school meals as healthy, many also express a desire for schools to improve meal quality and healthfulness [11–13]. Previous studies have reported that parents' and students' perceptions of the healthfulness of school meals do not always align with the assessed nutrient quality of the foods offered at schools [14]. Thus, there appears to be room both to improve the quality and healthfulness of school meals and to more effectively communicate these improvements to the school community.

Incorporating more scratch-cooked foods—defined as meals prepared daily at the site of consumption or in a central kitchen, using whole, minimally processed ingredients or a mix of fresh, raw, whole ingredients and ready-made products—can further improve the quality and healthfulness of school meals [15]. Increasing scratch-cooked meals can help schools reduce the use of processed foods, allowing better control of nutrients like sodium and sugar, making it easier to meet school meal nutritional guidelines [16, 17]. Moreover, incorporating scratch cooking can help schools increase student participation by allowing them to increase menu variety, appeal, taste, and inclusion of culturally appropriate foods [17]. However, transitioning to scratch cooking requires resources such as kitchen equipment/infrastructure, refrigeration space, foodservice staff

with culinary training for institutional settings, and funding, presenting barriers for many schools [16, 18–20].

Improving the environmental sustainability of school food systems is also critical. The National School Lunch Program (NSLP) and the School Breakfast Program (SBP) serve billions of meals every year, highlighting the enormous opportunity school meals present to improve food systems [21, 22]. Including locally grown foods in school meal programs can increase the availability of fresh, local, seasonal fruits and vegetables and students' knowledge of such foods [23–25]. These changes also have the potential to improve child nutrition and meal participation, lower transportation costs, benefit local and socially disadvantaged farmers/producers and support local economies and food systems [22–24, 26, 27].

Including more organic foods in school meals offers potential benefits, including reduced environmental harm and improved health outcomes compared to conventionally produced nonorganic foods. Organic foods typically contain lower levels of synthetic fertilizers, pesticides, and antibiotics, as well as higher nutritional value [28–30]. However, incorporating more locally grown and organic foods is challenging due to availability, seasonality, the additional time and labor required to serve nonprocessed foods, finding local producers, and often higher prices [18, 24].

Despite the potential benefits associated with incorporating scratch-cooked, organic, and/or locally grown foods into school meal programs, little is known about the degree of their inclusion in school meals. Results from the 2019 U.S. Department of Agriculture's Farm-to-School Census showed that 72% of SFAs nationwide use locally grown foods in school lunches and 68% in school breakfasts [31]. However, there is no data about the use of organic and scratch-cooked foods in school meals. Moreover, there is a gap in information regarding the factors influencing the inclusion of these foods in school meals. Given the importance of serving healthier and more sustainably produced school meals, this study aimed to (1) identify how often SFAs report including scratch-cooked, organic, and locally grown foods in school meals; (2) identify the SFA demographic and operational characteristics associated with more frequent inclusion of these food options; and (3) understand the relationship between the reported use of these foods and select barriers to student meal participation.

2 | Methods

2.1 | Participants

In March 2023, the California Department of Education emailed all California SFAs participating in the NSLP ($n = 1317$) and invited them to complete an online survey sharing their perspectives about providing school meals during the first year of California's universal school meals (USM) policy (SY 2022–23) [32]. The survey link was open for 6 weeks, and two reminder emails were sent. Completing the survey was voluntary, and participants were not incentivized to participate.

We received 703 survey responses, and from those, we excluded surveys that were left blank ($n = 144$), responses with less than a 50% completion rate ($n = 81$), duplicate responses ($n = 37$), responses without information about the represented SFA ($n = 4$), and responses from SFAs not recognized by the California Department of Education or schools that were part of a larger SFA ($n = 7$). The final analytical sample included 430 survey responses representing 32.6% of the SFAs in California. This sample is representative of SFAs in the state of California based on free or reduced-price meals (FRPM) eligibility (69% of SFAs in this study and statewide have $\geq 40\%$ of students eligible for FRPM) but not on enrollment size (SFAs with small enrollment: 55% in this vs. 67% statewide) and urbanicity (SFAs in urban areas: 64% in this study vs. 41% statewide) [33].

2.2 | Instrumentation

The survey included 64 questions about the experience of directing a school food service during the school year 2022–23, which was the first year of California’s Universal School Meal Policy [32]. The present study focused on some of the questions related to meal preparation and procurement, challenges in implementing the state’s USM policy, barriers to meal participation, and finances. Most questions were multiple-choice, with Likert scale responses. Where applicable, questions were adapted from previously validated instruments; otherwise, they were newly developed for this study. Details regarding the development of this tool have been previously published [20, 34–40]. The survey was administered online via Qualtrics (Version March 2023, Provo, UT) and took approximately 30–45 min to complete (see [Supporting Information](#)).

2.3 | Procedure

2.3.1 | Frequency of Use of Scratch-Cooked, Organic, and Locally Grown Foods

The frequency of scratch-cooked foods was measured with the question: “In a typical week, how many days at a typical school does your SFA use school-made/scratch or modified scratch preparation (use of minimally processed foods, some degree of ingredient preparation, and cooking when needed, e.g., spaghetti with scratch-prepared sauce)?” Answer options ranged from 0 to 5 days [40]. The frequency of use of organic foods was measured with the question, “In a typical week, how many days at a typical school do you serve any organic foods?” Answer options ranged from 0 to 5 days. The frequency of use of locally grown foods was measured with the question: “During the current school year, what is your best estimate of the percentage of ‘locally grown or produced’ foods purchased in your district?” Answer options included $< 10\%$, $10\%–24\%$, $25\%–39\%$, $40\%–59\%$, $60\%–74\%$, $> 75\%$, and “Don’t know.” Response options were dichotomized into SFAs with $< 40\%$ of food purchases being locally grown vs. $\geq 40\%$ to have groups with comparable sizes, maximizing our statistical power in the analyses.

2.3.2 | Demographic Characteristics

Demographic characteristics of SFAs were used as independent variables and as covariates based on previous studies showing that the percentage of students eligible for FRPM, student enrollment size, urbanicity, and the percentage of White students are associated with school meal operations and meal quality [18, 20, 36]. The conceptual model showing the relationship between our variables is described in Figure 1. Details on the measurements of FRPM eligibility, student enrollment size, and urbanicity have been described elsewhere [41]. In summary, FRPM eligibility was classified as low ($< 40\%$ of students eligible for FRPM) and high ($\geq 40\%$ of students eligible for FRPM); student enrollment size was classified as small (< 2500 students), medium (2500–9999 students), and large ($\geq 10,000$ students); and urbanicity was classified based on the 2010 Rural–Urban Commuting Area (RUCA) Codes as urban (RUCA primary code 1) and nonurban (RUCA primary codes 2–10) [42]. The percentage of White students enrolled in each SFA was determined using school-level enrollment data by race/ethnicity [43]. For the analyses, each SFA was categorized as having a majority of White students ($> 50\%$ of students) or having a majority of students of color ($\leq 50\%$ of students of White race).

2.3.3 | Operational Characteristics

SFAs were asked about multiple challenges with food service operations, and the present study focused on those that might impact their ability to prepare scratch-cooked meals, including staffing shortages, inadequate kitchen equipment, and inadequate kitchen facility and storage space. Response options for each challenge were dichotomized into: “significant or moderate challenge” and “minimal or not a challenge.” SFAs reported whether they received grants to increase procurement of local produce with the question: “In the last 2 school years (SY 2021–22 and SY 2022–23), has your SFA been awarded any federal grants for increasing procurement of local produce (e.g., farm to school)?” Response options were dichotomized into yes (“yes, already spent” or “yes, still spending”) and no (“pending and not yet received”, “applied but not awarded”, or “we did not apply”). The awarding of state grants for increasing procurement of local produce was measured similarly. SFAs reported whether they consider the current meal reimbursement rate to be enough to cover lunch costs with the question: “Is the meal reimbursement (federal, state, and local combined, if applicable) for LUNCH sufficient for your SFA to cover the full cost of producing meals (including food, labor, and supplies, including those related to the pandemic)?” Response options included: “yes,” “no,” and “don’t know/not sure”. SFAs were also asked “What factors (if any) have helped your SFA to serve more locally grown or produced foods? (*check all that apply*)”. Response options included: “state meal reimbursement funds”, “state grant funds”, “federal grant funds”, “additional funding but not sure of the source”, “support and technical assistance from a non-profit organization”, and “we are not serving locally grown or produced foods”.

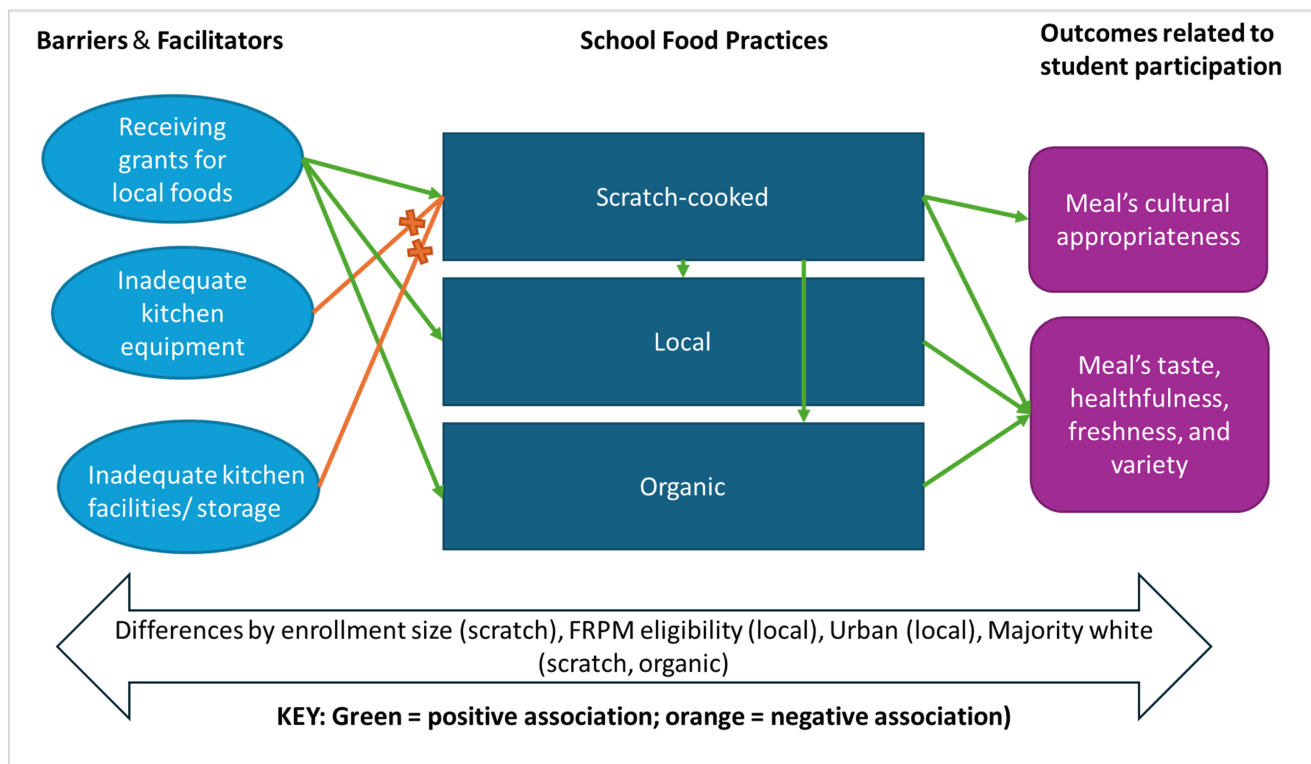


FIGURE 1 | Conceptual model showing the relationship between the use of scratch-cooked, organic, and locally grown foods and SFAs' operational and demographic characteristics.

2.3.4 | Barriers to Meal Participation

The survey included questions about multiple barriers to meal participation, and the present study focused on those barriers that could be affected by the frequency of using scratch-cooked, organic, and/or locally grown foods, based on previous literature [16, 17, 23, 24, 26]. SFAs were asked about perceived barriers to meal participation with the question, "Thinking about the students who do NOT regularly eat the reimbursable school meals, how common do you think the following barriers are for the students you serve?" Selected barriers included the following: "Students do not like the taste of the food"; "Students do not think the food is fresh"; "Students or parents do not think the food is healthy"; "Students get tired of the options" (proxy for variety); and "Foods do not meet students' cultural or non-medical dietary preferences." Response options were dichotomized into some, many, or most students vs. none or very few students.

2.4 | Data Analysis

Categorical variables were described with frequencies and percentages, and count variables were described with means and standard deviations. The demographic and operational characteristics associated with using scratch-cooked and organic foods were identified with Poisson regression with days per week using these foods as the outcome. The regression coefficients of the Poisson models were exponentiated to facilitate the interpretation of the effect sizes. Logistic regression models were used to identify the factors associated with using locally

grown foods with a dichotomous outcome of SFAs with < 40% of food purchases being locally grown vs. ≥ 40%. All demographic characteristics (i.e., FRPM eligibility, student enrollment size, urbanicity, and the percentage of White students) were included simultaneously in one regression model for each food type to evaluate their association while holding each other constant. The association between each operational characteristic (i.e., staffing shortages; inadequate kitchen equipment, facility, and storage space; receiving grants for increasing procurement of local produce; and considering the current lunch reimbursement insufficient to cover costs) and each food type was assessed in separate models adjusted by SFAs' demographic characteristics.

The association between the use of each food type and perceived barriers to student participation was evaluated with logistic regression models adjusted for SFAs' demographic characteristics. Separate models were used for each barrier. In addition, logistic models for organic and locally grown foods were also adjusted by the frequency of scratch cooking to evaluate the association between using these foods and perceived barriers to student participation (direct effect) that is not explained by the relationship between scratch cooking and these foods (indirect effect) (Figure 1).

All statistical analyses were conducted using Stata, and a Bonferroni correction was used to account for multiple comparisons by each food type (Bonferroni $\alpha = 0.02$) (StataCorp. 2023. Stata Statistical Software: Release 18. College Station, TX: StataCorp LLC).

3 | Results

Table 1 shows the characteristics of the survey respondents and their SFAs. Most respondents were food service directors (63.9%) and represented small SFAs (54.9%), SFAs with more than 40% of students eligible for FRPM (68.9%), SFAs in urban areas (64.0%), and SFAs with a majority of students of color (74.4%). Over half of the represented SFAs reported that school meals for their schools are prepared by school sites (58.8%) and that they participate with other SFAs or another organization in a food-purchasing cooperative (52.0%).

3.1 | Use of Scratch-Cooked, Organic, and Locally Grown Foods

Figure 2 shows the frequency with which SFAs reported including scratch-cooked, organic, and locally grown foods in school meals. SFAs reported using scratch cooking an average of 2.5 days per week, with 21% employing this approach every school day (Figure 2A). Conversely, organic foods were less frequently used, with 66% of SFAs not serving them in a typical week, 21%

servicing them 1 or 2 days per week, and 13% serving them three or more days per week, averaging 0.9 days per week. (Figure 2A). About one-third of SFAs reported that 40% or more of their food purchases were locally grown, and 20% did not use locally grown foods. (Figure 2B).

3.2 | Factors Associated With Higher Use of Scratch-Cooked, Organic, and Locally Grown Foods

Table 2 shows the exponentiated regression coefficients (e^{β}) for models examining the association between different demographic and operational characteristics of SFAs and the inclusion of scratch-cooked, organic, and locally grown foods in school meals. SFAs with a majority of White students reported scratch cooking meals 26% more frequently than SFAs with a majority of students of color (e^{β} 1.26; 95% CI 0.07, 0.38). SFAs who reported being awarded grants to increase procurement of local produce used scratch cooking 23% more frequently than SFAs who did not receive these grants (e^{β} 1.23; 95% CI 0.06, 0.34) (Table 2).

TABLE 1 | Characteristics of survey respondents and their California school food authorities ($n = 431$).^a

Characteristics	<i>n</i>	%
Title		
School Nutrition Director/Foodservice Director	274	63.9
School Nutrition Supervisor/Manager/Coordinator	97	22.6
Other	58	13.5
Enrollment size		
2499 or fewer students	236	54.9
2500–9999 students	120	27.9
10,000 or more students	74	17.2
Urbanicity ^b		
Urban	275	64.0
Not urban	155	36.1
Free and reduced-price meal eligibility for students		
Low FRPM eligibility (less than 40% of students)	132	31.1
High FRPM eligibility (40% or more of students)	292	68.9
Race of the majority of students		
White	108	25.6
Students of color	314	74.4
School meal preparation location ^c		
School sites	253	58.8
District Nutrition Services department/central kitchen	188	43.7
Foodservice management company or for-profit company	59	13.7
Another school district	22	5.1
Participation in a food-purchasing cooperative		
Yes	223	52.0
No	206	48.0

^aSample size varies for some questions due to missing survey responses.

^bUrbanicity was determined using the reported zip code and based on the 2010 USDA rural–urban commuting area (RUCA) codes, and it was dichotomized into urban (RUCA primary code = 1) and nonurban (RUCA primary codes = 2–10) [42].

^cPercentages for the school meal preparation location add up to more than 100% because this was a check all that apply question.

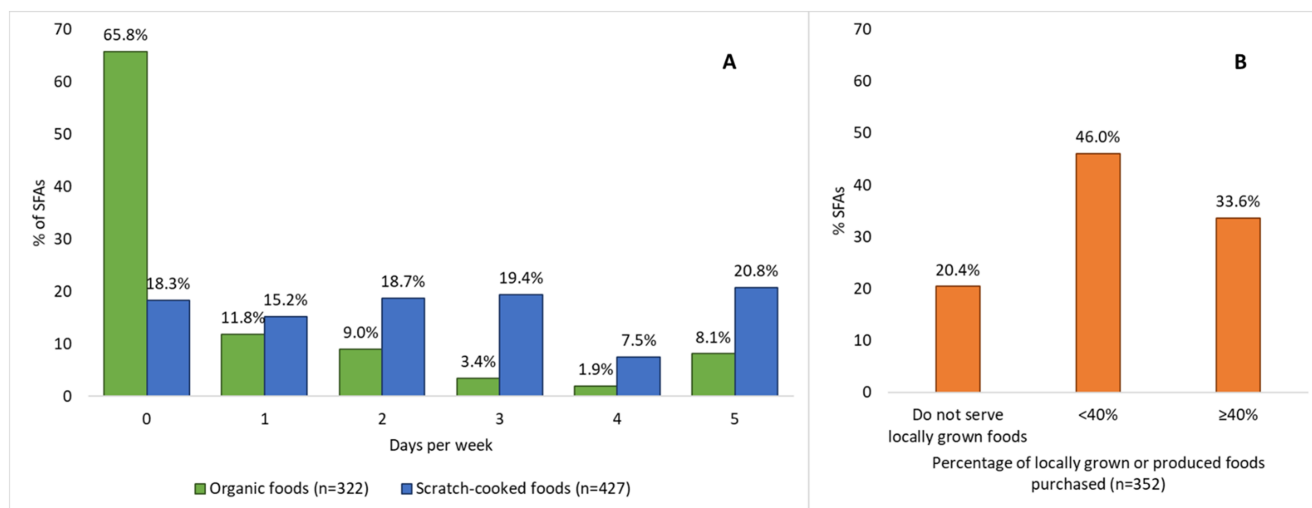


FIGURE 2 | The frequency with which school meals include (A) scratch-cooked, organic, and (B) locally grown foods, reported by Californian school food authorities. Responses from SFAs that answered “Don’t know” to the frequency of using organic foods were excluded ($n = 105$).

The factors associated with more frequent use of organic foods include race composition, receiving grants to increase procurement of local produce, and doing more scratch cooking (Table 2). SFAs with a majority of White students reported using organic foods 76% more frequently than SFAs with a majority of students of color ($e^{\beta} 1.76$; 95% CI 0.28, 0.85). SFAs awarded grants to increase procurement of local produce reported using organic foods 85% more frequently than SFAs that did not receive these grants ($e^{\beta} 1.85$; 95% CI 0.37, 0.86). SFAs experiencing challenges with inadequate kitchen facilities and storage space reported using organic foods 27% less frequently than SFAs not experiencing these challenges ($e^{\beta} 0.73$; 95% CI $-0.57, -0.06$). Each 1-day increase in scratch cooking was associated with a 15% increase in the use rate of organic foods ($e^{\beta} 1.15$; 95% CI 0.07, 0.21).

FRPM eligibility, being awarded grants to increase procurement of local produce, experiencing challenges with kitchen infrastructure, and doing more scratch cooking were associated with SFAs reporting that 40% or more of the foods purchased in their district were locally grown or produced (Table 2). SFAs with high FRPM eligibility were 126% more likely to report that 40% or more of the foods purchased in their district were locally grown than SFAs with low FRPM eligibility ($e^{\beta} 2.26$; 95% CI 1.28, 3.99). SFAs who reported being awarded grants to increase procurement of local produce were 127% more likely to report that 40% or more of the foods purchased in their district were locally grown than SFAs who did not receive these grants ($e^{\beta} 2.27$; 95% CI 1.36, 3.79). SFAs experiencing challenges with inadequate kitchen equipment and with inadequate kitchen facilities and storage space were 52% and 47% less likely to report that 40% or more of the foods purchased in their district were locally grown than SFAs not experiencing these challenges ($e^{\beta} 0.48$; 95% CI 0.29, 0.82 and $e^{\beta} 0.53$; 95% CI 0.32, 0.88, respectively). Each 1-day increase in scratch cooking was associated with a 31% higher chance of SFAs reporting that 40% or more of foods purchased in their district were locally grown ($e^{\beta} 1.31$; 95% CI 1.14, 1.50).

Experiencing challenges with staffing shortages and considering the current lunch reimbursement inadequate to cover costs

were not associated with differences in the use of scratch-cooked, organic, or locally grown foods ($p > 0.02$).

SFAs most commonly identified state meal reimbursement funds as a facilitator for serving more locally grown or produced foods, with 58.1% citing this as a helping factor. Additionally, state and federal grants were also reported as facilitators (35.7% and 31.9%, respectively) (Figure 3).

3.3 | Use of Scratch-Cooked, Organic, and Locally Grown Foods in School Meals and Perceived Barriers to Student Meal Participation

Table 3 shows the regression coefficients for the models examining the association between scratch-cooked, organic, and locally grown foods in school meals and perceived barriers to student meal participation. Each 1-day increase in the use of scratch cooking was associated with 14% fewer reports of students not participating in school meals due to concerns about the meals’ taste (OR 0.86; 95% CI 0.76, 0.97), 21% fewer reports of students not participating in school meals due to concerns about the meals’ freshness (OR 0.79; 95% CI 0.69, 0.90), and 19% fewer reports of students not participating in school meals due to concerns about the meals’ healthfulness (OR 0.81; 95% CI 0.71, 0.93). Similarly, each 1-day increase in the use of organic foods was associated with 24% fewer reports of students not participating in school meals due to concerns about the meals’ freshness (OR 0.76; 95% CI 0.63, 0.91) and 24% fewer reports of students not participating in school meals due to concerns about the meals’ healthfulness (OR 0.76; 95% CI 0.64, 0.91). Purchasing more locally grown foods was associated with 51% fewer reports of students not participating in school meals due to concerns about the meals’ healthfulness (OR 0.49; 95% CI 0.29, 0.82).

Using scratch-cooked, organic, or locally grown foods in school meals was not associated with the reported barrier of meals not meeting students’ cultural/medical preferences ($p > 0.02$).

TABLE 2 | Factors associated with the use of scratch-cooked, organic, and locally grown foods in a study of the implementation of California's universal school meal policy among school food authorities.

	Scratch cooking ^a (days/week 0–5) (<i>n</i> = 420)		Organic foods ^a (days/week 0–5) (<i>n</i> = 318)		Locally grown foods ^b (< 40% vs. ≥ 40%) (<i>n</i> = 349)	
	<i>e</i> ^β	95% CI	<i>e</i> ^β	95% CI	OR	95% CI
Demographic characteristics ^c						
Medium enrollment size (Ref: small)	1.08	−0.07, 0.23	0.94	−0.34, 0.21	0.80	0.46, 1.38
Large enrollment size (Ref: small)	1.24	0.03, 0.40	0.74	−0.68, 0.09	0.76	0.40, 1.46
40% or more students eligible for FRPM (Ref: < 40%)	1.00	−0.15, 0.15	0.95	−0.34, 0.23	2.26*	1.28, 3.99
Urban (Ref: not urban)	0.90	−0.26, 0.04	1.13	−0.17, 0.41	1.81	1.04, 3.13
Majority of White students (Ref: < 50%)	1.26*	0.07, 0.38	1.76*	0.28, 0.85	1.25	0.69, 2.26
Operational characteristics ^d						
Experiencing significant to moderate challenges with staffing shortages (Ref: minimal or not a challenge)	1.09	−0.08, 0.25	1.24	−0.12, 0.54	0.76	0.42, 1.35
Experiencing significant to moderate challenges with inadequate kitchen equipment (Ref: minimal or not a challenge)	1.03	−0.12, 0.18	0.81	−0.48, 0.06	0.48*	0.29, 0.82
Experiencing significant to moderate challenges with inadequate kitchen facilities and/or storage space (Ref: minimal or not a challenge)	0.94	−0.20, 0.08	0.73*	−0.57, −0.06	0.53*	0.32, 0.88
Being awarded grants to increase procurement of local produce (Ref: not awarded)	1.23*	0.06, 0.34	1.85*	0.37, 0.86	2.27*	1.36, 3.79
Considering that the current reimbursement is enough to cover lunch costs (Ref: not enough)	0.92	−0.22, 0.05	0.89	−0.37, 0.14	0.74	0.46, 1.21
Frequency of scratch cooking preparation in schools (days/week)			1.15*	0.07, 0.21	1.31*	1.14, 1.50

^aPoisson models were used to identify the factors associated with the frequency of scratch cooking preparation and the use of organic foods in schools (days/week), and the regression coefficients were exponentiated to facilitate the interpretation of the effect sizes; responses from SFAs that answered “don't know” were excluded.

^bLogistic regression models were used to identify the factors associated with the percentage of purchasing locally grown or produced foods (< 40% vs. ≥ 40%); responses from SFAs that answered “don't know” were excluded.

^cAll demographic characteristics were included simultaneously in one regression model for each food type to evaluate their association while holding each other constant.

^dThe association between each operational characteristic and each food type was assessed in separate models adjusted by SFAs' demographic characteristics. Sample sizes vary due to the missingness of responses.

**p* value is less than Bonferroni's corrected $\alpha = 0.02$.

4 | Discussion

Our study found significant variability in the use of scratch-cooked and locally grown foods among California SFAs, while the use of organic foods remained notably low. Operational and demographic characteristics were associated with the frequency of using these foods, suggesting possible facilitators and barriers to adopting these practices. SFAs who reported being awarded grants to increase procurement of local produce more often reported using scratch-cooked, organic, and locally grown foods. The use of organic and locally grown foods was higher among SFAs that used more scratch cooking and lower among SFAs experiencing challenges with inadequate kitchen facilities and storage space. SFAs with more White students

reported using scratch-cooked and organic foods in school meals more frequently.

In our study, 82% of SFAs reported using scratch cooking. Higher frequency of scratch cooking was associated with reduced barriers to student meal participation, particularly concerning the meals' healthfulness, taste, and freshness. This finding supports evidence from previous studies that scratch cooking can help schools improve meal quality [16–18]. A previous study examining high school students' experiences of school meals reported that students recommended shifting toward scratch-cooked meals to improve quality [44]. Scratch cooking has been reported as a technique that helps schools serve more options and include culturally diverse meals [17]. However, our study did not find a

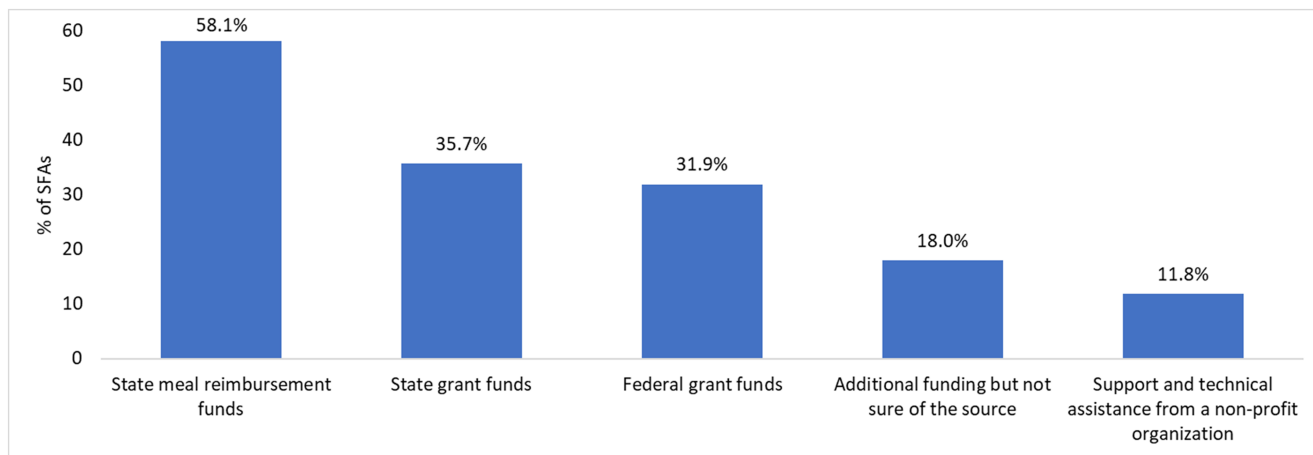


FIGURE 3 | SFA-reported factors that helped serve more locally grown or produced foods, reported by a sample of California school food authorities in SY 2022–23 ($n = 389$).

TABLE 3 | Associations between the use of scratch-cooked, organic, or locally grown foods in school meals and select barriers to student participation reported by school food authorities in California.

	Barriers to student participation									
	Students do not like the taste of the food ($n = 386$)		Students do not think the food is fresh ($n = 362$)		Students or parents do not think the food is healthy ($n = 366$)		Students get tired of the options ($n = 377$)		Foods do not meet students' cultural or nonmedical dietary preferences ($n = 345$)	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Scratch cooking (days/weeks) ^a	0.86*	0.76, 0.97	0.79*	0.69, 0.90	0.81*	0.71, 0.93	0.88	0.78, 0.99	0.96	0.84, 1.10
Organic foods (days/weeks) ^b	0.98	0.83, 1.14	0.76*	0.63, 0.91	0.76*	0.64, 0.91	—	—	—	—
Locally grown foods (< 40% vs. ≥ 40%) ^b	1.04	0.64, 1.70	0.72	0.43, 1.21	0.49*	0.29, 0.82	1.13	0.69, 1.84	—	—

^aLogistic regression models adjusted by enrollment size, free or FRPM eligibility, urbanicity, and percentage of White students were used to assess the association between the use of scratch-cooked foods with select barriers to student participation (At least some students vs. none or very few students; “don’t know/not sure” were excluded).

^bLogistic regression models adjusted by enrollment size, free or FRPM eligibility, urbanicity, percentage of White students, and frequency of scratch cooking were used to assess the association between the use of organic and locally grown foods with some select barriers to student participation. Sample sizes vary due to the missingness of responses and the exclusion of “don’t know” responses.

* p value is less than Bonferroni’s corrected $\alpha = 0.02$.

significant association between the frequency of scratch cooking and a perception among food service directors that students do not participate in school meals due to concerns about meal variety and cultural appropriateness.

While 80% of SFAs reported purchasing locally grown or produced foods, most purchased only a minority of such products, and few served organic foods. This finding is consistent with the 2019 USDA’s Farm-to-School Census, where 77% of California SFAs reported serving locally grown foods [45]. In our study, more frequent use of organic and locally grown foods was associated with fewer perceived barriers to student participation related to concerns about meals’ healthfulness. Schools implementing

programs to incorporate local and seasonal foods have shown increased offering of fruits and vegetables in their meals [23].

Serving organic foods can improve the healthfulness of school meals and contribute to the sustainability of school meal programs due to their production without synthetic chemicals that harm human and environmental health [28–30]. However, serving more locally grown and organic foods often require additional resources and infrastructure for storage and preparation and often comes with higher prices [18, 24]. Our findings show an association between the operational characteristics of SFAs and the frequency of using these foods, with inadequate kitchen facilities and storage space often limiting their use [16, 18, 44].

Nonetheless, SFAs receiving grants to increase procurement of local produce reported higher usage of scratch-cooked, organic, and locally grown foods, indicating that government investments support the inclusion of local foods in school meal programs. Therefore, providing sufficient resources, including financial support and appropriate infrastructure, may be necessary for schools to effectively integrate more organic and locally sourced foods into their meals.

The USDA and the state of California have invested to help schools serve healthier meals [46–48]. In 2020, the USDA's NSLP Equipment Assistance Grant allocated approximately \$3.5 million to California to help schools serve healthier meals, continue to provide meal service during the COVID-19 pandemic and expand the SBP [49]. Meanwhile, the State of California appropriated \$150 million in 2021 and an additional \$600 million in 2022 for its Kitchen Infrastructure and Training (KIT) program, which helped schools update their kitchens, train food service staff, and incorporate more scratch-cooked foods into their meal [46]. Moreover, the California Farm-to-School Incubator Grant Program awarded \$8.5 million in grant funding in 2021 and \$25.5 million in 2022 to help schools bring fresh, local produce to school meals [50].

In our study, SFAs doing more scratch cooking reported more frequent use of organic and locally grown foods, as scratch preparation allows for greater flexibility in ingredient selection compared to processed or pre-packed foods. Future studies using mediation analysis are needed to understand the pathways of the relationship between scratch cooking and the use of organic and locally grown foods. Given the connection between the use of scratch-cooked, organic, and locally grown foods with meal quality and perceived barriers to student participation, efforts to bring professional development and culinary expertise to school food-service staff to increase scratch-cooked school foods can help continue to advance the quality and healthfulness of school meals [51, 52]. Moreover, scratch cooking can make it easier for schools to meet the new nutritional standards for school meals that will be implemented in the 2025–26 school year by giving them better control of nutrients like sodium and sugar used in school meals [10].

Demographic characteristics, including the students' racial composition and FRPM eligibility, were associated with how often SFAs reported using scratch-cooked, organic, and/or locally grown foods. Having a majority of White students was associated with more frequent use of scratch-cooked and organic foods in our study. Similar inequities in access to scratch-cooked food in schools were previously reported [18]. These disparities may contribute to differing parental perceptions by race and ethnicity previously reported in California, in which parents of Hispanic and Asian students reported less favorable perceptions of school meal quality, taste, and healthfulness than parents of White students [12]. Racial disparities in income could partially explain these disparities in access to scratch-cooked and organic foods [53]. A previous study found that food service budgets of wealthier school districts receive far more local support (with four times the share of the budget coming from local sources and twice the support from district general funds) than districts serving lower-wealth students, which rely more on federal

funding for their food service programs [18]. Previous studies have shown that racial and ethnic disparities in access to healthy foods exist in the U.S., where more communities with a majority of nonWhite people have limited access to healthy foods than predominantly White communities. This suggests that students who lack access to scratch-cooked and organic foods at school may also face similar limitations in their local communities [54–56]. Additional research is needed to better understand the factors driving these inequities to reduce nutritional and health disparities.

This study also found that SFAs with a high FRPM eligibility reported using locally grown foods more often than those with low FRPM eligibility. This may be partly attributed to the California Farm-to-School Incubator Grant Program, which awarded a total of \$34 million between 2021 and 2022 to support 180 farm-to-school projects statewide, with 71% of the benefiting students being eligible for FRPM [50, 57]. This is an example of how targeting resources to schools can effectively reduce disparities in access to healthy foods.

4.1 | Limitations

Strengths of this study include a sample representative of SFAs in California based on FRPM eligibility [41]. However, the study sample did not necessarily represent SFAs in the state regarding enrollment size or urbanicity [41]. Our study has several limitations. First, while we invited all school food authorities in California to participate, only about one-third responded, increasing the risk of response bias. However, our sample includes various types of school districts and diverse responses, suggesting that many different types of school food experiences are represented. Further, our outcomes and exposures were self-reported. Future studies should examine whether scratch-cooked, locally sourced, and organic foods in school meals are associated with student reports of their perceptions and administrative data on participation in school meals. Another limitation is that there is no universally accepted definition of scratch cooking, and practices such as speed scratch cooking, which involves using a combination of processed and fresh foods, could lead to variability in how SFAs report their cooking methods [18]. In our survey, to assess the extent of scratch cooking, we used a question that has been used in previous studies, which includes a definition of scratch preparation to minimize confusion [40]. However, we were unable to find a validated measure to assess the frequency of using scratch-cooked, organic, and locally grown foods. The definition of locally grown foods is similarly subjective; for example, one national study asked SFAs how they defined local foods, and the most common response reported by 30% of SFAs was that they had no set definition [31]. Future work should focus on developing and validating more comprehensive measures of these constructs. Another limitation is that we were unable to assess if schools with high use of scratch-cooked, locally grown, and organic foods altogether have higher reductions of barriers to student participation than schools with high use of only one or two of these foods, mainly due to the low frequency of use of organic foods in our sample. Future studies that assess if the joint effect of using scratch-cooked, locally grown, and organic food is greater than their individual effects are needed.

5 | Implications for School Health Policy, Practice, and Equity

Findings from this study revealed that using scratch-cooked, organic, and/or locally grown foods more often was associated with reduced barriers to student meal participation related to the meals' healthfulness. This emphasizes the potential importance of increasing the use of these foods in school meal programs. Further, the study found disparities based on race and ethnicity, in which SFAs with predominantly White students reported using more scratch-cooked and organic foods compared to those with more students of color. Addressing these disparities may more equitably provide high-quality school meals that appeal to students from all demographic groups and improve the nutrition and health of students who might also lack access to healthy foods in their local communities.

Receiving grants to increase procurement of local produce was associated with more frequent use of scratch-cooked, organic, and locally grown foods. This suggests that government investments can enhance the ability of schools to purchase these higher-quality foods. Conversely, facing challenges such as inadequate kitchen facilities and storage space was associated with less frequent use of scratch-cooked, organic, and locally grown foods. Therefore, providing schools with the necessary resources to overcome barriers related to infrastructure has the potential to improve school meal quality, student participation, and, therefore, the nutritional health of children.

6 | Conclusion

Most SFAs in California incorporate some level of scratch-cooked and locally grown foods into their school meals, with one-third serving some organic foods. These practices were associated with fewer barriers to student participation related to the meals' healthfulness, taste, and freshness, highlighting the benefits of integrating healthier food options into school meals. SFAs that received additional funds to support providing students with these foods reported doing so more frequently. However, we found evidence of disparities by race/ethnicity that should be addressed to enhance the quality of school meals across all demographic groups. Our findings can inform policy by highlighting the benefits of integrating scratch-cooked, organic, and/or locally grown foods into school meals and the resources schools need to overcome the barriers to offering these foods. To make school meals healthier and improve child nutrition, it is essential to provide schools with adequate kitchen infrastructure, funding, and other resources to support more scratch-cooked meals made from high-quality ingredients that students enjoy consuming.

Acknowledgments

This research was funded by California General Fund Senate Bill (SB) 170 (2021), SB 154 (2022), and SB 101 (2023). The authors would like to thank the foodservice directors who participated in the study, the Nutrition Services Division of the California Department of Education, Celeste Felix, and the Healthy School Meals for All national team for providing expertise and guidance to the study.

Ethics Statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Review Board of the University of California, Davis (IRB ID 1840487-2, approved March 20th, 2023).

Conflicts of Interest

The authors declare no conflicts of interest.

References

1. M. R. Corkins, S. R. Daniels, S. D. De Ferranti, et al., "Nutrition in Children and Adolescents," *Medical Clinics of North America* 100, no. 6 (2016): 1217–1235, <https://doi.org/10.1016/j.mcna.2016.06.005>.
2. J. Liu, C. D. Rehm, J. Onopa, and D. Mozaffarian, "Trends in Diet Quality Among Youth in the United States, 1999-2016," *Journal of the American Medical Association* 323, no. 12 (2020): 1161–1174, <https://doi.org/10.1001/jama.2020.0878>.
3. L. Wang, E. Martínez Steele, M. Du, et al., "Trends in Consumption of Ultraprocessed Foods Among U.S. Youths Aged 2-19 Years, 1999-2018," *Journal of the American Medical Association* 326, no. 6 (2021): 519–530, <https://doi.org/10.1001/jama.2021.10238>.
4. K. Ralston, K. Treen, A. Coleman-Jensen, and J. Guthrie, "Children's Food Security and USDA Child Nutrition Programs," accessed April 19, 2023, <https://www.ers.usda.gov/webdocs/publications/84003/eib-174.pdf?v=6041.7>.
5. K. Cullen and T. Chen, "The Contribution of the USDA School Breakfast and Lunch Program Meals to Student Daily Dietary Intake," *Preventive Medicine Reports* 3, no. 5 (2016): 82–85, <https://doi.org/10.1016/J.PMEDR.2016.11.016>.
6. J. Cohen, A. Hecht, G. McLoughlin, L. Turner, and M. Schwartz, "Universal School Meals and Associations With Student Participation, Attendance, Academic Performance, Diet Quality, Food Security, and Body Mass Index: A Systematic Review," *Nutrients* 13 (2021): 911, <https://doi.org/10.3390/NU13030911>.
7. F. Register, "Nutrition Standards in the National School Lunch and School Breakfast Programs," accessed January 30, 2023, <https://www.govinfo.gov/content/pkg/FR-2012-01-26/pdf/2012-1010.pdf>.
8. J. Liu, R. Micha, Y. Li, and D. Mozaffarian, "Trends in Food Sources and Diet Quality Among U.S. Children and Adults, 2003–2018," *JAMA Network Open* 4, no. 4 (2021): e215262, <https://doi.org/10.1001/JAMANETWORKOPEN.2021.5262>.
9. J. Vernarelli and B. O'Brien, "A Vote for School Lunches: School Lunches Provide Superior Nutrient Quality Than Lunches Obtained From Other Sources in a Nationally Representative Sample of U.S. Children," *Nutrients* 9, no. 9 (2017): 924, <https://doi.org/10.3390/NU9090924>.
10. U.S. Department of Agriculture, "Updates to the School Nutrition Standards," accessed August 15, 2024, <https://www.fns.usda.gov/cn/school-nutrition-standards-updates>.
11. D. Orta-Aleman, M. D. Zuercher, K. A. Bacon, et al., "Students' Perspectives on the Benefits and Challenges of Universal School Meals Related to Food Accessibility, Stigma, Participation, and Waste," *Journal of Nutrition Education and Behavior* 56, no. 9 (2024): 599–610, <https://doi.org/10.1016/j.jneb.2024.04.011>.
12. M. D. Zuercher, J. F. W. Cohen, P. Ohri-Vachaspati, et al., "Parent Perceptions of School Meals and How Perceptions Differ by Race and Ethnicity," *Health Affairs Scholar* 2, no. 1 (2024): qxad092, <https://doi.org/10.1093/haschl/qxad092>.
13. H. R. Thompson, S. S. Machado, K. A. Madsen, R. Cauchon-Robles, M. Neelon, and L. Ritchie, "Impact of a Teacher Intervention to Encourage Students to Eat School Lunch," *International Journal of Environmental Research and Public Health* 19, no. 18 (2022): 11553, <https://doi.org/10.3390/ijerph191811553>.

14. S. Martinelli, F. Acciai, M. Yedidia, and P. Ohri-Vachaspati, "Do Parental Perceptions of the Nutritional Quality of School Meals Reflect the Food Environment in Public Schools?," *International Journal of Environmental Research and Public Health* 18 (2021): 10764, <https://doi.org/10.3390/IJERPH182010764>.
15. California Department of Education, "Kitchen Infrastructure and Training Funds," accessed May 31, 2024, <https://www.cde.ca.gov/ls/nu/kitfunds2022.asp#freshlyprepared>.
16. B. Collins, "Can Schools Save Kids' Palates? Cooking From Scratch in Schools—The Greatest Food Service Challenge of Our Time," *Childhood Obesity* 8, no. 4 (2012): 323–326, <https://doi.org/10.1089/chi.2012.0076>.
17. G. Woodward-Lopez, J. Kao, K. Kiesel, et al., "Is Scratch-Cooking a Cost-Effective Way to Prepare Healthy School Meals With U.S. Department of Agriculture Foods?," *Journal of the Academy of Nutrition and Dietetics* 114, no. 9 (2014): 1349–1358, <https://doi.org/10.1016/j.jand.2014.05.002>.
18. J. M. Vincent, A. Gunderson, D. Friedman, A. McKee-Brown, S. Wilson, and V. Gomez, "Are California Public Schools Scratch-Cooking Ready? A Survey of Food Service Directors on the State of School Kitchens," accessed May 2, 2024, https://citiesandschools.berkeley.edu/uploads/CC+S_CA_Schools_Scratch_Cooking_Report_Final_Nov_2020.pdf.
19. U.S. Department of Agriculture, "School Nutrition and Meal Cost Study Final Report Volume 1: School Meal Program Operations and School Nutrition Environments," accessed February 10, 2023, <https://fns-prod.azureedge.us/sites/default/files/resource-files/SNMCS-Volume1.pdf>.
20. M. D. Zuercher, J. F. W. Cohen, C. E. Hecht, K. Hecht, L. D. Ritchie, and W. Gosliner, "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 (2022): 3855, <https://doi.org/10.3390/NU14183855>.
21. U.S. Department of Agriculture, "Child Nutrition Tables," accessed October 11, 2023, <https://www.fns.usda.gov/pd/child-nutrition-tables>.
22. G. Gardner, W. Burton, M. Sinclair, and M. Bryant, "Interventions to Strengthen Environmental Sustainability of School Food Systems: Narrative Scoping Review," *International Journal of Environmental Research and Public Health* 20, no. 11 (2023): 5916, <https://doi.org/10.3390/ijerph20115916>.
23. California Department of Education, "Farm to School," accessed April 17, 2024, <https://www.cde.ca.gov/Ls/nu/he/farmtoschool.asp>.
24. D. S. Conner, G. Abate, T. Liquori, M. W. Hamm, and H. C. Peterson, "Prospects for More Healthful, Local, and Sustainably Produced Food in School Meals," *Journal of Hunger & Environmental Nutrition* 5, no. 4 (2010): 416–433, <https://doi.org/10.1080/19320248.2010.527276>.
25. M. P. Prescott, R. Cleary, A. Bonanno, M. Costanigro, B. B. R. Jablonski, and A. B. Long, "Farm to School Activities and Student Outcomes: A Systematic Review," *Advances in Nutrition* 11, no. 2 (2020): 357–374, <https://doi.org/10.1093/advances/nmz094>.
26. California Department of Education, "Local Food for Schools," accessed April 17, 2024, <https://www.cde.ca.gov/ls/nu/localfoodforschools.asp>.
27. S. Van Passel, "Food Miles to Assess Sustainability: A Revision," *Sustainable Development* 21, no. 1 (2013): 1–17, <https://doi.org/10.1002/sd.485>.
28. S. Hurtado-Barroso, A. Tresserra-Rimbau, A. Vallverdú-Queralt, and R. M. Lamuela-Raventós, "Organic Food and the Impact on Human Health," *Critical Reviews in Food Science and Nutrition* 59, no. 4 (2019): 704–714, <https://doi.org/10.1080/10408398.2017.1394815>.
29. A. Mie, H. R. Andersen, S. Gunnarsson, et al., "Human Health Implications of Organic Food and Organic Agriculture: A Comprehensive Review," *Environmental Health* 16, no. 1 (2017): 111, <https://doi.org/10.1186/s12940-017-0315-4>.
30. A. Rahman, P. Baharlouei, E. H. Y. Koh, et al., "A Comprehensive Analysis of Organic Food: Evaluating Nutritional Value and Impact on Human Health," *Food* 13, no. 2 (2024): 208.
31. U.S. Department of Agriculture, "Farm to School Census and Comprehensive Review Summary Report," accessed May 2, 2024, <https://fns-prod.azureedge.us/sites/default/files/resource-files/Farm-to-School-Census-Comprehensive-Review-Summary.pdf>.
32. California Department of Education, "California Universal Meals," accessed September 3, 2024, <https://www.cde.ca.gov/ls/nu/sn/cauniversalmeals.asp>.
33. California Department of Education, "Free or Reduced-Price Meal (Student Poverty) Data - Accessing Educational Data," accessed February 20, 2024, <https://www.cde.ca.gov/ds/ad/filessp.asp>.
34. U.S. Department of Agriculture, "School Nutrition and Meal Cost Study," accessed March 15, 2024, <https://www.fns.usda.gov/school-nutrition-and-meal-cost-study>.
35. J. Hoffman, L. Rosenfeld, N. Schmidt, et al., "Implementation of Competitive Food and Beverage Standards in a Sample of Massachusetts Schools: The Nourish Study (Nutrition Opportunities to Understand Reforms Involving Student Health)," *Journal of the Academy of Nutrition and Dietetics* 8, no. 115 (2015): 1299–1307.e2, <https://doi.org/10.1016/J.JAND.2015.04.019>.
36. U.S. Department of Agriculture, "Results of the U.S. Department of Agriculture, Food and Nutrition Service-Administered School Food Authority Survey on Supply Chain Disruptions," accessed February 13, 2024, <https://fns-prod.azureedge.us/sites/default/files/resource-files/FNS-Survey-Supply-Chain-Disruptions.pdf>.
37. California Department of Education, "California Healthy Kids Study Key Informant Interview Guide for School Food & Nutrition Environment," 2015.
38. Centers for Disease Control and Prevention, "School Health Policies and Programs Study 2006 - Food Service District Questionnaire," accessed March 15, 2024, <https://www.cdc.gov/healthyouth/shpps/2006/questionnaires/pdf/foodserd2006questionnaire.pdf>.
39. C. Rider, A. Linares, J. Kao, C. Becker, and G. Woodward-Lopez, "Assessing Healthful Eating and Physical Activity Practices in Places Children Learn," *Journal of Extension* 1 (2021): 58.
40. L. Ritchie, P. Wakimoto, G. Woodward-Lopez, et al., "The Healthy Communities Study Nutrition Assessments: Child Diet and the School Nutrition Environment," *American Journal of Preventive Medicine* 10, no. 49 (2015): 647–652, <https://doi.org/10.1016/J.AMEPRE.2015.06.016>.
41. M. D. Zuercher, D. Orta-Aleman, J. F. W. Cohen, et al., "The Benefits and Challenges of Providing School Meals During the First Year of California's Universal School Meal Policy as Reported by School Foodservice Professionals," *Nutrients* 16, no. 12 (2024): 1812.
42. U.S. Department of Agriculture, "Rural-Urban Commuting Area Codes," accessed October 9, 2023, <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes/>.
43. California Department of Education, "Census Day Enrollment Data," accessed June 27, 2024, <https://www.cde.ca.gov/ds/ad/filesenrcensus.asp>.
44. Y. Asada, A. G. Hughes, M. Read, M. B. Schwartz, and J. F. Chriqui, "High School Students' Recommendations to Improve School Food Environments: Insights From a Critical Stakeholder Group," *Journal of School Health* 87, no. 11 (2017): 842–849, <https://doi.org/10.1111/josh.12562>.
45. U.S. Department of Agriculture, "Farm to School Census - California (CA)," accessed August 18, 2024, <https://farmtoschoolcensus.fns.usda.gov/census-results/states/ca>.

46. California Department of Education, “Kitchen Infrastructure and Training Funds,” accessed January 22, 2024, <https://www.cde.ca.gov/ls/nu/kitfunds.asp>.
47. California Department of Education, “Grants, Recognition, and Appropriations,” accessed January 22, 2024, <https://www.cde.ca.gov/ls/nu/grarecapp.asp>.
48. U.S. Department of Agriculture, “NSLP Equipment Assistance Grants,” accessed April 17, 2024, <https://www.fns.usda.gov/grant/nslp-equipment-assistance>.
49. California Department of Education, “NSLP Equipment Assistance Grant,” accessed August 15, 2024, <https://www.cde.ca.gov/ls/nu/sn/mbsnp032021.asp>.
50. California Department of Food and Agriculture, “CA Farm to School Incubator Grant Program,” accessed September 4, 2024, <https://www.cdfa.ca.gov/caf2sgrant/>.
51. Foundation CA, “Chef Ann Foundation,” accessed August 15, 2024, <https://www.chefannfoundation.org/>.
52. Brigaid, “Brigaid,” accessed August 15, 2024, <https://www.chefsbrigaid.com/>.
53. U.S. Department of the Treasury, “Racial Inequality in the United States,” accessed June 5, 2024, <https://home.treasury.gov/news/featured-stories/racial-inequality-in-the-united-states>.
54. E. A. Baker, M. Schootman, E. Barnidge, and C. Kelly, “The Role of Race and Poverty in Access to Foods That Enable Individuals to Adhere to Dietary Guidelines,” *Preventing Chronic Disease* 3, no. 3 (2006): A76.
55. A. Hilmers, D. C. Hilmers, and J. Dave, “Neighborhood Disparities in Access to Healthy Foods and Their Effects on Environmental Justice,” *American Journal of Public Health* 102, no. 9 (2012): 1644–1654, <https://doi.org/10.2105/ajph.2012.300865>.
56. E. W. Renee, R. K. Christopher, and G. B. Jessica, “Disparities and Access to Healthy Food in the United States: A Review of Food Deserts Literature,” *Health & Place* 16, no. 5 (2010): 876–884, <https://doi.org/10.1016/j.healthplace.2010.04.013>.
57. California Farm to School Incubator Grant Program Evaluation Team, “CDFA Farm to School Incubator Grant Program Evaluation Progress Report: 2022-2024,” accessed November 6, 2024, https://californiafarmtoschooleval.org/wp-content/uploads/2024/09/2024-f2s-progress-report_full-report.pdf.

Supporting Information

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