Research Square

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Public Assistance Program Participation and Overweight and Obesity Among Low-Income California Adults: A Repeated Cross-Sectional Analysis of the California Health Interview Survey, 2019–2024

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Abstract

Background

Participation in public assistance programs may be associated with weight outcomes among low-income adults, but associations may differ by program type and sex. We examined associations of participation in the Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI), and California Work Opportunity and Responsibility to Kids (CalWORKs) with overweight and obesity among low-income California adults and evaluated differences by sex.

Methods

We analyzed 2019–2024 California Health Interview Survey (CHIS) data among adults with household income at or below 130% of the federal poverty level (n = 16,918). Survey-weighted binomial regression estimated adjusted prevalence ratios (APRs) for overweight (BMI 25.0–29.9 kg/m²) and obesity (BMI ≥ 30.0 kg/m²), adjusted for sociodemographic characteristics, smoking, insurance, and food insecurity, with sex-stratified models.

Results

SNAP participation was associated with higher obesity (APR = 1.23; 95% CI = 1.07–1.42) but not overweight; concentrated among females (APR = 1.37; 95% CI = 1.15–1.64) and non-significant among males. CalWORKs was associated with higher overweight (APR = 1.29; 95% CI = 1.10–1.59) but not obesity; significant among males (APR = 1.72; 95% CI = 1.14–2.59) but not females. SSI was not significantly associated with either outcome.

Conclusions

Associations varied by program type, outcome, and sex; further research is needed to elucidate underlying mechanisms and to inform policies that support healthy weight.

Background

Obesity has become a public health crisis in the United States (U.S). More than 40% of US adults have obesity during 2021–2023, compared with 31% in 2000.[1,2] Obesity is associated with chronic diseases including type 2 diabetes, hyperlipidemia, high blood pressure, cardiovascular disease, and cancer,[3] and imposes an estimated $173 billion per year in healthcare cost.[4] Obesity disproportionately burdens those with lower socioeconomic status (SES) and is shaped by persistent social and economic disparities.[5,6] Among women, obesity prevalence is higher at lower income levels: 42% of those living below 130% of the federal poverty level (FPL) are obese, compared with 29% of those in higher-income households.[7]

Low-income adults bear a disproportionate obesity burden yet remain among the most difficult populations to reach through conventional interventions.[3,5] Limited financial resources direct food purchasing toward inexpensive, energy-dense options, and low-income households often lack geographic access to fresh food which may contribute to poor diet quality and irregular eating patterns.[8]

Federal and state safety-net programs provide food and income support to low-income households, including the Supplemental Nutrition Assistance Program (SNAP; known as CalFresh in California), the Supplemental Security Income (SSI), and Temporary Assistance for Needy Families (TANF; administered in California as CalWORKs, California Work Opportunities and Responsibilities to Kids). SNAP is the nation's largest food assistance program and provides food-specific benefits. SSI and CalWORKs are both cash-grant programs, with no restrictions on food purchases. Notably, beginning in June 2019, California reversed the long-standing "SSI cash-out" policy, allowing SSI/SSP(State Supplementary Payment) participants to become eligible for SNAP, provided all other eligibility criteria are met.[9] Because these programs differ in structural and benefit type, their associations with weight outcomes may also differ.

California represents a critical setting for this research.In federal fiscal year 2024, SNAP served approximately 5.38 million California residents, accounting for 14% of the state population.[10] Despite adult obesity prevalence (28%) in 2022 in CA is lower than most U.S. states, substantial racial and ethnic health disparities persist: obesity rates among Hispanic/Latinos adults are 37.8% and 42.5% among Black adults compared with 25.8% among non-Hispanic whites and 11.1% among non-Hispanic Asians in California.[6] California's obesity-related medical cost burden is also substantial, with annual medical expenditures estimated at $5,812 among adults with obesity versus $1,502 among adults with normal weight.[11]

Prior studies examining the relationship between food assistance programs and obesity have yielded inconsistent findings, with studies differing in the magnitude of associations, the programs implicated, and whether associations varied by sex or duration of participation. A central methodological challenge is that individuals who enroll in SNAP tend to have more severe food insecurity and deeper poverty than eligible nonparticipants, and adverse selection into the program on the basis of higher health risk likely contributes to the observed association.[12] Consistent with this concern, after controlling for nonrandom selection into the program, most previous research has shown that SNAP participants are no less and often more cardiometabolically healthy than eligible nonparticipants, particularly with respect to obesity risk.[13] Prior reviews have found a more consistent positive association among adult women than men, and a quasi-experimental analysis using near-far matching found that a positive SNAP–BMI association from adjusted regression was attenuated to a near-

null, non-significant estimate after addressing unmeasured confounding.[14,15] Thus, the independent causal effect of SNAP participation on weight status remains difficult to identify in observational data.

Nonetheless, updated descriptive estimates remain important. Using 2007 CHIS data, one study found SNAP associated with higher obesity prevalence, and this association was more pronounced among men than women; while SSI was associated with 50% higher prevalence; and CalWORKs showed no significant association.[16] However, another research showed that long-term participation in SNAP was associated with a 10% increase in obesity among females and a 15% increase in obesity among males.[17] Most existing evidence predates 2010, fewer covers the COVID-19 period, and overweight as a distinct outcome has been largely overlooked. The 2019–2024 CHIS data provide a contemporary window for examining descriptive associations between SNAP, SSI, and CalWORKs participation and overweight and obesity among low-income California adults; however, repeated cross-sectional data cannot isolate the effects of pandemic-era policy changes.

To address these gaps, we aimed to examine the associations between participation in SNAP, SSI and CalWORKs and the prevalence of overweight and obesity among low-income California adults, and to evaluate whether these associations differed by sex and survey year.

Method

Study Sample

We conducted a secondary analysis of publicly available data from the 2019–2024 California Health Interview Survey (CHIS), a population-based survey designed to represent noninstitutionalized California residents. The survey instruments were developed and previously published by the UCLA Center for Health Policy Research and were not developed specifically for the present study. The English-language CHIS questionnaires for each survey year are publicly available through the CHIS Questionnaires and Survey Topics website.[18] CHIS collects information on health status, health behaviors, and access to health services through structured web and telephone interviews conducted in multiple languages. Survey data and documentation are publicly available through the UCLA Center for Health Policy Research. CHIS public-use data are de-identified and publicly available. This secondary analysis did not involve direct interaction with human participants and was considered non-human subjects research; therefore, additional institutional review board approval was not required.

We used CHIS data collected from 2019–2024 and restricted the analytic sample to adults aged 18 years or older with household income at or below 130% of FPL (approximately 19,578/year for a single individual or 33,566/year for a family of three in 2024).[19] This income threshold corresponds to the gross income eligibility criteria for SNAP, ensuring all respondents were income-eligible for at least one program. Among 136,506 adult CHIS respondents across 2019–2024; we excluded respondents with invalid income information (n = 2,430) or household income above 130% FPL (n = 117,097). We additionally excluded respondents with missing food insecurity data (n = 10) or missing body mass index (BMI) data (n = 51). The final complete-case analytic sample included 16,918 adults.

Measures

The primary outcomes were BMI, overweight, and obesity. BMI was calculated from self-reported height and weight as kg/m^2. Overweight was defined as a BMI of 25 to 29.9 kg/m^2, and obesity was defined as a BMI of 30.0 kg/m^2 or higher, consistent with World Health Organization classifications.

The primary exposures were participation in three public assistance programs: SNAP, SSI and CalWORKs. SNAP participation was defined as answering “yes” response to the survey question, ‘Are you receiving food stamp benefits?’ SSI participation was defined as answering ‘yes’ to ‘Are you receiving SSI?’ CalWORKs participation was defined as answering ‘yes’ to ‘Are you now receiving TANF or CalWORKs?’. Each program was treated as a separate binary exposure (participants vs non-participants), each program was modeled independently with adjustment for concurrent participation in the other programs as covariates.

Food insecurity was measured using the CHIS-administered food security variable, which classifies respondents into three categories: food secure, food insecure without hunger, and food insecure with hunger based on response to the U.S. Department of Agriculture (USDA) six-item household food security scale.[20]

Covariates

We adjusted for the following covariates in all multivariable models: age (18–29, 30–49, 50–69, and ≥ 70 years), sex (male as reference, female), survey year (2019–2024), race/ethnicity (non-Hispanic White as reference, Latino/Hispanic, Asian, African American, and other single or multiple race), place of birth (US-born as reference, foreign-born), education level (less than 12 years as reference, high school diploma, some college, and bachelor’s degree or higher), household size (1–2 persons as reference, 3–5 persons, and ≥ 6 persons), smoking status (never smoked regularly as reference, quit smoking, and currently smokes), number of cigarettes smoked per day, health insurance status (insured all past 12 months as reference, uninsured all past 12 months, and currently uninsured), food insecurity (food secure as reference, food insecure without hunger, and food insecure with hunger). Physical activity, alcohol consumption, and comorbid health conditions were not included as covariates in the primary models, as these variables were not consistently available or applicable across all CHIS survey years in the analytic period; their absence is acknowledged as a limitation.

Statistical Analysis

All analysis accounted for the complex survey design of CHIS, incorporating 80 replicate weights and the final raked weight. We first described the weighted distribution of BMI, overweight, and obesity prevalence across sociodemographic characteristics. We then estimated the association between program participation and BMI, overweight, and obesity. For BMI as a continuous outcome, we used weighted linear regression models with adjusted mean differences. For obesity or overweight as binary outcomes, we used weighted binomial regression with a log link and reported adjusted prevalence ratios (APR) and 95% confidence intervals (CI). Each program was modeled separately as the primary exposure, with non-participants as the reference group; models for each program additionally adjusted for concurrent participation in the other two programs.

To examine whether sex modified the association, we conducted sex-specific multivariable models separately for male and female for all three programs. In addition, to describe temporal patterns over time, adjusted predicted prevalence of obesity and overweight by program participation status and survey year were estimated using marginal predicted probabilities from multivariable models with a program×year interaction term; predicted probabilities were computed for each year×participation status combination using PROC SURVEYMEANS, accounting for the complex survey design.

As a sensitivity analysis, we restricted the analytic sample to single-program participants only, excluding individuals who reported receiving benefits from more than one of the three programs simultaneously. This approach evaluated whether the associations in the primary analysis were driven by co-participation. Results are presented in the Supplementary Table 1. All statistical analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC). All statistical tests were two-sided and significance was considered at $P < 0{\cdot}05$.

Results

The analytic sample included 16,918 adults with household income at or below 130% of the federal poverty level, representing a weighted population of approximately 29.7 million low- income California adults across 2019–2024 (Table 1). The sample was predominately female (58.8%) and the largest race/ethnicity group was Latino/Hispanic (39.8%). The weighted prevalence of overweight was 31.0% and of obesity was 36.0%, with a mean BMI of 28.7 kg/m^2 (SE = 0.1). Food insecurity was common in the study population, with 45.5% of participants reporting some level of food insecurity.

Table 1
Participant characteristics by weight status among low-income California adults, 2019–2024

				BMI (kg/m^2)		Overweight		Obesity	
	N*	Weighted %	SE	Mean	SE	Weighted%	SE	Weighted %	SE
Age(years)									
18–29	2506	28.7	0.5	27.4	0.2	27.3	1.0	29.9	1.0
30–49	4535	32.3	0.4	29.9	0.2	31.5	1.0	42.4	1.0
50–69	6467	25.5	0.4	29.4	0.1	33.7	0.9	39.5	0.9
≥70	3410	13.5	0.4	27.2	0.2	32.5	1.2	27.2	1.4
P for trend				0.08		< 0.001		0.49	
Sex									
Male	5973	41.1	0.5	28.4	0.1	34.1	0.8	33.9	0.9
Female	10945	58.8	0.5	28.9	0.1	28.8	0.6	37.5	0.6
P				0.001		< 0.001		0.001	
Race/Ethnicity									
Non-Hispanic white	5730	19.4	0.3	28.2	0.1	28.3	0.9	33.3	0.9
Latino/Hispanic	4395	39.8	0.5	29.5	0.1	33.9	0.9	41.0	1.0
Asian	2157	12.0	0.3	24.6	0.2	26.9	1.3	11.3	0.9
African-American	1150	6.9	0.2	30.5	0.4	24.0	1.6	46.8	1.9
Other single/multiple race	3486	21.9	0.5	29.2	0.2	32.5	1.1	39.5	1.1
P for trend				< 0.001		< 0.001		< 0.001	
Birthplace									
US-born	11013	54.8	0.6	29.2	0.1	28.5	0.7	39.6	0.6
Foreign-born	5905	45.2	0.6	28.1	0.1	34.1	0.8	31.6	0.9
P for trend				< 0.001		< 0.001		< 0.001	
Education level									
<12 years	2496	32.9	0.5	29.2	0.1	33.4	1.0	39.3	1.0
High-school diploma	4047	32.6	0.5	29.0	0.2	30.0	0.9	38.4	1.1
Some college	6214	20.5	0.4	28.5	0.2	28.4	0.9	35.0	1.0
Bachelor's degree or higher	4161	14.0	0.3	26.9	0.2	31.6	1.2	24.3	1.0
P for trend				< 0.001		0.39		< 0.001	
Household size									
1 or 2 persons	9088	31.0	0.4	28.3	0.1	30.8	0.8	33.0	0.8
3–5 persons	6433	54.8	0.5	28.6	0.2	30.9	0.7	35.7	0.7
≥ 6 persons	1397	14.2	0.4	29.7	0.2	31.7	1.5	44.0	1.5
P for trend				< 0.001		0.07		< 0.001	
Smoking status									
Never smoked regularly	11410	76.2	0.5	28.5	0.1	30.7	0.5	35.2	0.6
Quit smoking	3564	14.0	0.4	29.5	0.2	33.4	1.5	38.4	1.4
Currently smokes	1944	9.7	0.3	28.9	0.2	29.9	1.6	38.7	1.6
P for trend				0.02		0.91		0.03	
Health insurance status									
Insured all past 12 months	15141	84.9	0.4	28.8	0.1	30.3	0.5	36.4	0.5
Uninsured all past 12 months	669	5.1	0.3	28.1	0.4	35.1	2.4	35.1	2.6

				BMI (kg/m^2)		Overweight		Obesity	
	N*	Weighted %	SE	Mean	SE	Weighted%	SE	Weighted %	SE
Currently uninsured	1108	10.0	0.3	28.3	0.3	34.7	2.0	33.3	2.0
P for trend				0.01		0.004		0.03	
Food insecurity									
Food secure	9444	54.5	0.6	28.2	0.1	31.3	0.7	32.8	0.7
Food insecurity without hunger	4428	28.9	0.5	28.9	0.2	32.1	1.0	37.4	1.0
Food insecurity with hunger	3046	16.6	0.4	30.0	0.2	28.2	1.1	44.3	1.2
P for trend †				< 0.001		0.16		< 0.001	
Year									
2019	2413	17.3	0.4	28.4	0.2	30.8	1.4	35.1	1.2
2020	2205	16.4	0.4	29.2	0.2	30.5	1.3	39.3	1.4
2021	2938	16.4	0.3	28.5	0.2	32.8	1.3	34.1	1.2
2022	2893	16.1	0.3	28.8	0.2	31.4	1.3	35.3	1.3
2023	2938	16.8	0.4	28.8	0.2	29.1	1.4	38.2	1.4
2024	3531	17.0	0.3	28.5	0.2	31.4	1.1	34.1	1.1

BMI, body mass index; CHIS, California Health Interview Survey; SE, standard error.

* N reflects unweighted sample counts; weighted percentages account for the complex survey design of CHIS, incorporating 80 replicate weights and the final raked weight.

† P values for trend were estimated using survey-weighted linear (BMI) and logistic (overweight, obesity) regression models with ordinal predictors.

Overall, 41.7% of adults participated in at least one of the three programs: 34.5% in SNAP, followed by 14.2% for SSI, and 12.0% for CalWORKs. Some adults reported receiving benefits from multiple programs, 84.5% of CalWORKs recipients also received SNAP, 47.7% of SNAP participants received at least one other program benefit, and 62.0% of SSI participants were co-enrolled.

Obesity and overweight prevalence varied across sociodemographic groups (Table 1). Obesity prevalence was highest among adults aged 30–49 years (42.4%), African American adults (46.8%), adults with less than 12 years of education (39.3%), adults living in households of six or more persons (44.0%), and adults experiencing food insecurity with hunger (44.3%). Overweight prevalence showed distinct patterns: with the highest rates observed among adults aged 50–69 years, foreign-born respondents, and those with high school education. By sex, obesity prevalence was higher among females (38.9%) than males (32.3%), while overweight prevalence was higher among males (35.2%) than females (28.0%).

Associations between program participation and weight outcomes were presented in Table 2. After adjusting for sociodemographic characteristics, calendar year, smoking status, health insurance status, food insecurity, obesity prevalence was 41.8% among SNAP participants versus 33.0% among non-participants, and overweight prevalence was 27.9% versus 32.6%. SNAP participation was associated with higher prevalence of obesity (APR = 1.23; 95% CI = 1.07–1.42). The adjusted mean BMI was 0.87 kg/m^2 higher among SNAP participants (mean: 29.5 kg/m^2) compared to non-participants (mean: 28.2 kg/m^2) (95% CI = 0.50–1.24). SNAP participation was not significantly associated with overweight (APR = 0.97; 95% CI = 0.84–1.13).

Table 2
Public assistance participation and weight outcomes among low-income California adults‡

				BMI (kg/m^2)				Overweight				Obesity		
	N	Weighted %	SE	Mean	SE	Adjusted difference	95% CI	Weighted %	SE	Adjusted prevalence ratio†	95% CI	Weighted %	SE	Adjust preval ratio
SNAP														
Non-participants	10310	65.5	0.5	28.2	0.1	Ref	-	32.6	0.6	Ref	-	33.0	0.6	Ref
Participants	6608	34.5	0.5	29.5	0.1	0.87	0.50, 1.24	27.9	1.0	0.97	0.84,1.13	41.8	1.0	1.23
SSI														
Non-participants	13861	85.8	0.4	28.7	0.1	Ref	-	31.4	0.5	Ref	-	35.6	0.6	Ref
Participants	3057	14.2	0.4	28.8	0.2	0.033	-0.35, 0.41	28.6	1.2	0.93	0.78,1.11	38.5	1.3	1.05
CalWORKs														
Non-participants	15068	88.0	0.4	28.5	0.1	Ref	-	31.1	0.5	Ref	-	34.9	0.5	Ref
Participants	1850	12.0	0.4	30.0	0.3	0.32	-0.23, 0.86	30.0	1.5	1.29	1.1, 1.59	44.4	1.6	1.15

APR, adjusted prevalence ratio; BMI, body mass index; CI, confidence interval; CHIS, California Health Interview Survey; SE, standard error; SNAP, Supplemen Assistance Program; SSI, Supplemental Security Income; CalWORKs, California Work Opportunities and Responsibility to Kids.

N reflects unweighted sample counts; weighted percentages account for the complex survey design of CHIS, incorporating 80 replicate weights and the fina

† Adjusted prevalence ratios (APRs) and adjusted BMI differences were estimated from survey-weighted binomial regression (log link) and linear regression respectively, incorporating 80 replicate weights and the final raked weight. Each program was modeled as the primary exposure with non-participants as the

‡ All models adjusted for age, sex, race/ethnicity, place of birth, education level, household size, smoking status, number of cigarettes per day, health insura insecurity, survey year, and concurrent participation in the other two programs.

SSI participation was not significantly associated with obesity or overweight. Obesity prevalence was 38.5% among SSI participants compared to 35.6% among non-participants (APR = 1.05; 95% CI = 0.89–1.23), and overweight prevalence was 28.6% versus 31.4% (adjusted PR = 0.93; 95% CI = 0.78–1.11). The adjusted BMI difference was 0.03 kg/m2(95% CI = − 0.35–0.41).

CalWORKs participants had the highest obesity prevalence (44.4%) versus 34.9% among non-participants, and overweight prevalence was 30.0% versus 31.1%. CalWORKs participation was significantly associated with overweight (APR = 1.29; 95% CI = 1.10–1.59), but were not significantly associated with obesity (APR = 1.15; 95% CI = 0.93–1.44). The adjusted mean BMI was 0.32 kg/m^2(95% CI = − 0.23–0.86).

Sex-stratified analysis are presented in Table 3. The SNAP-obesity association was stronger among females (APR = 1.37; 95% CI = 1.15–1.64) and was not statistically significant among males (APR = 1.06; 95% CI = 0.82–1.36). For CalWORKs participation, associations differed by sex. Among males, CalWORKs participation was associated with higher overweight prevalence (APR = 1.72; 95% CI = 1.14–2.59). Among females, CalWORKs participation was not significantly associated with obesity (APR = 1.08; 95% CI = 0.85–1.39) or overweight (APR = 1.08; 95% CI = 0.87–1.35). SSI was not associated with any weight status in either sex. Obesity and overweight prevalence by sex and program participation status are shown in Supplementary Figs. 1 and 2, respectively, and are consistent with the sex-stratified patterns reported in Table 3.

Table 3
Sex-stratified associations between public assistance participation and weight outcomes‡

		BMI (kg/m^2)						Overweight				Obesity		
	N*	Weighted %	SE	Mean	SE	Adjusted difference	95% CI	Weighted %	SE	Adjusted prevalence ratio†	95% CI	Weighted %	SE	Adj pre rati
Male														
SNAP Non-participants	3861	69.2	0.8	28.2	0.2	Ref	-	35.7	1.0	Ref	-	32.2	1.0	Ref
SNAP Participants	2112	30.8	0.8	28.8	0.3	0.40	-0.24,1.05	30.5	1.7	0.84	0.66,1.07	37.6	1.7	1.0
Female														
SNAP Non-participants	6449	63.0	0.6	28.3	0.1	Ref	-	26.4	1.1	Ref	-	33.6	1.2	Ref
SNAP Participants	4496	37.0	0.6	30.0	0.2	1.12	0.70,1.53	30.2	0.8	1.08	0.90,1.29	44.2	0.7	1.3
Male														
SSI Non-participants	4881	87.6	0.6	28.4	0.1	Ref	-	34.3	0.9	Ref	-	33.7	0.9	Ref
SSI Participants	1092	12.4	0.6	28.4	0.3	-0.20	-0.91, 0.51	32.7	2.2	1.01	0.79, 1.28	35.3	0.9	1.0
Female														
SSI Non-participants	8980	84.6	0.5	28.9	0.1	Ref	-	29.3	0.7	Ref	-	37.0	0.7	Ref
SSI Participants	1965	15.4	0.5	29.1	0.3	0.16	-0.41,0.73	26.3	1.4	0.91	0.71, 1.16	40.2	1.8	1.1
Male														
CalWORKs Non-participants	5452	89.8	0.6	28.3	0.1	Ref	-	36.9	3.3	Ref	-	38.7	3.0	Ref
CalWORKs Participants	521	10.2	0.6	29.4	0.4	0.48	-0.48,1.45	33.8	0.8	1.72	1.14, 2.59	33.3	0.9	1.0
Female														
CalWORKs Non-participants	9616	86.7	0.5	28.7	0.1	Ref	-	26.4	1.5	Ref	-	53.3	1.9	Ref
CalWORKs Participants	1329	13.3	0.5	30.4	0.4	0.24	-0.51,1.00	29.2	0.6	1.08	0.87,1.35	36.0	0.6	1.0

APR, adjusted prevalence ratio; BMI, body mass index; CI, confidence interval; CHIS, California Health Interview Survey; SE, standard error; SNAP, Supplemen Assistance Program; SSI, Supplemental Security Income; CalWORKs, California Work Opportunities and Responsibility to Kids.

* N reflects unweighted sample counts; weighted percentages account for the complex survey design of CHIS, incorporating 80 replicate weights and the fir

† Sex-stratified adjusted prevalence ratios (APRs) and adjusted BMI differences were estimated from survey-weighted binomial regression (log link) and line models, respectively, fit separately for males and females, incorporating 80 replicate weights and the final raked weight.

‡ All models adjusted for age, race/ethnicity, place of birth, education level, household size, smoking status, number of cigarettes per day, health insurance s insecurity, survey year, and concurrent participation in the other two programs.

Estimates are marginal predicted probabilities derived from multivariable logistic regression models with a program×year interaction term, adjusted for age, place of birth, education, household size, smoking status, health insurance status, food insecurity, survey year, and concurrent participation in the other two vertical lines indicate the onset of the COVID-19 pandemic (2020) and the termination of SNAP Emergency Allotments (EA; February 2023).

Sensitivity analysis restricted to single-program participants is presented in the Supplementary Table 1. Among SNAP-only participants, obesity prevalence was modestly higher than among non-participants (APR = 1.17; 95% CI = 1.00–1.37), and overweight was not significantly associated (APR = 0.99; 95% CI = 0.83–1.17). SSI-only participants showed no significant association with either obesity (APR = 0.87; 95% CI = 0.69–1.09) or overweight (APR = 0.91; 95% CI = 0.71–1.16). Among CalWORKs-only participants (n = 182), there was a significant association with overweight (APR = 1.47; 95% CI = 1.05–2.07), while the obesity association was non-significant (APR = 0.89; 95% CI = 0.50–1.57); these estimates should be interpreted with caution given the limited statistical power. Overall, the sensitivity analysis suggests that the associations observed in the primary analysis for SNAP were not entirely explained by co-participation with other programs, and that the CalWORKs overweight association persisted when restricted to single-program recipients.

Adjusted predicted prevalence of obesity and overweight by program participation status and survey year are shown in Fig. 1. Across all three programs, obesity prevalence among participants remained consistently higher than non-participants throughout 2019–2024. For SNAP and CalWORKs, prevalence among participants and non-participants track closely throughout the study period, consistent with the non-significant adjusted association in Table 2. Overweight prevalence showed less consistent separation across all three programs.

Discussion

Our study results indicate that SNAP participation was associated with a higher prevalence of obesity, whereas CalWORKs participation was associated with a higher prevalence of overweight, and SSI participation showed a positive but not statistically significant association. The inclusion of overweight as a distinct outcome, beyond the obesity focus of most prior studies, proved substantively important: CalWORKs was significantly associated with overweight but not obesity, a pattern that would have been missed had only obesity been examined. For SNAP participants, association is concentrated among women, while CalWORKs associations differ by sex.

The positive association between SNAP participation and obesity is consistent with prior studies in similar populations.[16,21] As discussed above, SNAP enrollment is highly selected: participants may experience deeper poverty, more severe food insecurity, and greater health-related risks than income-eligible nonparticipants. The higher obesity prevalence observed among SNAP participants likely reflects these compounding disadvantages rather than benefit receipt itself.[15,22] These findings should therefore inform efforts to strengthen the program's reach and adequacy, not restrict its scope.

Distinguishing overweight from obesity may provide additional insight into how public assistance participation relates to weight status. Overweight represents an earlier stage on the weight trajectory where behavioral and structural interventions may be more effective at preventing progression to obesity, and the metabolic and social risk profiles of overweight and obese adults differ in ways that may call for distinct policy responses.[23,24] In this study, SNAP participation was associated with obesity but not overweight, while CalWORKs participation was associated with overweight but not obesity. These program-specific patterns may reflect differences in demographic composition, household structure, or concurrent participation in SNAP among recipients, but these hypotheses cannot be evaluated with the present cross-sectional design.

The association between SNAP participation and obesity was concentrated among women and was not statistically significant among men, demonstrating a reversal of the pattern described in prior work which the association was stronger among men, but is more consistent with several earlier national studies and reviews that found positive associations more consistently among women.[14,16] This female-specific association may reflect residual selection among women who participate in SNAP rather than an effect of SNAP receipt itself. [15] Compared with income-eligible nonparticipants, women receiving SNAP may differ in depth of poverty, food insecurity severity, caregiving-intensive household structures, and other unmeasured health-related risks.[22] These differences may not be fully captured by available CHIS covariates and could help explain why the association was concentrated among women. Therefore, the sex-stratified findings should be interpreted as identifying a high-burden subgroup rather than evidence of a sex-specific program effect.

The CalWORKs finding should be interpreted cautiously. CalWORKs provides unrestricted cash assistance and is targeted to families with children below approximately 80% of the federal poverty level, substantially lower than the 200% FPL threshold for SNAP eligibility in California, suggesting that CalWORKs participation may identify a subgroup experiencing deeper material hardship and caregiving demands than many CalFresh/SNAP-eligible households.[25] Employment requirements, housing instability, and caregiving demands are plausible contributors to stress-related eating among CalWORKs participants, though these stressors are not unique to CalWORKs and likely affect many SNAP participants and eligible nonparticipants as well; the extent to which they disproportionately concentrate among CalWORKs participants specifically cannot be determined from these data.[26]

Given that 84.5% of CalWORKs participants concurrently received SNAP, it is difficult to isolate associations attributable to a single program. The observed associations may therefore partially capture the combined influence of food and cash benefit cycles, the cumulative burden of managing multiple program requirements, or unmeasured socioeconomic characteristics common to co-enrolled adults.[27,28] Sensitivity analyses restricted to single-program participants generally supported the primary findings, although estimates for CalWORKs-only participants were imprecise because of the small sample size.

In the present study, SSI participation was not significantly associated with obesity. This contrasts with earlier CHIS data from 2007, which found SSI participation associated with a 50% higher obesity prevalence.[16] This attenuation likely reflects two mechanisms specific to the post-2019 period. First, before 2019, SSI and SNAP were mutually exclusive in California, allowing each program's independent association with obesity to be identified. After 2019, the majority of SSI participants also receive SNAP, making it hard to isolate SSI-specific effects after mutual adjustment for concurrent program participation.[9] Second, reverse causation cannot be excluded: since 2019, the Social Security Administration formally recognizes obesity as a medically determinable impairment that can contribute to SSI eligibility, meaning obese individuals are selectively more likely to qualify.[29] Together, these two mechanisms make it difficult to interpret the SSI–obesity association in the post-2019 period.

The year-specific predicted prevalence estimates should be interpreted descriptively in Fig. 1. Obesity prevalence was generally higher among program participants than nonparticipants across survey years, particularly for SNAP and CalWORKs, whereas overweight patterns were less consistent. Because CHIS provides repeated cross-sectional data, these temporal patterns cannot establish whether pandemic-era policy changes or other secular changes contributed to differences in weight status.

STRENGTHS AND LIMITATIONS

Six pooled years of population-representative CHIS data provide a large sample of low-income California adults, enabling stable estimates across subgroups and across all three programs simultaneously. This is among the first studies to examine these associations across the COVID-19 pandemic period, including

years of substantial SNAP benefit expansion and subsequent termination. The inclusion of overweight as a distinct outcome adds to prior work focused solely on obesity and revealed program-specific associations that would otherwise have been obscured.

Several limitations should be acknowledged. The cross-sectional design precludes causal inference; the observed associations likely reflect selection of higher-risk individuals into these programs and cannot be interpreted as program effects. Because CHIS does not provide BMI history before program enrollment, we could not determine whether overweight or obesity preceded program participation or developed after enrollment. Selection bias is a particular concern: program participants differ systematically from eligible nonparticipants in food insecurity severity, health status, and other unmeasured risk factors, and these differences likely account for a substantial portion of the observed associations. Adjusting simultaneously for participation in multiple programs reduces confounding but does not recover independent causal effects under strong selection. BMI was derived from self-reported height and weight, which tends to underestimate true BMI. This underreporting is differential, individuals with higher BMI tend to underreport to a greater degree, which would bias the observed prevalence ratios toward the null; the true associations may therefore be stronger than reported here. Physical activity, alcohol consumption, and comorbid health conditions were not adjusted for due to data limitations. CHIS excludes adults without stable housing or telephone access, who are likely at higher risk, potentially leading to underestimation of these associations. Longitudinal quasi-experimental studies with objective dietary measures would advance causal understanding.

Conclusions

Participation in public assistance programs was differentially associated with overweight and obesity among low-income California adults. SNAP participation was associated with a higher prevalence of obesity, particularly among females, whereas CalWORKs participation was associated with a higher prevalence of overweight, particularly among males. SSI participation was not significantly associated with either outcome. Because of the cross-sectional study design, these findings should not be interpreted as causal effects of program participation.

Several policy actions follow directly from these patterns. SNAP's nutrition incentive programs, including the Gus Schumacher Nutrition Incentive Program (GusNIP) and Double Up Food Bucks, which subsidize purchases of fruits and vegetables have demonstrated improvements in dietary quality among participants and represent approaches that expand healthy food access without restricting participant autonomy.[30] Evidence also indicates that increasing the frequency or value of benefit distributions may improve diet quality more effectively than item-level restrictions, which carry documented risks of increased administrative burden and stigma.[28] California's AB 1811, which simplified joint SSI–SNAP enrollment, offers a model for reducing administrative barriers.[31]

The subgroups bearing the highest obesity burden identified in this study may be disproportionately affected by recent federal policy changes. The One Big Beautiful Bill Act (P.L. 119 – 21), signed in July 2025, eliminates mandatory SNAP-Ed funding beginning in FY2025 and reduces SNAP funding by approximately $186 billion over 10 years through expanded work requirements and cost-shifting to states.[32] Additionally, the President's FY 2026 budget proposes eliminating the CDC's National Center for Chronic Disease Prevention and Health Promotion, which funds state and local obesity prevention programs and chronic disease surveillance.[33] These changes would reduce both the nutritional resources available to low-income adults and the public health infrastructure used to monitor outcomes in this population. Whether these reductions will worsen the patterns documented here is a question that should be examined as new data become available.

Abbreviations

APR
Adjusted prevalence ratio
BMI
Body mass index
CalWORKs
California Work Opportunity and Responsibility to Kids
CHIS
California Health Interview Survey
CI
Confidence interval
FPL
Federal poverty level
GusNIP
Gus Schumacher Nutrition Incentive Program
RAKEDW0
Final survey weight
SE
Standard error
SES
Socioeconomic status
SNAP
Supplemental Nutrition Assistance Program

SNAP-Ed
Supplemental Nutrition Assistance Program Education
SSI
Supplemental Security Income
SSI/SSP
Supplemental Security Income/State Supplementary Payment
TANF
Temporary Assistance for Needy Families
U.S.
United States.

Declarations

Ethics approval and consent to participate

This study used publicly available, de-identified secondary data from the California Health Interview Survey (CHIS). All methods were carried out in accordance with the Declaration of Helsinki and relevant institutional guidelines and regulations. Because this secondary analysis involved only publicly available, de-identified data and did not constitute human subjects research, institutional review board approval and informed consent were not required.

Consent for publication

Not applicable.

Availability of data and materials

The datasets analyzed during the current study are publicly available from the UCLA Center for Health Policy Research through the California Health Interview Survey data access portal: https://healthpolicy.ucla.edu/our-work/california-health-interview-survey-chis/access-chis-data.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

YW conducted the statistical analyses and drafted the manuscript. YW, JJS, DS, and MJL contributed to the conception and design of the study, interpretation of the findings, and critical revision of the manuscript. MJL supervised the study. All authors read and approved the final manuscript.

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Figures

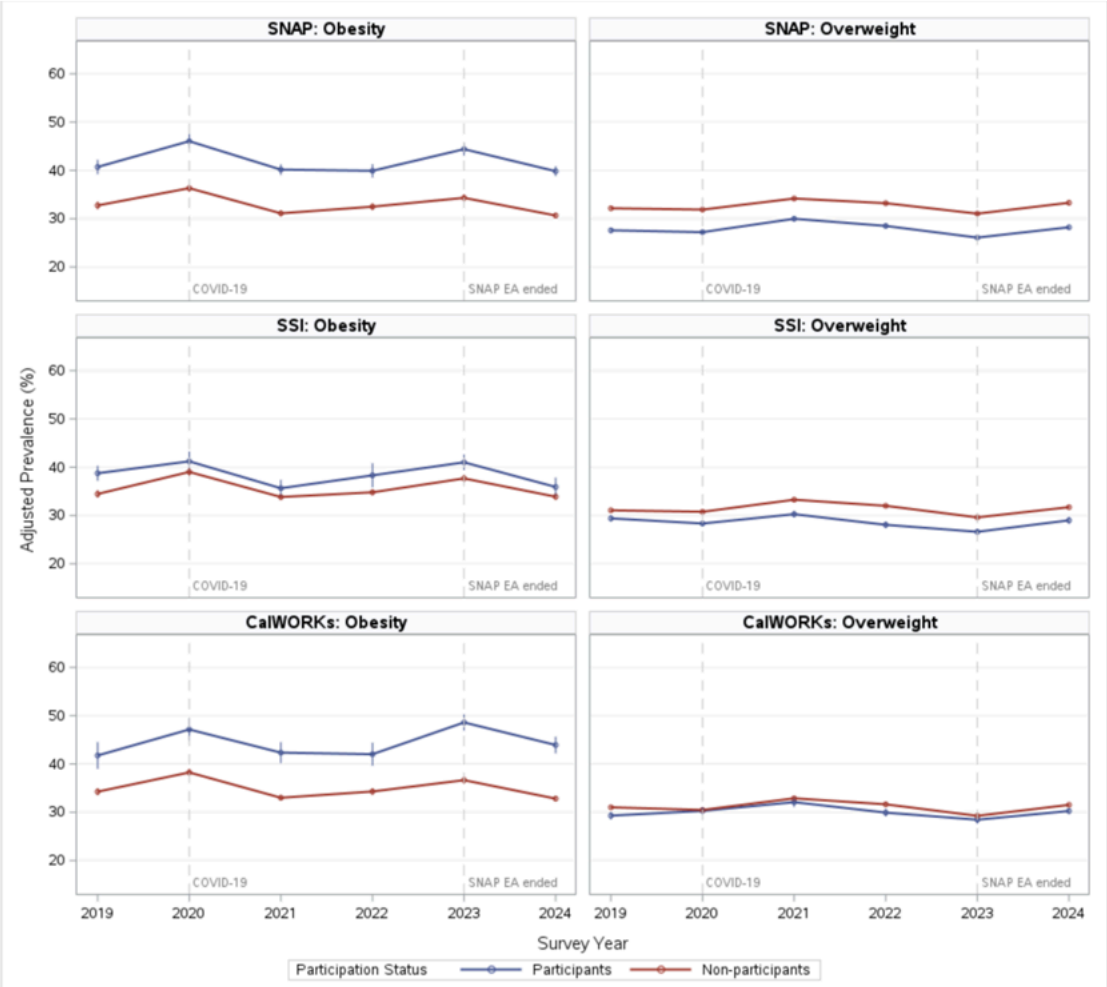


Figure 1

Adjusted weight-status prevalence by public assistance participation and survey year

Estimates are marginal predicted probabilities derived from multivariable logistic regression models with a program×year interaction term, adjusted for age, sex, race/ethnicity, place of birth, education, household size, smoking status, health insurance status, food insecurity, survey year, and concurrent participation in the other two programs. Dashed vertical lines indicate the onset of the COVID-19 pandemic (2020) and the termination of SNAP Emergency Allotments (EA; February 2023).

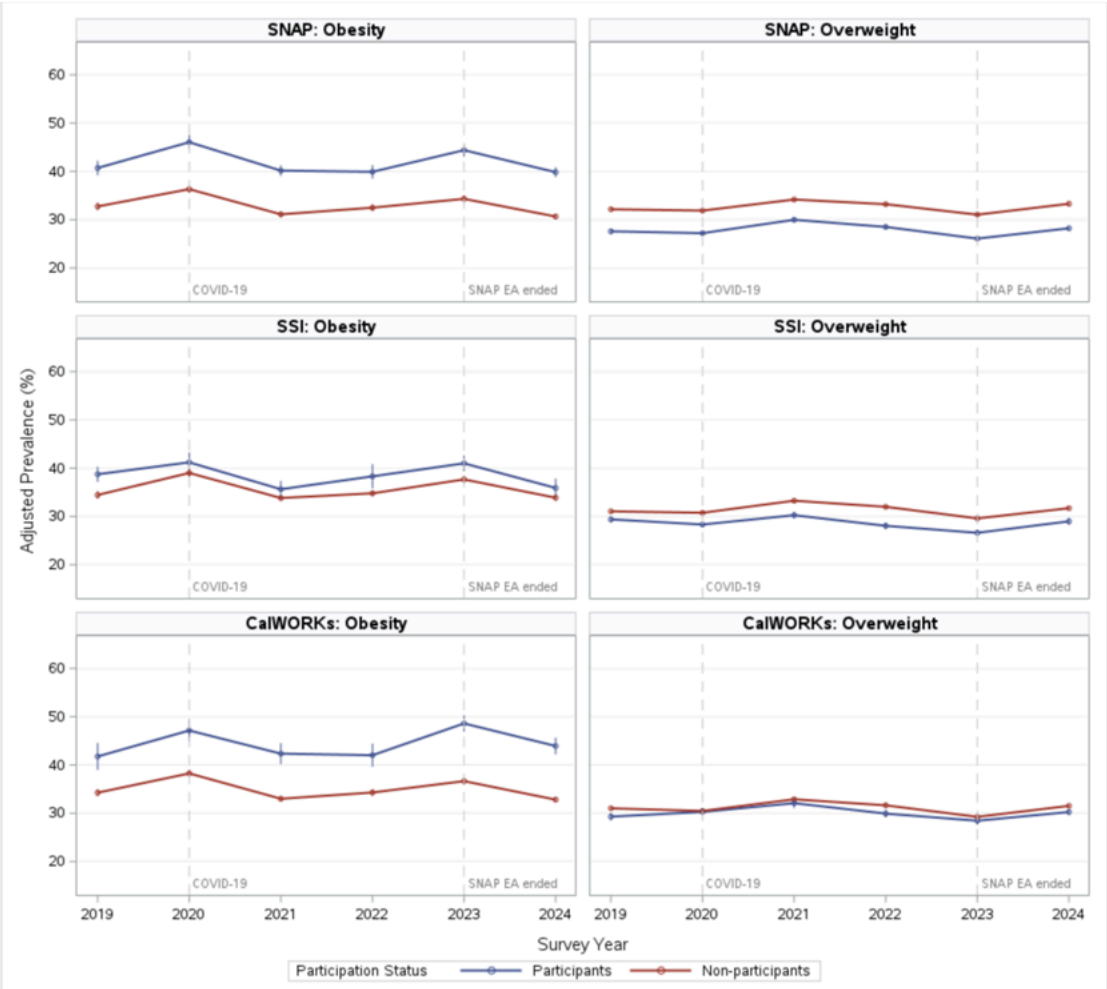


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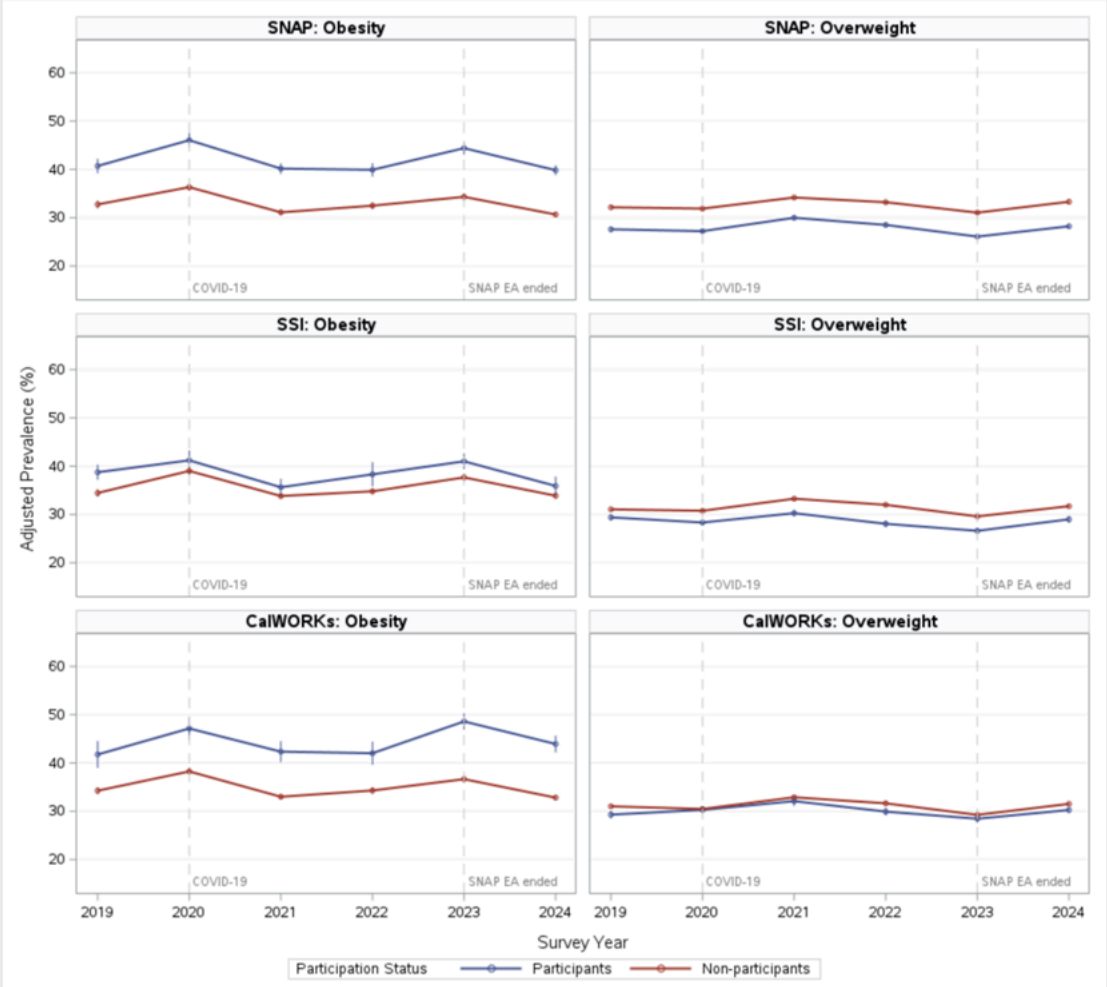


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