

COVID-19 Benefits and Dietary Behaviors Among Mothers From Low-Income, Food-Insecure Households

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ABSTRACT

Objective: To examine the dietary behaviors of mothers from very low food security (VLFS) households following the availability of coronavirus disease 2019 (COVID-19) unemployment and *Supplemental Nutrition Assistance Program* benefits.

Methods: Diet and food security status were obtained from 2,584 California mothers during Federal Fiscal Year 2020. Fruits, vegetables, and 100% fruit juice (FV100%FJ), sugar-sweetened beverages, and water intake, and Healthy Eating Index-2015 scores, were compared across 4 groups (before vs after COVID-19 benefits by VLFS vs non-VLFS households) with race/ethnicity and age as covariates.

Results: Before COVID-19 benefits, VLFS was associated with fewer cups of FV100%FJ ($P = 0.010$), more fluid ounces of sugar-sweetened beverages ($P = 0.004$), and poorer diet quality ($P = 0.003$). After COVID-19 benefits, mothers from VLFS vs non-VLFS households reported similar dietary outcomes. VLFS mothers reported 0.96 (95% confidence interval, 0.53–1.38) more cups of FV100%FJ after COVID-19 benefits.

Conclusions and Implications: Coronavirus disease 2019 benefits may have reduced dietary inequities among low-income families. Associations between increased *Supplemental Nutrition Assistance Program* and unemployment benefits and decreased costs associated with the negative health outcomes linked to food insecurity and poor diets would be of value.

Key Words: COVID-19, SNAP, food insecurity, dietary behaviors, diet quality (*J Nutr Educ Behav.* 2022;000:1–7.)

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INTRODUCTION

Food insecurity is a household-level condition of limited or uncertain access to adequate and nutritious food.¹ Individuals from families living in food-insecure households eat fewer fruits and vegetables,² drink more sugar-sweetened beverages (SSBs),³ and have poorer overall diet quality,¹ which are dietary outcomes associated with chronic diseases.^{4–6}

Previously we reported⁷ that levels of very low food security (VLFS) decreased among families from low-

income California households following California's March 19, 2020, coronavirus disease 2019 (COVID-19) executive order to stay-at-home⁸ through September 2020. We attributed this decline to the federal government's response to the economic downturn from COVID-19. Specifically, in California, Families First Coronavirus Response Act funds were used to raise the *Supplemental Nutrition Assistance Program* (SNAP) benefit; and Coronavirus Aid, Relief, and Economic Security (CARES) Act funds supported the distribution of Pandemic Electronic

Benefits Transfer (P-EBT) cards to families with children.⁹ Eligible unemployed Californians could receive supplemental benefits of \$600/wk through July and then \$300/wk through September 2020.¹⁰

The current study aimed to investigate these enhanced COVID-19 benefits in reducing dietary inequities among VLFS households. Our specific objective was to examine changes in dietary behaviors and diet quality before vs after the availability of the enhanced COVID-19 benefits in California through Federal Fiscal Year (FFY) 2020 among mothers from families from low-income, food-insecure households.

METHODS

The California Family Health Study (CFHS) is an annual, cross-sectional telephone survey of the youngest adult female caregivers of children 5–17 years from households with incomes $\leq 185\%$ of the federal poverty level. The CFHS was developed to track population-based US Department of

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Agriculture (USDA) *Supplemental Nutrition Assistance Program-Education* (SNAP-Ed; *CalFresh Healthy Living in California*) evaluation framework indicators,¹¹ among the California SNAP-Ed eligible population. The CFHS is conducted throughout each FFY (September through October) and is approved as a full committee project by the California Health and Human Services Agency, Committee for the Protection of Human Subjects. Consent is documented for all participants.

The CFHS involves developing sampling frames each quarter by randomly selecting households earning $\leq 185\%$ of the federal poverty level with ≥ 1 adult female and ≥ 1 child 5–17 years from the Medi-Cal Eligibility Data System (MEDS). The MEDS includes the names, demographics, and contact information of individuals from households in which ≥ 1 resident had applied for benefits administered by the State of California within the past year. Sampling procedures include removing households from each frame with individuals who participated in the CFHS during the previous year.

A letter of introduction to the study in English or Spanish is sent to the youngest adult female in each selected household on the basis of the preferred language and mailing address identified in the MEDS. Bilingual staff subsequently call each household to verify household eligibility and confirm the identity of the youngest caregiver of children aged 5–17 years (subsequently referred to as mothers). The rationale for selecting the youngest mother is that she is likely the household member most involved in buying groceries and preparing meals for the family, and she is the most knowledgeable about the food security status of the household. The initial recruitment procedures also include offering a \$15 gift card for survey participation and scheduling the interview at the end of the call.

During a subsequent telephone call, all food and beverage items that the mother consumed during the previous day were recorded using the web-based and validated, automated self-administered 24-hour dietary assessment tool (ASA24).¹² The

quantity and size of each item are determined through interviewer/mother discussions while referencing images in a pictorial portion-size booklet or measuring cups and spoons, which had been previously sent to all mothers. All English-Spanish language bilingual interviewers complete training on basic interviewing protocols and procedures specific to the administration of the ASA24.

The 4 ASA24-derived outcome variables for this study represent SNAP-Ed population-level indicators of dietary health¹¹: cups of fruits, vegetables, and 100% fruit juice (FV100%FJ); fluid ounces of SSBs; cups of water; and Healthy Eating Index (HEI)-2015 scores, a measure of diet quality in accordance with the 2015–2020 Dietary Guidelines for Americans.¹³ Daily caloric intake was also calculated to exclude from the analyses mothers reporting implausible values (≤ 400 or $\geq 4,400$ for adult women) per ASA24 procedures.¹²

In addition to demographic questions, a supplemental questionnaire included 6 items from the USDA Food Security Survey Module (Table 1) that were used to determine food security status.¹⁴ 1. The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more. Was that often, sometimes, or never true for (you/your household) in the last 12 months? and 2. (I/we) couldn't afford to eat balanced meals. Was that often, sometimes, or never true for (you/your household) in the last 12 months? Items 3–5 were also based on the last 12 months, and required yes or no responses: 3. ... were you ever hungry but didn't eat because there wasn't enough money for food? 4. ... did you ever eat less than you felt you should because there wasn't enough money for food? 5. ... did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food? Mothers providing affirmative responses to item 5 were asked, 6. How often did this happen – almost every month, some months but not every month, or only 1 or 2 months? An overall food security score was calculated, with codes of 1 for responses of “often” or “sometimes” for the first 2 items,

responses of “yes” for the subsequent 3 items, and responses of “almost every month” and “some months but not every month” for the last item. Per standardized coding instructions,¹⁴ food security status is considered very low for aggregate scores of 6–5, “low” for scores of 4–2, and “high or marginal” for scores 1–0. For the current study, 6–5 represented VLFS; mothers with scores of 4–0 were considered non-VLFS. Mothers were asked their age and race/ethnicity: “Are you Hispanic, Latina, or of Spanish origin?”; “What is your race? You may answer more than 1”; “Are you American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or other Pacific Islander, White, or other?”

During FFY 2020, CFHS survey operations were suspended from March 15 to April 26 in response to California's executive order requiring all nonessential businesses to close.⁸ We defined the time before COVID-19 from the start of the FFY 2020 CFHS on November 21, 2019 to March 14, 2020, and the time after COVID-19 from April 27, 2020 to September 29, 2020 (ie, end of the survey). Enhanced COVID-19 benefits included increases in unemployment and SNAP benefits and the distribution of P-EBT cards to families with children from California SNAP households, which all became available during or after California's COVID-19 shutdown and the suspension of FFY 2020 CFHS survey operations. The CARES Act Federal Pandemic Unemployment Compensation funds provided additional \$600/wk payments to unemployed Californians from April 4 to July 31, 2020. For unemployment between July 26 and September 5, 2020, supplemental payments were \$300/wk through the *Lost Wages Assistance* program. *Supplemental Nutrition Assistance Program* recipients began to receive the maximum allowable allotment on the basis of household size, equating to an average monthly increase from March through September 2020 of \$216–\$230 (July 29, 2021, email from Kathy Yang, Chief, CalFresh Policy and Employment Bureau, California Department of Social Services). Two cycles of P-EBT

Table 1. Six Items of the USDA Food Security Survey Module

Introduction: I'm going to read you several statements that people have made about their food situation. For these statements, please tell me whether the statement was often true, sometimes true, or never true for (you/your household) in the last 12 months—that is, since last (name of current month).

1. "The food that (I/we) bought just didn't last, and (I/we) didn't have money to get more." Was that often, sometimes, or never true for (you/your household) in the last 12 months?
2. "(I/we) couldn't afford to eat balanced meals." Was that often, sometimes, or never true for (you/your household) in the last 12 months?
3. In the last 12 months, since last (name of current month), did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?
4. [IF YES ABOVE, ASK] How often did this happen—almost every month, some months but not every month, or in only 1 or 2 months?
5. In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
6. In the last 12 months, were you every hungry but didn't eat because there wasn't enough money for food?

cards were distributed on the basis of school start dates (round 1, \$365; round 2, \$123–\$246). Collectively, \$1.73 billion was redeemed for food purchases by September 30, 2020 (May 5, 2021, email from Hares Rahimzei, P-EBT Project Lead, California Department of Social Services).

To address the study objective, mothers were coded into 1 of 4 groups: before vs after the availability of the enhanced COVID-19 benefits by the level of household food security (VLFS vs non-VLFS). Differences across the 4 groups for each outcome were examined using general linear model analyses (ANOVA) with Fisher's least significant difference tests for *post hoc* mean comparisons. First, we examined differences in mean outcomes between VLFS and non-VLFS households before and after COVID-19 benefits. Next, means were compared before vs after the COVID-19 benefits regardless of food security status. To assess whether observed changes in the outcomes were greater for mothers from VLFS vs non-VLFS households, mean differences (after-vs-before COVID-19 benefits) and 95% confidence intervals (CIs) were examined. Nonoverlapping 95% CIs were considered significantly different, and Cohen's *d* statistics and 95% CIs were calculated to assess effect sizes. Finally, using FFYs 2018 and 2019 CFHS, we calculated mean differences, 95% CIs, and Cohen's *d* statistics before and after COVID-19. These findings were compared with those of mothers participating in the FFY 2020 CFHS to examine seasonal effects on dietary intake (April to September vs

November to March) to avoid any presumed effect of the enhanced COVID-19 benefits, which may have been responsible for the observed improvements in dietary outcomes in FFY 2020.

Covariates in the analyses were race/ethnicity (Latinas and mothers coded as other for race/ethnicity along with those with missing data for the reference group to African Americans and Whites, each coded as 1) and age centered on the mean. After excluding records with missing Food Security Survey Module items ($n = 123$) and implausible daily caloric intake per ASA-24 procedures¹² ($n = 107$), the analytic database consisted of responses from 2,584 mothers. The software SPSS (version 28.0, IBM Corp, 2021) was used for data merging, cleaning, coding, and analyses. The criterion of $P < 0.05$ was used to determine significant differences.

RESULTS

A total of 1,721 mothers (66.6%) in the analytic sample were Latina, 396 (15.3%) were White, and 335 (13.0%) were African American. Race/ethnicity was coded as other for 119 (4.6%) and was missing for 13 (0.5%) of the 2,584 mothers. The mean age of the sample was 39.7 years (median, 39.0 years).

Most (66.3%) of mothers participating in the FFY 2020 CFHS were interviewed before California's March 19, 2020, executive order to stay-at-home.⁸ The number of mothers in each of the 4 groups (before vs after the availability of enhanced COVID-

19 benefits by VLFS vs non-VLFS household) appear in Table 2.

Mean values across the 4 groups for all outcomes were significant (Table 2). Before the availability of enhanced COVID-19 benefits, mothers from VLFS vs non-VLFS households reported fewer cups of FV100%FJ ($P = 0.010$), more fluid ounces of SSBs ($P = 0.004$) and, accordingly, had lower mean HEI-2015 scores ($P = 0.003$). After the availability of enhanced COVID-19 benefits, no differences in FV100%FJ, SSBs, or HEI-2015 scores were observed for mothers from VLFS and non-VLFS households. Cups of FV100%FJ and water increased for mothers from both VLFS and non-VLFS households after the enhanced COVID-19 benefits.

Table 3 displays the after-vs-before mean differences for cups of FV100%FJ and water by food security status. After the availability of enhanced COVID-19 benefits, mothers from VLFS households reported an increase in mean cups of FV100%FJ that was more than 3 times greater than the increase found for mothers from non-VLFS households. A Cohen's *d* of 0.44 was calculated for mothers from VLFS households; the effect size for the increase in FV100%FJ for mothers from non-VLFS households was 0.12. The 95% CI for the after-vs-before mean differences and Cohen *d* statistics for mothers from VLFS and non-VLFS households do not overlap. Increases in water consumption, after-vs-before COVID-19 benefits, were similar for mothers from VLFS vs non-VLFS households, as indicated by the overlapping 95% CIs.

Table 2. Dietary Behaviors and Diet Quality of Mothers From Low-Income California Households Before vs After Enhanced COVID-19 Benefits and by Levels of Household Food Security, CFHS, FFY 2020

Variables	F (P)	Before the Availability of Enhanced COVID-19 Benefits n = 1,714 (November 21, 2019-March 14, 2020)		After the Availability of Enhanced COVID-19 Benefits n = 870 (April 27-September 29, 2020)	
		VLFS Households n = 331	Non-VLFS Households n = 1,383	VLFS Households n = 126	Non-VLFS Households n = 744
F, V, FJ (cups)	8.95 (< 0.001)	2.7 ^a	3.1 ^b	3.7 ^c	3.4 ^c
Water (cups)	7.98 (< 0.001)	7.3 ^a	7.4 ^a	9.0 ^b	8.4 ^b
SSB (fl oz)	2.83 (0.04)	7.6 ^b	5.8 ^a	6.4 ^{a,b}	6.2 ^{a,b}
HEI-2015 (scores)	3.22 (0.02)	55.9 ^a	58.4 ^b	58.5 ^{a,b}	57.4 ^{a,b}

CFHS indicates California Family Health Study; COVID-19, coronavirus disease 2019; F, fruits; FFY, Federal Fiscal Year; FJ, 100% fruit juice; HEI-2015, Healthy Eating Index-2015; Non-VLFS, high, marginal, or low food security; SSB, sugar-sweetened beverage; V, vegetables; VLFS, very low food security.

Because of California's executive stay-at-home order, survey data were not collected from March 16 to April 26, 2020.

Note: Superscripted letters (^{a,b,c}) represent comparisons for means across groups within each outcome. Means with different superscripted letters denote statistically significant differences ($P < 0.05$) as determined from Fisher's least significant difference tests for *post hoc* comparisons. Covariates were race/ethnicity and age.

Table 3 also shows the mean differences in dietary behaviors for the after-vs-before COVID-19 periods for mothers participating in the FFYs 2018 and 2019 CFHS. The combined CFHS datasets found increases for cups of FV100%FJ ($P = 0.003$) and water ($P \leq 0.001$), indicating that mothers consumed more FV100%FJ and drank more water in April through September than November through March. However, for cups of FV100%FJ, the mean difference for mothers from VLFS households was more than 6 times greater than for the FFYs 2018 and 2019 CFHS survey participants. For these comparisons, the mean difference and Cohen d 95% CIs also do not overlap. The overlapping CIs for FV100%FJ among mothers from non-VLFS households in FFY 2020 compared with FFYs 2018 and 2019, as well as for cups of water regardless of food security status compared with FFYs 2018 and 2019, indicate nonsignificant differences.

DISCUSSION

Consistent with past research,¹⁻³ we found unhealthier dietary behaviors and poorer diet quality among mothers from families experiencing VLFS compared with non-VLFS. However, significant relationships between VLFS status and reduced intake of FV100%FJ, increased SSB consumption, and lower HEI-2015 scores were

found among mothers interviewed before, but not after, the availability of enhanced COVID-19 benefits. These findings suggest that increased SNAP and unemployment benefits in response to COVID-19 may have been responsible for reducing dietary inequities among families from low-income households, at least through FFY 2020.

There are differences in the potential causes and health implications between our findings for increased water and FV100%FJ consumption among mothers from VLFS households following the availability of enhanced COVID-19 benefits. Because water intake levels were equivalent between mothers from VLFS and non-VLFS households before and after COVID-19 benefit periods, food security status appears not to influence water consumption. Our analyses of survey responses from mothers participating in the pre-COVID-19 FFYs 2018 and 2019 CFHS point to a seasonal effect. That is, mothers from VLFS and non-VLFS households drank more water during April through September (FFY 2020 after the enhanced COVID-19 benefits period) than November through March (FFY 2020 before the enhanced COVID-19 benefits period) in FFYs 2018 and 2019 as well as FFY 2020, and the magnitude of the increases for each survey period was similar. These findings make intuitive sense because water consumption, specifically tap

water, is not subject to the additional resources one might realize when living in a non-VLFS household or receiving enhanced COVID-19 benefits. Similarly, analyses of the National Health and Nutrition Examination Surveys survey data from 1999 to 2006 found no associations between water intake levels and income-poverty ratios (family income adjusted for family size).^{15,16}

The average increase in FV100%FJ intake following the availability of enhanced COVID-19 benefits among mothers from VLFS households was greater than expected from a seasonal effect, as determined by the analyses of response from the pre-COVID-19, FFYs 2018, and 2019 CFHS. Increases in the mean differences in FV100%FJ, after-vs-before the enhanced COVID-19 benefits periods, can be interpreted using Cohen's criteria of 0.8 for large, 0.5 for medium, and 0.2 for small effects.¹⁷ The effect sizes for the FV100%FJ increase for mothers from non-VLFS households following the enhanced COVID-19 benefits and survey participants from the FFYs 2018 and 2019 CFHS failed to meet Cohen's criterion for small effects.¹⁷ However, the average increase in daily FV100%FJ intake among mothers from VLFS households following the availability of enhanced COVID-19 benefits approached the criterion for medium effects. In more practical terms, the

Table 3. Differences in Dietary Behaviors of Mothers from Low-Income California Households, After-vs-Before Enhanced COVID-19 Benefits, and by Levels of Household Food Security, CFHS, FFY 2020, and 2018–2019

Variables	Mothers from VLFS Households After-vs-Before Enhanced COVID-19 Benefits FFY 2020 (n = 457)			Mothers from Non-VLFS Households After-vs-Before Enhanced COVID-19 Benefits FFY 2020 (n = 2,127)			Mothers from FFYs 2018 + 2019 CFHS After-vs-Before FFY 2020 Enhanced COVID-19 Benefits Periods (n = 8,009)		
	Mean Difference	P	Cohen's d	Mean Difference	P	Cohen's d	Mean Difference	P	Cohen's d
F, V, FJ (cups)	1.0 (0.5–1.4)	< 0.001	0.44 (0.24–0.64)	0.3 (0.1–0.5)	0.006	0.12 (0.03–0.21)	0.1 (< 0.1–0.3)	0.003	0.05 (0.004–0.10)
Water (cups)	1.7 (0.5–3.0)	0.006	0.29 (0.09–0.49)	1.0 (0.5–1.4)	< 0.001	0.17 (0.08–0.25)	0.8 (0.5–1.1)	< 0.001	0.14 (0.09–0.19)

CFHS indicates California Family Health Study; COVID-19, coronavirus disease 2019; F, fruits; FFY, Federal Fiscal Year; FJ, 100% fruit juice; HEI-2015, Healthy Eating Index-2015; Non-VLFS, high, marginal, or low food security; V, vegetables; VLFS, very low food security.

Note: Covariates were race/ethnicity and age.

potential health benefits from a 0.96 cup increase in FV100%FJ intake can be interpreted in light of past studies. Meta-analyses have found increased fruits and vegetables related to a reduced risk in developing type 2 diabetes,⁴ and each serving (~0.5 cups) of fruits and vegetables a day lowers the risk of dying from cardiovascular disease by 4%.⁵

What factors might explain why the enhanced COVID-19 benefits seemingly brought SSB consumption and diet quality to levels similar among mothers from VLFS and non-VLFS households and increased FV100%FJ intake among VLFS mothers to levels greater than among non-VLFS mothers? The VLFS households, compared with non-VLFS households, were more likely to have someone in the family who lost their job because of COVID-19. Food security is inversely related to income,¹⁸ and low-wage workers were more likely to become unemployed during COVID-19.¹⁹ In 1 study, 30.7% of individuals from VLFS households stated that they lost their job because of the COVID-19 pandemic, compared with 15.5% from low food secure and 10.3% from marginal and high food secure households.²⁰ Families experiencing VLFS, in turn, may have been more likely to receive regular unemployment insurance along with the supplemental \$600/wk CARES Act stimulus payments. Research into the economic impact of the CARES Act suggests that the sum of regular and CARES Act supplemental unemployment benefits exceeded prior employment wages for 76% of recipients, with a median replacement rate of 145% of prior income.²⁰ Moreover, before COVID-19, mean household income may have been lower among VLFS than non-VLFS households. Thus, the proportional increase in the standard and supplemental unemployment payments versus prior wages may have been greater for VLFS households, which would have been the case even if unemployment rates were similar among VLFS and non-VLFS households. Very low food security households then may have used these surplus funds versus prior household spending limits to change their preunemployment food-related purchasing and lifestyle behaviors (which may have included more convenient, less

expensive, higher caloric processed foods) to buy healthier items, including more FV100%FJ.

After-vs-before COVID-19 increases in proportional income may have also been greater among VLFS households to the degree that they were more likely than non-VLFS households to have been enrolled in SNAP. Researchers have demonstrated that VLFS households were more likely to receive SNAP benefits.^{21,22} Being the case, VLFS households might have been more likely to receive the additional monthly benefits and P-EBT cards, as well as subject to the SNAP restrictions against purchasing prepared food items. Mothers from VLFS households may also have been more likely to have been exposed to SNAP-Ed messages, which in California predominantly focus on increasing FV100%FJ and MyPlate food groups and portions.²³

A limitation of the ASA24, as employed in the current study, is that the types and quantities of foods and beverages consumed during the previous day may not represent one's typical dietary behaviors. Study shortcomings also include limited empirical data to support the assumption that supplemental unemployment or SNAP benefits were directly responsible for the healthier diets observed among mothers from families from VLFS households. Items on the CFHS instrument were selected solely to track USDA SNAP-Ed evaluation framework indicators.¹¹ Questions assessing SNAP enrollment, or the receipt of unemployment or other benefits, would have provided greater evidence that COVID-19-related economic assistance led to improved dietary behaviors. Limited demographic variables also prevented analyses that included covariates other than race/ethnicity and age to control for potential confounding. Sample sizes within the 4 study groups varied; accordingly, significant and nonsignificant findings were subject to different levels of statistical power in our between-group comparisons.

IMPLICATIONS FOR RESEARCH AND PRACTICE

In August 2021, after the end of the 2020 CFHS, the USDA increased the

monthly SNAP benefit to \$36 per person, on average.²⁴ Whether this increase will substantially impact dietary behaviors after the enhanced COVID-19 benefits have ended worthy of study. Researchers and policymakers may also consider the return on investment studies to investigate associations between incremental increases in SNAP and unemployment benefits in relation to decreases in the costs associated with the negative health outcomes linked to food insecurity and poor diets among low-income populations. Ideally, a point can be identified in which increases in SNAP funding provide the maximum gain in reducing associated health care costs.

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