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Universal Free School Meal Policies and Participation in the US National School Meal Programs

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IMPORTANCE School meals can support children's health and educational outcomes; however, in the US, only students from households with incomes at or below 185% of the federal poverty level qualify for free or reduced-price meals. Although the Community Eligibility Provision (CEP) enables schools in higher poverty areas to offer free meals to all students, many schools do not participate; the temporary implementation of federal Universal Free School Meal (UFSM) policies during the COVID-19 pandemic and subsequent state-level policies highlight the need for assessing their impact on participation rates in school meal programs.

OBJECTIVE To examine the impact of federal- and state-level UFSM and related policies on National School Lunch Program (NSLP) and School Breakfast Program (SBP) participation rates during and after the COVID-19 pandemic.

DESIGN, SETTING, AND PARTICIPANTS This comparative effectiveness research study used a natural experiment created by the COVID-19 pandemic to analyze school-level data from the 2019 to 2020 school-year period to the 2023 to 2024 school-year period. A difference-in-difference analysis with linear mixed-effects models was conducted to assess the impact of federal-level UFSM implementation and deimplementation and state-level policies on SBP and NSLP participation rates. School-level meal claims data were analyzed across 14 states with UFSM or related policies and 11 comparison states, and schools participating in the NSLP and the SBP were included in this analysis.

EXPOSURES Federal UFSM policy, state-level UFSM policies, CEP participation, and limited expansions of free meal access.

MAIN OUTCOMES AND MEASURES Participation rates in SBP and NSLP, measured as percentage-point changes over time.

RESULTS Federal UFSM during the COVID-19 pandemic increased NSLP and SBP participation by 10 percentage points (range, −8 to 18 percentage points) and 8 percentage points (range, 2-20 percentage points), respectively, where percentage points refers to absolute changes in participation rates. Deimplementation in school year 2022 to 2023 reduced participation by 12 percentage points (range, −15 to −4 percentage points) for NSLP and 10 percentage points (range, −18 to −4 percentage points) for SBP. States that maintained UFSM policies showed consistently higher participation rates compared with states that discontinued UFSM, with increases between 9 and 19 percentage points (NSLP) and between 5 and 26 percentage points (SBP) in the first year of policy implementation, relative to the prior year. CEP participation resulted in substantial participation gains (23 percentage points for NSLP, 13 percentage points for SBP). State policies with limited free meal expansions showed no significant effect.

CONCLUSIONS AND RELEVANCE Results of this comparative research analysis suggest that UFSM policies may effectively increase school meal participation, indicating the need for sustained state and federal support to increase participation rates and potentially mitigate diet-related disparities and food insecurity among children.

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Supplemental content

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School meals play a key role in improving children's diets and overall health, yet access to free or reduced-price meals (FRPM) in the US is traditionally restricted to students from low-income households.[1] The National School Lunch Program (NSLP) and School Breakfast Program (SBP) operate on a 3-tiered system where students qualify for FRPM based on household income (eg, ≤130% of the federal poverty level for free meals, and between 130%-185% for reduced-price meals). This means-tested system leaves many near-eligible families without access to affordable school meals and potentially at risk of food insecurity.[2,3] Moreover, many eligible students do not participate due to barriers including stigma and the required paperwork.[4-6]

Even short periods of food insecurity in children can lead to long-term psychological, physical, and developmental harm.[7-12] Universal Free School Meal (UFSM) policies have the potential to address food insecurity, as well as reduce diet-related disparities, ensure consistent access to healthy meals, and reduce barriers to participation.[13-16] Additionally, UFSM may result in direct savings for families at risk of food insecurity, enhancing their ability to meet other basic needs.[17-20] UFSM policies can also provide benefits across all socioeconomic groups; poor diet quality is a leading contributor to chronic disease, and school meals are typically healthier than meals brought from home.[21-23] By ensuring universal access to nutritious meals, UFSM can improve children's overall diet quality, supporting better physical health, cognitive development, and academic performance.[16]

To address the limitations of a means-tested approach, the Community Eligibility Provision (CEP)—part of the Healthy, Hunger-Free Kids Act of 2010—enabled schools with greater than or equal to 40% of students from low-income households to offer free meals to all students. In 2023, this threshold was reduced to 25%, increasing the number of CEP-eligible schools.[24] Research suggests that CEP participation can provide important benefits, including improved diet quality, reduced risk of unhealthy weight gain, and higher school attendance rates.[16] However, many schools are ineligible, and even among CEP-eligible schools, nearly a third opt not to participate due to inadequate federal reimbursement rates (eAppendix 1 in Supplement 1).[25,26]

In 2020, the COVID-19 pandemic shuttered schools and exacerbated food insecurity, disproportionately affecting low-income communities[27]; therefore, a national UFSM policy was implemented from March 2020 until June 2022 (ie, the second half of school year [SY] 2019-2020 through the end of SY 2021-2022).[28,29] Although this was discontinued, several states passed legislation to continue access to free meals.

In SY 2022 to 2023, the first wave of states (ie, California, Maine, Massachusetts, Nevada, and Vermont) implemented state-level UFSM policies. A second wave followed in SY 2023 to 2024, with Colorado, Michigan, Minnesota, and New Mexico reintroducing UFSM.[30] In a more limited approach, other states passed laws to expand access to free school meals for children from low-income households (but not free meals for all children). For example, Arizona and Louisiana waived fees for reduced-price meals, allowing those students to receive meals for free.[31,32] Texas implemented a similar policy but limited to school breakfast.[33] Lastly, New Jersey expanded eligibility for free meals to families with incomes less than or equal to 200% of the federal poverty level.[34]

By leveraging the natural experiment created by the COVID-19 pandemic and subsequent state policies, we investigated the impact of federal- and state-level UFSM policies on SBP and NSLP participation rates. We examined both the implementation and deimplementation of federal UFSM, as well as state-level UFSM, and other policies designed to enhance free school meals access.

Key Points

Question What is the impact of federal- and state-level Universal Free School Meal (UFSM) policies on participation rates in the National School Lunch Program (NSLP) and the School Breakfast Program (SBP) during and after the COVID-19 pandemic?

Findings In this comparative effectiveness study, the federal UFSM policy during the COVID-19 pandemic increased NSLP and SBP participation, and states maintaining UFSM policies showed sustained participation increases. Limited expansions of free meal access showed no significant outcome.

Meaning Results suggest that UFSM policies may effectively increase school meal participation and may help reduce diet-related disparities and food insecurity among children, underscoring the need for continued state and federal support.

Methods

Study Design

This comparative effectiveness research study was approved by the institutional review board of Merrimack College and determined not human participants research, thereby not requiring informed consent. We examined differences in NSLP and SBP participation (equations available in eAppendix 2 in Supplement 1) across states that implemented different policies. Specifically, we compared program participation in 9 states with UFSM (first wave: California, Maine, Massachusetts, Vermont, and Nevada; and second wave: Colorado, Michigan, Minnesota, and New Mexico), 3 states with a limited expansion of free meals by eliminating reduced-price meals (Arizona, Louisiana, and Texas), and 1 state that expanded eligibility for free meals (New Jersey), with school meal participation in 11 matched comparison states (Florida, Illinois, Mississippi, New Hampshire, North Carolina, Oregon, Pennsylvania, Rhode Island, Virginia, Washington, and Wisconsin), selected from among the states that did not implement state-level UFSM policies when the federal UFSM policy ended (hereafter referred to as *control states*). This study followed the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) reporting guidelines (eAppendix 6 in Supplement 1).

Controls were matched based on demographic similarities with intervention states, including race and ethnicity, poverty levels, child food insecurity rates, and political leanings (ie, percentage of the state legislature that was Republican,

Table 1. Timelines of the School Feeding Policies in the US From School Year 2019-2020 to 2023-2024

Policy group	CEP status at baseline	SY 2019-2020 Baseline	SY 2020-2021 COVID-19 pandemic[a]	SY 2021-2022 Federal UFSM	SY 2022-2023 State policy phase 1	SY 2023-2024 State policy phase 2
Traditional means-tested approach[b]	Non-CEP	TMA	FedUFSM	FedUFSM	TMA	TMA
	CEP	CEP	FedUFSM	FedUFSM	CEP	CEP
UFSM 1st wave[c]	Non-CEP	TMA	FedUFSM	FedUFSM	UFSM	UFSM
	CEP	CEP	FedUFSM	FedUFSM	UFSM[d]	UFSM[d]
UFSM 2nd wave[e]	Non-CEP	TMA	FedUFSM	FedUFSM	TMA	UFSM
	CEP	CEP	FedUFSM	FedUFSM	CEP	UFSM[d]
Limited expansion of free meals in phase 2[f,g]	Non-CEP	TMA	FedUFSM	FedUFSM	TMA	LEFM
	CEP	CEP	FedUFSM	FedUFSM	CEP	CEP
Postpandemic implementation of CEP[h]	Non-CEP	TMA	FedUFSM	FedUFSM	CEP	CEP
	CEP	NA	NA	NA	NA	NA

Abbreviations: CEP, Community Eligibility Provision; FedUFSM, federal Universal Free School Meal; LEFM, limited expansion of free school meals via expanded eligibility or removal of reduced-price meals; NA, not applicable; SY, school year; TMA, traditional means-tested approach; UFSM, state Universal Free School Meal.

[a] No participation data were collected during this time period for this study.

[b] Used as control group in this study. Control States: Florida, Illinois, Mississippi, North Carolina, New Hampshire, Oregon, Pennsylvania, Rhode Island, Virginia, Washington, Wisconsin.

[c] States that implemented state UFSM policy in phase 1 (SY 2022-2023). UFSM wave 1 states: California, Massachusetts, Maine, Nevada, Vermont.

[d] Implementing CEP under a state UFSM policy.

[e] States that implemented state UFSM policy in phase 2 (SY 2023-2024). UFSM wave 2 states: Colorado, Michigan, Minnesota, New Mexico.

[f] States that implemented expanded eligibility or removal of reduced-price meals in phase 2 (SY 2023-2024). Limited expansion of free meals states: Arizona, Louisiana, New Jersey, Texas.

[g] CEP categorization was defined according to school CEP status at baseline (SY 2019-2020).

[h] Schools that accessed CEP after the COVID-19 pandemic with no state UFSM policy in place.

Democratic, or Independent). Race and ethnicity information was included to improve comparability between groups. Additionally, schools were categorized by CEP status to account for differences in access. Moreover, within control states, the analysis considered schools transitioning from non-CEP at baseline to CEP status after the COVID-19 pandemic (**Table 1**).

Inclusion criteria encompassed all schools participating in the NSLP or SBP serving students from kindergarten to grade 12. We included public and charter schools, special education, career and technical education, and alternative education schools. We excluded adult education programs, prekindergarten, online schools, and juvenile detention centers. Additionally, private schools or public schools not participating in the NSLP or SBP were excluded, as were public schools reporting zero meals served after UFSM implementation at the federal or state level.

Data Sources

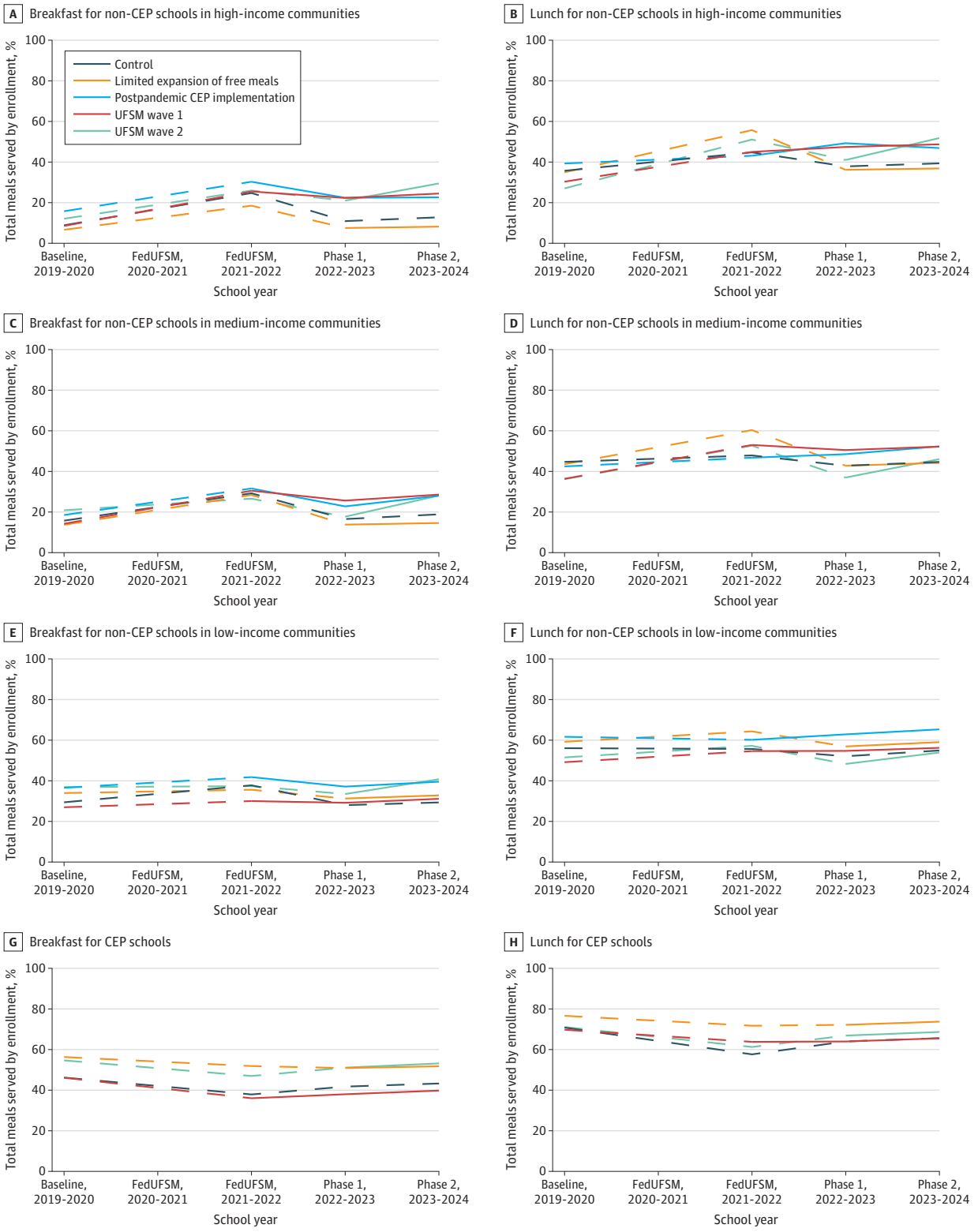
For each state, rates of school meal participation were measured using monthly breakfast and lunch claims information. Data were obtained via Freedom of Information Act requests submitted to Child Nutrition Programs within state Departments of Education, Public Health, or Agriculture. Meal claims data were collected from September to December for SY 2019 to 2020 through 2023 to 2024, excluding SY 2020 to 2021 due to school closures. These months were selected for consistency across years (ie, spring of SY 2019-2020 was a period of major disruptions). Information on school-level monthly meal claims was matched with school-level characteristics (eg, location, school type, school level, enrollment, and eligibility for FRPM) from the Elementary/Secondary Information System database of the National Center for Education Statistics[35] (eAppendix 3 in Supplement 1 contains details on merging procedures and assumptions during data cleaning) and includes a flowchart summarizing inclusion criteria (eFigure in Supplement 1) and the number of schools by policy group and state (eTable 1 in Supplement 1).

Statistical Analysis

We conducted a difference-in-difference analysis, where September to December 2019 (prefederal UFSM) was used as the baseline. The baseline was compared with participation during the federal UFSM policy (September-December 2021) and 2 postfederal UFSM periods: September to December 2022 (state policy phase 1 [first wave]) and September to December 2023 (state policy phase 2 [second wave]). Schools in states that maintained means-tested meal programs were used as controls and compared with schools in the following intervention groups: (1) state UFSM first wave, (2) state UFSM second wave, (3) states with limited expansion of free meals, and (4) schools that accessed CEP during phase 1 in control states. As a robustness check, we repeated the analysis using the intervention states before their policy implementation as additional controls (eTable 2 in eAppendix 4 in Supplement 1).

Linear mixed-effects models were used to compare SBP and NSLP participation rates across intervention groups and time periods. Nested random effects, with random intercepts at the level of school and state, were used to account for heterogeneity in participation rates across schools and states, as well as accommodate within-state and within-school correlation (eAppendix 2 in Supplement 1). Analyses were conducted separately for schools grouped by their CEP status at baseline (SY 2019-2020) and by program type (NSLP or SBP). In this study, the term *CEP schools* refers to those already participat-

Figure. Observed School Breakfast Program (SBP) and National School Lunch Program (NSLP) Average Participation Trends From September to December 2019 to September to December 2023 by Policy Group



A-F, Non–Community Eligibility Provision (CEP) schools (by socioeconomic status group of communities that schools mainly serve). G-H, CEP schools. CEP categorization was defined according to school CEP status at baseline (school year 2019-2020). For each group, dashed lines indicate the periods when the state-level policy was not yet implemented; hence, the traditional means-tested approach was in place. FedUFSM indicates federal Universal Free School Meal.

Table 2. Estimated Impacts of Federal Policies on School Breakfast Program (SBP) and National School Lunch Program (NSLP) Participation[a]

Comparison year	[Group] participant/ program[b]	Non-CEP (ie, schools not participating in CEP at baseline, SY 2019-2020)								CEP (ie, schools participating in CEP at baseline, SY 2019-2020)							
		SBP participation level				NSLP participation level				SBP participation level				NSLP participation level			
		Before, %	After, %	Difference (95% CI), percentage point	Average difference,[c] percentage point	Before, %	After, %	Difference (95% CI), percentage point	Average difference, percentage point	Before, %	After, %	Difference (95% CI), percentage point	Average difference, percentage point	Before, %	After, %	Difference (95% CI), percentage point	Average difference, percentage point
Federal UFSM																	
SY 2019-2020 vs SY 2021-2022	[A] Controls	20	40	20 (18 to 22)		45	63	18 (16 to 19)		57	52	− (−8 to −4)		77	66	−11 (−13 to −10)	
	[B] UFSM wave 1	20	25	5 (2 to 8)		39	47	8 (5 to 11)		61	47	−13 (−15 to −11)		71	65	−6 (−8 to −4)	
	[C] UFSM wave 2	38	42	4 (2 to 5)		48	55	7 (5 to 8)		62	54	−9 (−11 to −7)		77	63	−14 (−15 to −12)	
	[D] Limited expansion of free meals	30	33	3 (2 to 4)	8	51	61	10 (8 to 12)	10	62	58	−4 (−5 to −3)	−7	77	68%	−9 (−11 to −7)	−10
	[E] Postpandemic implementation of CEP	44	46	2 (0 to 5)		62	54	−8 (−10 to −6)		NA	NA	NA		NA	NA	NA	
Federal UFSM deimplementation																	
SY 2021-2022 vs SY 2022-2023	[A] Controls	40	22	−18 (−19 to −16)		63	48	−15 (−16 to −13)		52	49	−2 (−5 to 0)		66	68	2 (1 to 4)	
	[C] UFSM wave 2	42	37	−4 (−6 to −3)	−10	55	50	−4 (−6 to −3)	−12	54	55	2 (0 to 3)	0	63	71	8 (6 to 10)	5
	[D] Limited expansion of free meals	33	27	−6 (−7 to −5)		61	49	−12 (−14 to −10)		58	58	0 (−1 to 1)		68	74	6 (4 to 8)	
SY 2019-2020 vs SY 2021-2022	[A] Controls	20	22	2 (2 to 3)		45	48	3 (2 to 4)		57	49	−8 (−9 to −7)		77	68	−9 (−10 to −8)	
	[C] UFSM wave 2	38	37	−1 (−2 to 0)	−1	48	50	2 (1 to 4)	1	62	55	−7 (−9 to −5)	−6	77	71	−6 (−7 to −4)	−6
	[D] Limited expansion of free meals	30	27	−3 (−4 to −2)		51	49	−2 (−3 to 1)		62	58	−3 (−4 to −2)		77	74	−3 (−4 to −1)	

Abbreviations: CEP, Community Eligibility Provision; NA, not applicable; SY, school year; UFSM, state Universal Free School Meal.

[a] Reference group: elementary public schools located in urban areas.

[b] [A]: states discontinuing UFSM after the COVID-19 pandemic; [B]: states maintaining UFMS in 2022 via State policies; [C]: states reintroducing UFMS in 2023 via state policies; [D]: states introducing limited expansion of free meals in 2023; [E]: schools that access CEP after the COVID-19 pandemic.

[c] The average difference is calculated as a weighted average, determined by the number of schools in each intervention group. Discrepancies in impact calculations are due to rounding.

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Table 3. Estimated Impacts of State-Based Universal Free School Meal (UFSM) Policies on School Breakfast Program (SBP) and National School Lunch Program (NSLP) Participation[a]

Comparison year	Group	Non-CEP (ie, schools not participating in CEP at baseline, SY 2019-20)								CEP (ie, schools participating in CEP at baseline, SY 2019-20)							
		SBP participation level				NSLP participation level				SBP participation level				NSLP participation level			
		Before, %	After, %	Difference (95% CI), percentage point	Relative difference (95% CI),[b] percentage point	Before, %	After, %	Difference (95% CI), percentage point	Relative difference (95% C), percentage point	Before, %	After, %	Difference (95% CI), percentage point	Relative difference, (95% CI), percentage point	Before, %	After, %	Difference (95% CI), percentage point	Relative difference (95% CI), percentage point
State policies phase 1																	
SY 2021-2022 vs SY 2022-2023	Controls	40	22%	−18 (−19 to −16)	NA	63	48	−15 (−16 to −13)	NA	52	49	−2 (−5 to 0)	NA	66	68	2 (1 to 4)	NA
	State UFSM wave1	25	33	8 (5 to 11)	26 (22 to 28)	47	51	4 (1 to 6)	19 (15 to 22)	47	57	10 (8 to 12)	12 (9 to 16)	65	65	1 (−1 to 3)	−2 (−4 to 1)
	Postpandemic implementation of CEP	46	41	−5 (−8 to −3)	13 (9 to 15)	54	62	8 (5 to 10)	23 (20 to 26)	NA	NA	NA	NA	NA	NA	NA	NA
SY 2019-2020 vs SY 2022-2023	Controls	20	22	2 (2 to 3)	NA	45	48	3 (2 to 4)	NA	57	49	−8 (−9 to −7)	NA	77	68	−9 (−10 to −8)	NA
	State UFSM wave1	20	33	12 (11 to 13)	10 (9 to 11)	39	51	12 (11 to 13)	9 (8 to 10)	61	57	−3 (−5 to −2)	5 (3 to 7)	71	65	−5 (−7 to −4)	3 (2 to 5)
	Post pandemic implementation of CEP	44	41	−3 (−5 to −1)	−5 (−8 to −3)	62	62	0 (−2 to 2)	−3 (−5 to −1)	NA	NA	NA	NA	NA	NA	NA	NA
State policies phase 2																	
SY 2022-2023 vs SY 2023-2024	Control	22	24	1 (0 to 2)	NA	48	49	1 (0 to 2)	NA	49	51	2 (1 to 3)	NA	68	71	2 (1 to 3)	NA
	State UFSM wave1	33	35	3 (2 to 4)	1 (0 to 3)	51	53	2 (1 to 3)	1 (−1 to 2)	57	59	2 (0 to 3)	0 (−2 to 2)	65	67	1 (0 to 2)	−1 (−3 to 1)
	State UFSM wave2	37	43	6 (4 to 7)	5 (3 to 6)	50	60	10 (9 to 11)	9 (7 to 10)	55	58	3 (2 to 5)	1 (−1 to 3)	71	73	2 (0 to 3)	−1 (−2 to 1)
	Limited expansion of free meals	27	30	3 (2 to 4)	2 (1 to 3)	49	49	0 (−1 to 1)	−1 (−2 to 0)	58	59	1 (−1 to 1)	−1 (−3 to 0)	74	75	0 (−1 to 2)	−2 (−3 to 0)
SY 2019-2020 vs SY 2023-2024	Controls	20	24	4 (3 to 5)	NA	45	49	4 (3 to 5)	NA	57	51	−6 (−7 to −5)	NA	77	71	−7 (−8 to −6)	NA
	State UFSM wave1	20	35	15 (14 to 16)	11 (10 to 13)	39	53	13 (13 to 14)	10 (8 to 11)	61	59	−1 (−3 to 0)	5 (3 to 7)	71	67	−4 (−6 to −3)	2 (1 to 4)
	State UFSM wave2	38	43	5 (4 to 6)	1 (0 to 3)	48	60	12 (11 to 13)	8 (7 to 10)	62	58	−4 (−6 to −2)	2 (0 to 4)	77	73	−4 (−6 to −2)	3 (1 to 4)
	Limited expansion of free meals	30	30	1 (0 to 1)	−3 (−4 to −2)	51	49	−2 (−3 to −1)	−6 (−7 to −4)	62	59	−3 (−4 to −2)	3 (2 to 5)	77	75	−2 (−4 to −1)	4 (3 to 6)

Abbreviations: CEP, Community Eligibility Provision; NA, not applicable; SY, school year;

[a] Reference group: elementary public schools located in urban areas.

[b] The relative difference is calculated as the difference between intervention and control. Discrepancies in calculations are due to rounding.

ing in CEP at baseline, whereas the term *non-CEP schools* refers to those that were not participating in CEP at baseline.

The covariates included school level (elementary, middle, high, and other, encompassing ungraded, not applicable, or not reported levels) and school location (urban, suburban, large rural, and small town/rural based on Rural-Urban Commuting Area codes). Additionally, we accounted for school differences in race and ethnicity by stratifying schools according to student population quartiles (where Q1 [lowest percentage] was the reference category) for each of the following categories: (1) Asian, (2) Black or African American, (3) Hispanic or Latino, (4) White, and (5) other (American Indian or Alaska Native and Native Hawaiian or Other Pacific Islander, combined). Lastly, for non-CEP schools, we controlled for socioeconomic subgroups (SES), defined by the percentage of students eligible for FRPM (high-SES: eligibility ≤25%; medium-SES eligibility: >25%-40%; low-SES: eligibility >40%). The main results are presented for a reference group consisting of elementary public schools located in urban areas and, for non-CEP schools, with a higher proportion of students with higher SES. We further investigated whether variations in school characteristics influenced the results.

Results

Prepandemic Program Participation Levels (SY 2019-2020)

At baseline (SY 2019-2020), CEP schools exhibited higher meal participation rates compared with non-CEP schools. Across all schools and states, average SBP participation was 48% (CEP) vs 25% (non-CEP), whereas NSLP participation was 72% (CEP) vs 45% (non-CEP) (**Figure**). Considering school characteristics, for the reference group of urban public elementary schools, estimated baseline SBP participation rates were 57% in CEP schools vs 20% in the non-CEP schools with a greater proportion of students from higher income households and 77% vs 45% for NSLP (**Table 2**).

Considering both SBP and NSLP, elementary schools had overall higher baseline participation rates compared with middle and high schools (between 8 percentage points and 16 percentage points higher; $P < .001$, where percentage points indicates absolute differences in participation rate). Similarly, rural schools had higher participation than urban schools (4-9 percentage points; $P < .001$). Among all non-CEP schools, lower-income schools had higher baseline participation compared to higher-income schools (9 percentage points; 95% CI, 8-10 percentage points; $P < .001$). Additionally, non-CEP schools in the highest quartile of Black or African American or Hispanic or Latino student populations showed significantly higher baseline participation rates compared with those in the lowest quartile (2 percentage points; 95% CI, 2-3 percentage points; $P < .001$ and 3 percentage points; 95% CI, 2-3 percentage points; $P < .001$, respectively).

Implementation of Federal UFSM (SY 2021-2022)

Among non-CEP schools, in SY 2021 to 2022 under federal UFSM policies, SBP participation increased by 8 percentage points on average (range, 2-20 percentage points) and NSLP by 10 percentage points (range, −8 to 18 percentage points) compared with prepandemic levels (SY 2019-2020) (Table 2). Higher-income schools had greater participation increases with the federal UFSM policy (9 percentage points; 95% CI, 6-12 percentage points; $P < .001$ and 13 percentage points; 95% CI, 10-15 percentage points; $P < .001$ for SBP and NSLP, respectively), compared with lower-income schools. In contrast, non-CEP schools in the highest quartile of Black or African American students experienced a significantly lower change in participation (−13 percentage points; 95% CI, −15 to −11 percentage points; $P < .001$ for NSLP) compared with schools in the lowest quartile.

In the same period, in CEP schools, SBP and NSLP participation decreased by 7 percentage points and 10 percentage points, respectively, from prepandemic levels. The declines varied across states, ranging from 4 to 13 percentage points for SBP and 6 to 14 percentage points for NSLP. Because CEP schools already had universal access to meals, these reductions do not reflect the impact of federal UFSM policies but rather the impact of the COVID-19 pandemic on schools with existing free meal policies.

Deimplementation of Federal UFSM (SY 2022-2023)

After the COVID-19 pandemic, in SY 2022 to 2023, for non-CEP schools in control states, deimplementation of federal UFSM was associated with average declines of 10 percentage points (range, −18 to −4 percentage points; $P < .001$) and 12 percentage points (range, −15 to −4 percentage points; $P < .001$) in SBP and NSLP participation, respectively, compared with SY 2021 to 2022 (Table 2). As a result, on average, SBP and NSLP participation levels among non-CEP schools in SY 2022 to 2023 went back to levels comparable with prepandemic rates.

Among CEP schools, SBP participation remained stable from SY 2021 to 2022 to SY 2022 to 2023, whereas NSLP participation increased by 5 percentage points. However, participation levels in CEP schools remained below their prepandemic levels (SY 2019-2020) by 6 percentage points for both SBP and NSLP.

First Wave of State-Level UFSM Compared With Deimplementation States (SY 2022-2023 and 2023-2024)

Program participation between SY 2021 to 2022 and 2022 to 2023, the first phase of state policy implementation, exhibited substantial increases. Non-CEP schools in the first wave of state UFSM policies experienced a statistically significant increase of 26 percentage points (95% CI, 22-28 percentage points) in SBP and 19 percentage points (95% CI, 15-22 percentage points) in NSLP participation, compared with schools in control states. Moreover, non-CEP schools in implementing states reached participation levels higher than their prepandemic rates (SY 2019-2020) (**Table 3**).

For CEP schools, between SY 2021 to 2022 and 2022 to 2023, an increase of 12 percentage points (95% CI, 9-16 percentage points) in SBP participation was observed compared with control schools, whereas NSLP participation showed no statistically significant change. Compared with prepandemic levels (SY 2019-2020), SBP and NSLP participation in CEP schools dropped by 3 percentage points and 5 percentage

points, respectively. However, relative to control states, they saw an estimated increase of 5 percentage points in SBP and 3 percentage points in NSLP participation (again reflecting overall participation trends among schools that had access to free school meals independently of state policies).

In the second year of policy implementation (SY 2023-2024), no significant change was observed in non-CEP schools compared with control schools, suggesting that the state policy effectively sustained the positive impact on meal participation (ie, participation levels remained consistently higher than their prepandemic levels). Non-CEP schools in higher-income communities exhibited the largest increases in participation compared with lower-income communities. These increases in participation were 6 percentage points (95% CI, 5-7 percentage points; SBP) and 4 percentage points (95% CI, 3-5 percentage points; NSLP) in phase 1, and 8 percentage points (95% CI, 6-9 percentage points; SBP) and 7 percentage points (95% CI, 5-9 percentage points) (NSLP) in phase 2 ($P < .001$). Additionally, schools with predominantly Asian or White students had on average greater increases in participation after UFSM implementation than schools with lower Asian or White student populations.

Second Wave of State-Level UFSM Compared With Deimplementation States (SY 2023-2024)

In the second wave of state-level UFSM policies (SY 2023-2024), non-CEP schools saw statistically significant increases in participation of 5 percentage points (95% CI, 3-6 percentage points) for SBP and 9 percentage points (95% CI, 7-10 percentage points) for NSLP, compared with control schools (Table 3). Moreover, NSLP participation increased above prepandemic levels (8 percentage points; 95% CI, 5-10 percentage points; $P < .001$).

In contrast, no significant differences were observed between CEP and control schools. Both intervention and control CEP schools showed slight increases in participation.

Higher-income non-CEP schools had the greatest increases in participation of approximately 4 percentage points (95% CI, 3-5 percentage points) and 5 percentage points (95% CI, 4-6 percentage points) for both SBP and NSLP ($P < .001$). Schools with predominantly White or Asian students had higher increases in meal program participation.

Limited Expansion of Free Meals (SY 2023-2024)

Non-CEP schools in states with limited expansion of free meal policies in the second phase of UFSM policy (SY 2023-2024) experienced little to no additional gains in meal participation compared to control schools (Table 3). Although an increase of 2 percentage points (95% CI, 1-3 percentage points; $P < .001$) in SBP participation was observed in non-CEP schools, no significant impact was found for NSLP participation. Moreover, postpandemic participation levels remained below prepandemic levels, particularly for NSLP.

Similarly, participation levels remained relatively stable for CEP schools in states with policies with a limited expansion of free meals compared with control schools during SY 2023 2024. Although slightly mixed results were observed, there were no significant overall changes. Compared with both SY 2022 to 2023 (prestate policy) and SY 2019 2020 (prepandemic), intervention and control schools exhibited similar trends in SBP and NSLP participation rates.

Postpandemic Implementation of CEP (SY 2022-2023)

For schools that implemented CEP after the COVID-19 pandemic, compared with control schools, program participation in SY 2022 to 2023 increased by 13 percentage points for SBP (95% CI, 10-16 percentage points; $P < .001$) and 23 percentage points for NSLP (95% CI, 20-25 percentage points; $P < .001$), respectively, compared with SY 2021 to 2022. However, despite these significant gains, SBP participation levels were lower than prepandemic levels.

Schools with predominantly White students benefitted the most from CEP implementation, with increases of 9 percentage points (95% CI, 6-11 percentage points) in SBP and 5 percentage points (95% CI, 3-7 percentage points) in NSLP ($P < .001$). Schools with high percentages of Hispanic or Latino students also saw gains in participation, along with schools with higher percentages of Asian students and those in the other subgroup. Additionally, rural schools experienced a 2 percentage points (95% CI, 1-3 percentage points; $P < .001$) increase in participation compared with urban schools. Additional robustness results using alternative control groups are presented in eTable 3 in eAppendix 5 in Supplement 1).

Discussion

Roughly 29 million children receive school meals daily, with many relying on school meals for up to half their daily energy intake.[36-38] Study results suggest that federal- and state-level UFSM policies could effectively increase SBP and NSLP participation, thereby improving access to nutritious meals. The results highlight the likely substantial impact of the federal UFSM policy implemented during the COVID-19 pandemic, which increased SBP and NSLP participation in non-CEP schools that gained access to free meals. Additionally, when comparing non-CEP and CEP schools, where access to free meals remained unchanged, the federal UFSM policy was associated with increases of 15 percentage points in SBP and 20 percentage points in NSLP, indicating that it would not only counteract the negative effects of the pandemic but also significantly boost participation compared with prepandemic levels.[39]

In states that deimplemented the federal UFSM policy in SY 2022 to 2023, participation declined whereas states that maintained UFSM policies exhibited higher participation rates. The durability of these gains suggests that state-level UFSM policies could boost meals participation and thus support food security and potential health benefits.[40]

CEP was an important mechanism for increasing meal participation, especially in underserved communities.[41-46] Although schools with a higher percentage of White students potentially had the greatest increases in participation, schools with high percentages of minority groups also indicated gains in participation rates. The results also suggest that CEP continues to be an effective tool for expanding participation, par-

ticularly in schools serving communities with economic challenges.

In contrast, several states implemented limited expansion policies for free meals but showed minimal participation gains. These limited policies may fail to address the full range of barriers that affect participation (eg, stigma).[6] However, the effects of limited expansion policies may be hidden when examining overall participation rates, as the reduced-price category is small. Moreover, removing copays may increase meal participation among children from low-income households; Arizona's elimination of reduced-price copays, Medicaid Direct Certification,[47] and CEP expansion was associated with a 3 to 5 percentage points increase in lunch participation among students eligible for reduced-price meals.[48] Therefore, limited policies may still lead to meaningful impacts on participation among children from low-income households, and future research should examine this.

Although our study found that higher-income communities experienced greater increases in participation with UFSM than lower-income communities, this may be partly explained by their lower baseline participation rates (Figure). Additionally, UFSM policies can provide benefits across socioeconomic groups; free meals can potentially enhance diet quality, reduce economic strain, decrease logistical and psychological barriers to participation, and contribute to overall student well-being.[40,49,50] Moreover, the stigma for students eligible for FRPM may be greater when they attend schools in higher income communities; making meals universally available may be particularly beneficial for these students. Future studies should assess the differential impact of UFSM on students eligible for FRPM in higher-resourced schools.

Strengths and Limitations

This study leverages the strengths of a natural experiment, allowing for comparisons between states that continued, deimplemented, or adopted different free school meal policies. Given the limited research on such policies,[16,51] this study provides an opportunity to examine different UFSM approaches on program participation, which has been associated with public health and educational benefits.[21,52] The findings indicate that both federal and state-level UFSM policies could significantly boost school meal participation. Notably, groups with initially lower participation rates experienced larger gains, though increases were observed across all groups. Additionally, this study provides further insights into the impact of CEP, suggesting CEP policies should remain strong. Findings remained robust in sensitivity analyses, which used alternative compositions for the control groups (eAppendix 5 in Supplement 1).

However, some limitations should be considered. Data were not collected from all US states, although the sample included nearly half of all states, with a focus on the most populous ones, thereby covering over half of the student population nationally. The analysis was also hindered by potential missing data, which may have affected the results. Additionally, only 4 months of data were obtained per year, which limited our ability to apply time-series methods to assess participation trends over time. Future research with longer-term, high-frequency data could explore the use of an interrupted time series approach to better account for temporal patterns in participation. Further limitations arose from challenges related to data sensitivity, availability, and consistency across states, with some states providing incomplete eligibility information to protect student identities. To ensure transparency and completeness in methodological reporting, we provide a reporting checklist following the STROBE guidelines.[53]

Conclusions

The COVID-19 pandemic provided a natural experiment that enabled evaluating the impact of implementation and deimplementation of the most comprehensive universal school meal policy in the US. Further, after the pandemic, various statewide school meal policies could be examined to estimate their impacts on program participation. Both federal- and state-level UFSM policies were associated with increased school breakfast and lunch participation. By expanding UFSM access for students who may come from economically constrained households but are not eligible for FRPM, UFSM policies may be an effective tool to address diet-related disparities. The continuation of UFSM in multiple states likely provides millions of free, healthy school meals to students at risk for poor health and food insecurity. These policies, therefore, also have potential to reduce chronic diseases and diet-related health disparities within the US population.

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