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U.S. Household Food Spending Post COVID-19 and the Implications for Diet Quality

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Abstract

This report analyzes recent trends in household food spending across socioeconomic groups amid a combination of uncommon and economically impactful events. These include the Coronavirus (COVID-19) pandemic, supply chain disruptions, historically high food price inflation, and the pandemic stimulus. Estimates from a two-part spending model on 15 food categories based on the 2016–22 Consumer Expenditure Diary Survey show a partial return to prepandemic (2016–19) spending levels in 2022, but this was uneven across food categories and socioeconomic groups. As spending at restaurants in 2022 continued to be below 2016–19 levels, spending at supermarkets and other stores remained higher, especially on fruits and vegetables, prepared meals and salads, desserts, and savory snacks and sweeteners. These food spending patterns were similar across sociodemographic groups in 2022, with the exception of households enrolled in the Supplemental Nutrition Assistance Program (SNAP). With record inflation in 2022 reducing household purchasing power, non-SNAP low-income households reduced food spending at supermarkets and other stores relative to SNAP households, indicating the program's role in mitigating income constraints.

Keywords: Consumer Expenditure Diary Survey, food price inflation, COVID-19 pandemic

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What Is the Issue?

A combination of uncommon and economically impactful events (i.e., the Coronavirus (COVID-19) pandemic, food price inflation, and pandemic-related stimulus) induced significant changes in where and what foods consumers purchased in the United States. Research suggests that prior economic shocks had lasting impacts on food consumption patterns and diet and health-related outcomes. However, the recent events differed from previous economic shocks, and the lasting diet impacts are unclear. This report examines changes in household food spending across different socioeconomic groups and across time during this period (2016–22).

What Did the Study Find?

As households trended back to prepandemic food spending patterns (2016–19), some food purchasing behaviors persisted in 2022, a year marked by record food price inflation. Compared to 2016–19, inflation-adjusted food spending in 2022:

- Was lower at limited-service and full-service restaurants (where food tends to be higher in calories, sodium, and fat).
- Was higher at supermarkets and other stores, led by more fruit and vegetable spending (which are recommended for increased consumption in the Dietary Guidelines for Americans)—as well as more spending on prepared meals and salads, desserts, and savory snacks and sweeteners (these foods tend to be higher in saturated fats, sugar, and sodium).
- Indicated generally small changes in predicted dietary energy and nutrient composition, except for increases in sugar related to the increased consumption of beverages and other foods (savory snacks, sweeteners, etc.) purchased from supermarkets and other stores.

Compared to 2016–19, differences in food spending patterns across socioeconomic groups were generally stable across 2020 and 2022, with some notable exceptions:

- As historically high food price inflation decreased the purchasing power of U.S. households in 2022, overall food spending was flat or declined for most households, except those on the Supplemental Nutrition Assistance Program (SNAP).
- Differences in food spending at supermarkets and other stores between SNAP households and low-income non-SNAP households widened in 2020, which was further exacerbated during high food price inflation in 2022.

Regardless of year, differences in food spending were associated with race, ethnicity, urbanicity, income, and season, consistent with well-documented lasting differences in dietary intake and diet quality across socioeconomic groups and times of year.

- Compared to other seasons, households tended to spend more in the fall season on desserts ($17 more per capita) and savory snacks and sweeteners ($22 per capita), coinciding with the major holidays of Halloween, Thanksgiving, and Christmas.
- Urban households spent more on fruits and vegetables compared to their rural counterparts.
- Lower income households not on SNAP spent $209 less per capita on food from supermarkets and other retail establishments compared to households participating in SNAP.

How Was the Study Conducted?

This report used the Consumer Expenditure Diary Survey to examine food purchasing behaviors between 2016 and 2022. Food spending at supermarkets and other stores was grouped into 12 categories to closely align with components of the 2020–25 Dietary Guidelines for Americans. The categories are grains, processed red meats, nonprocessed red meats, poultry and seafood, dairy, fruits, vegetables (including beans and peas), oils, beverages, desserts, prepared meals and salads, and other foods (e.g., savory snacks, sweeteners, table fats, etc.). Food spending at restaurants is classified into limited service, full service, and other (e.g., meals and snacks at employers or schools, vending machines, and mobile food vendors). Inflation-adjusted food expenditures were estimated by adjusting nominal expenditures using regional Consumer Price Indexes. Marginal effects that were based on a two-part model measured the association between household food expenditures and different time periods; income and SNAP participation; race and ethnicity; household size; household structure; geography; and age.

U.S. Household Food Spending Post COVID-19 and the Implications for Diet Quality

Introduction

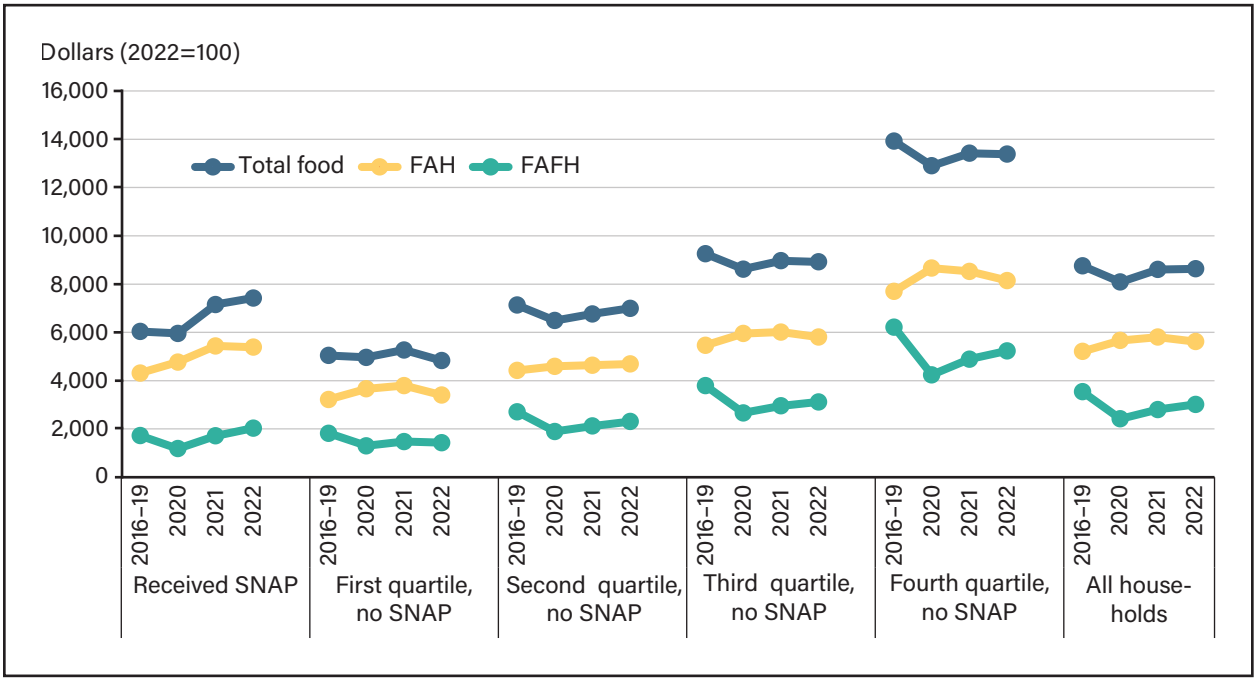
Economic recessions and slowdowns have profoundly influenced spending patterns on food as consumers navigate tighter budgets and uncertainty (Cho & Todd, 2018; Kumcu & Kaufman, 2011). These shifts in food purchasing behavior during economic downturns have yielded mixed effects on diet and health outcomes. Some research has indicated improved diet quality during recessions due to decreased eating out and increased home cooking (Chen & Strum, 2022; Todd, 2017). Others, however, have demonstrated the negative impacts, such as decreased fruit and vegetable consumption and heightened food insecurity (Dave & Kelly, 2012; Kim & Cubbin, 2019; Gundersen & Ziliak, 2018). These changes in food consumption behaviors can have enduring effects on health, persisting long after a recession ends (Wang et al., 2018; Charles & DeCicca, 2008).

The recession triggered by the early stages of the Coronavirus (COVID-19) pandemic shared similarities with previous economic downturns but diverged in critical dimensions, potentially leading to distinct diet and health outcomes (Lusk & McFadden, 2021). First, the pandemic imposed physical barriers to food access, including stay-at-home orders and the closure of restaurants. This prompted significant shifts in the ways people purchased and acquired food, such as increased online shopping and home cooking (Chenarides et al., 2021; Ellison et al., 2021; Cosgrove & Wharton, 2021; Restrepo & Zeballos, 2022). Second, fiscal and monetary stimulus provided by the U.S. Government in 2020–21 was comparatively more than during other economic shocks, bolstering household incomes and enhancing food affordability amid the recession (Adjemian et al., 2023). Lastly, 2022 was characterized by high food price inflation, driven partially by demand as well as supply chain disruptions, further shaping consumer behavior (USDA, Economic Research Service (ERS), 2024; Dong et al., 2022; Adjemian et al., 2023; Jordà et al., 2022). With additional income related to pandemic stimulus as the pandemic waned, those who could not spend money on travel, dining out, or shopping at the same scale as before the outbreak of the pandemic increased spending when the opportunities emerged in 2022 (Park et al., 2022).

A significant body of literature examines changes in food consumption in 2020, yielding mixed findings on whether consumers developed healthier eating habits. Reduced spending at restaurants and other foodservice venues (referred to as food away from home or FAFH) in 2020 could suggest a potential shift towards healthier food choices, as FAFH is often associated with higher caloric and saturated fat intake (Lin & Guthrie, 2012). However, a consensus regarding how consumers substituted from FAFH and into different foods purchased at retail venues (referred to as food at home or FAH) and its effects on diet quality remains elusive (Okrent & Zeballos, 2022). While some studies report increased consumption of fresh produce (Cosgrove & Wharton, 2021; Acton et al., 2022), others indicate a rise in the intake of processed foods, snacks, and desserts (Park et al., 2022; Okrent & Zeballos, 2022). Additionally, perceptions of diet quality changes brought on by the pandemic (e.g., "I eat/do not eat better during the pandemic") varied across individuals and socioeconomic groups, with lower-income households showing potential improvements in food choices (Okrent & Zeballos, 2022). However, outcomes related to food consumption such as food insecurity (Coleman-Jensen et al., 2022) and obesity (Ehmke & Restrepo, 2023) have worsened for some populations.

Despite extensive research on food consumption during the pandemic's early stages, limited analysis exists on food consumption patterns in 2021 and 2022. In particular, how did U.S. households adjust food purchasing patterns in light of historically high food price inflation? Inflation-adjusted food spending grew 6.4 percent between 2020 and 2021 with moderate food inflation (3.9 percent) but less than 0.5 percent between 2021 and 2022 with high food price inflation (9.9 percent) (USDA, ERS, 2024) (figure 1). Little is known about how these changes vary across socioeconomic groups.

Figure 1
Annual inflation-adjusted per capita food expenditures by U.S. households, by income and year



FAH = food at home. FAFH = food away from home. SNAP = Supplemental Nutrition Assistance Program.

Note: Nominal expenditures are deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. If a household reported income from SNAP, the household was placed in its own category, and the rest of the households were categorized into quantiles of income based on mean imputed income before taxes.

Source: USDA, Economic Research Service calculations based on the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

This report fills this gap by using the Consumer Expenditure Diary Survey from 2016 to 2022 to compare food purchasing behaviors in 2020, 2021, and 2022 with those from 2016 to 2019. Examining food expenditures at retail and foodservice establishments offers a nuanced understanding of shifts in household food shopping behaviors. Moreover, the detailed expenditure data align closely with the Dietary Guidelines for Americans, facilitating insights into dietary outcomes. Importantly, the large probabilistic sample of households allows for generalization to U.S. subpopulations, enabling a more thorough exploration of differences in food spending across socioeconomic groups.

Data

Timely data to investigate shifts in food consumption patterns since 2020 is sparse. Dietary intake data on food consumption would be ideal for examining changes in diet quality since 2020, but data have been unavailable until recently. Consequently, this report used the 2016–22 Diary portion of the Consumer

Expenditure Survey public-use microdata, which provides detailed household-level data on food purchases for four periods: 2016–19, 2020, 2021, and 2022. We chose these four periods as other studies found them to correlate with changes in food purchasing and diet quality induced by the pandemic (Conlin et al., 2024).

Following Okrent and Zeballos (2022), household food expenditures are categorized to closely align with the 2020–25 Dietary Guidelines for Americans (DGA) (USDA & U.S. Department of Health and Human Services, 2020). They classified household food expenditures at grocery stores and other food stores, referred to as food at home (FAH), into 12 groups that closely align with the *DGA* recommendations. These include grains; processed red meats; nonprocessed red meats; poultry, fish and seafood, eggs, and nuts; dairy products; fruits; vegetables (including beans and peas); oils; beverages; desserts; prepared meals and salads; and other FAH not elsewhere classified (e.g., savory snacks, sweeteners, etc.).

Due to the limited granularity of the Consumer Expenditure Survey, FAFH expenditures are categorized by the type of establishment rather than DGA recommendations: limited-service FAFH, full-service FAFH, and other FAFH. Limited-service FAFH includes food purchases at fast-food or take-out restaurants, concession stands, buffets, and cafeterias (other than the employer and school cafeterias). Full-service FAFH includes food purchases at sit-down restaurants. Other FAFH includes food purchases at school and employer cafeterias, vending machines, and mobile vendors. Even though we cannot classify FAFH according to the DGA recommendations, previous research highlights that (on average) FAFH is typically of lower diet quality and more caloric than FAH, and it contains more saturated fats and sodium and less calcium, iron, and fiber (Guthrie et al., 2018).

Noteworthy price fluctuations across food categories during the study period may have influenced household spending dynamics. For instance, beef and pork prices surged 12–25 percent, outpacing those of other foods, driving higher expenditures on protein foods in 2020 as well as shifts in quantities purchased (Dong et al., 2022). In contrast, during the price shocks of 2022, prices of beef, fruits, and vegetables grew less than the overall rate of inflation for FAH products, which could result in just the opposite (USDA, ERS, 2024). Therefore, to isolate quantity from price-induced changes in household spending, we deflated nominal household expenditures using the U.S. Department of Labor, Bureau of Labor Statistics regional Consumer Price Indexes (CPI) by categories: cereals and bakery products, dairy products, fruits and vegetables, nonalcoholic beverages, meats, other FAH, and FAFH. All inflation-adjusted household spending estimates were normalized by household size and presented on a per capita basis.

To gauge whether differences in spending were associated with socioeconomic status, we incorporated several variables to measure household income, household type, employment status, and demographic characteristics. Income was constructed as a combination of SNAP participation in the past year and reported gross income. Households reporting income from SNAP were placed into a separate category, and the rest of the households were categorized into quantiles of income based on mean imputed income before taxes.[1] Race and ethnicity of the household were based on the reference person and the spouse if the spouse is present: non-Hispanic White, non-Hispanic Black or African American, non-Hispanic Asian, and non-Hispanic Native American/Pacific Islander/multiracial. A binary variable categorized households as: married without children, married with children, single without children, single with children, and other household types. Additionally, variables for household size and average age of household heads were included. Two employment variables were constructed: one on whether the household included a person who was unemployed (and actively pursuing

[1] The lowest income quintile roughly aligns with households living at or below the poverty threshold for a given household size. Across all years in the analysis, 97–98 percent of households in the non-SNAP lowest income quintile were below the poverty threshold, and the remaining were in the second lowest income quintile. This number roughly aligns with SNAP income eligibility criteria, as a household is eligible to participate in SNAP if its monthly gross income is below 130 percent of the poverty line and its monthly net income is below 100 percent of the poverty line (Cho & Todd, 2018).

employment), and the other on whether the household worked in a white-collar or blue-collar occupation. Lastly, we considered a household's region of residence, urbanicity, and quarter of reported purchase.

The final data set included about 78,000 households that purchased food sometime during the sampling period; roughly 2,700 households were excluded due to missing information on region of residence (table 1). Across all time periods, the characteristics of the weighted population of households did not change, with some notable exceptions. The share of households with at least one person older than 65 years old increased between 2016–19 and 2020–22. In addition, the percentage of households that received SNAP increased, reflecting increased participation in SNAP in 2020 (Pew Research Center, 2023).

Table 1
Descriptive statistics of subpopulations in Consumer Expenditure (CE) Diary Survey, 2016–19, 2020, 2021, and 2022

		2016–19		2020		2021		2022	
	Unit	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Age	Years	50.6	0.10[abc]	51.9	0.15[ade]	51.5	0.11[bd]	51.4	0.17[ce]
Older than 65 years old	Percent	23.8	0.18[abc]	26.2	0.40[a]	26.1	0.31[b]	26.1	0.38[c]
Family size	Number	2.5	0.01[abc]	2.5	0.00[ade]	2.4	0.00[bdf]	2.4	0.00[cef]
Ethnicity and race									
Hispanic	Percent	12.5	0.51	13.0	0.47	12.9	0.45	13.4	0.38
Non-Hispanic White	Percent	64.1	0.71[c]	64.5	0.75[e]	63.4	0.66	62.6	0.73[ce]
Non-Hispanic Black	Percent	12.7	0.29	12.3	0.41[d]	13.2	0.40[d]	12.6	0.35
Non-Hispanic Asian	Percent	4.7	0.21[c]	5.0	0.39	4.9	0.40	5.6	0.39[c]
Non-Hispanic Native American/ Pacific Islander/Multiracial	Percent	6.0	0.24	5.3	0.51	5.6	0.40	5.9	0.43
Household composition									
Married without children	Percent	22.5	0.31	22.1	0.64	22.0	0.56	21.6	0.54
Married with children	Percent	22.7	0.33	22.0	0.69	22.2	0.55	22.6	0.63
Single without children	Percent	29.1	0.34[bc]	29.9	0.71	30.4	0.52[b]	30.7	0.65[c]
Single with children	Percent	5.4	0.21	5.3	0.45	5.3	0.30	4.8	0.35
Other household types	Percent	20.3	0.39	20.7	0.83	20.0	0.73	20.3	0.58
Received SNAP	Percent	9.3	0.28[bc]	9.8	0.59	10.5	0.60[b]	10.3	0.55[c]
Did not receive SNAP									
First income quartile	Percent	19.9	0.41	20.4	0.81	19.1	0.59	18.9	0.61
Second income quartile	Percent	22.8	0.37	23.9	0.86	23.0	0.53	22.9	0.70
Third income quartile	Percent	23.9	0.34	22.9	0.83	23.9	0.60	23.6	0.80
Fourth income quartile	Percent	24.0	0.44	22.9	0.73	23.5	0.55	24.3	0.81
Region									
Northeast	Percent	18.3	0.43[b]	17.7	0.42	17.2	0.46[b]	17.9	0.45
Midwest	Percent	20.1	1.05	20.8	0.94	20.8	0.90	20.4	0.98
West	Percent	39.3	0.91	39.8	0.91	39.7	0.99	39.7	0.82
South	Percent	22.3	1.21	21.8	1.05	22.3	1.26	22.0	1.00
Urban	Percent	93.2	0.76	93.7	0.89	93.5	1.07	94.0	0.78
White collar job	Percent	39.1	0.54	40.3	0.96	38.5	0.81	39.1	1.04

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		2016–19		2020		2021		2022	
	Unit	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Number of observations		43,086		10,383		11,821		12,386	
Number of observations eliminated		1,885		232		246		323	

S.E. = standard error. SNAP = Supplemental Nutrition Assistance Program.

Note: Consumer Expenditure Diary Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors. Nominal expenditures were deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. [a] if the difference between 2016–19 and 2020 was statistically different from 0,[b] if the difference between 2016–19 and 2021 was statistically different from 0, [c] if the difference between 2016–19 and 2022 was statistically different from 0, [d] if the difference between 2020 and 2021 was statistically different from 0, [e] if the difference between 2020 and 2022 was statistically different from 0, and [f] if the difference between 2021 and 2022 was statistically different from 0.

Source: USDA, Economic Resource Service calculations using data from the U.S. Department of Labor, Bureau of Labor Statistics, 2016–22 Consumer Expenditure Diary Survey public-use microdata.

Methods

We used a two-part regression model (sometimes referred to as a double hurdle) (Cragg, 1971) to estimate the relationship between inflation-adjusted spending for each FAH and FAFH category and year while controlling for socioeconomic factors. The choice of the regression model was driven by the Consumer Expenditure Survey Diary sample having a high prevalence of zeros. Using ordinary least squares to estimate these relationships with data that have a high prevalence of zero observations can result in inconsistent and biased estimates.

The two-part regression model estimates the decision to purchase an item and the amount purchased conditional on purchasing separately. The purchase decision was modeled using a probit model (part one), and the amount purchased (conditional on a positive purchase decision) was modeled using a generalized linear model (GLM) (part two). The GLM accommodates various distribution families and link functions to address skewness and heteroskedasticity in the data.[2] Specification tests showed that the GLM best fits the Consumer Expenditure Diary data with a log-link function and gamma distribution (see appendix A for more details). Interactions between the years and socioeconomic covariates were also included to gauge whether food purchasing behaviors varied across time and socioeconomic groups. The final two-part model included indicators for the years, the socioeconomic covariates described in the data section, and interactions between the years, and all of the socioeconomic covariates. The same two-part modeling approach was applied separately to the 12 FAH equations and the 3 FAFH categories.

Parameter estimates from the two-part model were not directly interpretable, so we focused on the marginal effects of the different years, socioeconomic covariates, and their interactions on spending for each food category (see appendix A for more detail). We evaluated the marginal effects at the mean of data. The marginal effects of the socioeconomic covariates and the interactions between them and year were relative to an omitted base group, including the 2016–19 time period, those who received SNAP benefits, Hispanic, married without children, rural, northeast, employed, blue collar job, and first quarter. Throughout this analysis, the "marginal effect" refers to an association between food spending and a covariate of interest, and estimates should not be construed as causal.

[2] In this analysis, heteroskedasticity occurs when the error term from a linear regression of inflation-adjusted spending on a food category on the covariates is nonconstant. This happens when the error term, which captures unobserved variability in the model, is correlated with one or more of the covariates. For example, preferences for saving time in food preparation drive some of the unobserved variation in food choices across households and are captured in the error term but may also be correlated with the covariate of income, included as a covariate in the model.

Results

This section presents estimates of the marginal effects of time, socioeconomic characteristics of households, and interactions between time and socioeconomic characteristics for 12 FAH and 3 FAFH categories.

Overall Changes in Food Spending Over Time

The likelihood of food purchasing (part one, probit model) and the amount spent on foods conditional on a positive purchase (part two, GLM model) differed across food categories and time periods. Since 2020, households maintained their likelihood of purchasing from FAH establishments compared to the base period, 2016–19 (shown by small and statistically insignificant coefficients on the year variables in the probit model of FAH) (table 2). Inflation-adjusted spending on FAH increased for those purchasing FAH over most of these years (compared to 2016–19 levels) (shown by the positive and statistically significant coefficients on the 2021 and 2022 variables in the GLM model of FAH) (table 2, table C.1). In contrast, households decreased their likelihood of purchasing from FAFH establishments between 2016–19 and 2022, but conditional spending on FAFH stayed the same, suggesting that the decline in FAFH spending was likely driven by fewer households purchasing any FAFH (table 3, table C.2). These findings are consistent with other data sets (Marchesi & McLaughlin, 2022).

Table 2
Estimated coefficients and marginal effects of year relative to prepandemic period (2016–19) from two-part model of U.S. inflation-adjusted FAH spending per capita

	Year	Probit (first part)	GLM (second part)	Marginal effect on real spending	Percentage change in spending compared to 2016–19
FAH	2020	0.28	-0.11	225.71***	4.33***
		(0.210)	(0.170)	(63.241)	(1.21)
	2021	0.01	0.40***	331.72***	6.37***
		(0.171)	(0.127)	(61.390)	(1.18)
	2022	0.05	0.31**	201.57***	3.87***
		(0.202)	(0.116)	(35.259)	(0.68)
Grains	2020	0.07	0.09	30.42***	6.06***
		(0.180)	(0.166)	(6.162)	(1.23)
	2021	-0.05	0.51***	38.58***	7.69***
		(0.179)	(0.142)	(7.679)	(1.53)
	2022	-0.08	0.31**	14.34***	2.86***
		(0.145)	(0.130)	(5.297)	(1.06)
	Year	**Probit (first part)**	**GLM (second part)**	**Marginal effect on real spending**	**Percentage change in spending compared to 2016–19**
Processed red meat	2020	-0.27	0.11	13.30**	4.7***
		(0.184)	(0.178)	(5.480)	(1.94)
	2021	-0.01	0.29*	18.62***	6.58***
		(0.151)	(0.169)	(5.804)	(2.05)
	2022	0.01	0.15	8.85**	3.13**
		(0.142)	(0.282)	(4.188)	(1.48)

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	Year	Probit (first part)	GLM (second part)	Marginal effect on real spending	Percentage change in spending compared to 2016–19
Nonprocessed red meat	2020	-0.45**	0.16	15.09	3.56
		(0.198)	(0.282)	(9.162)	(2.16)
	2021	-0.03	0.37	9.49	2.24
		(0.146)	(0.222)	(8.462)	(1.99)
	2022	0.27*	0.16	3.14	0.74
		(0.156)	(0.341)	(8.867)	(2.09)
Poultry, fish and seafood, and eggs	2020	-0.13	-0.17	7.19	1.47
		(0.210)	(0.209)	(6.733)	(1.37)
	2021	0.05	0.13	10.89	2.22
		(0.147)	(0.178)	(6.610)	(1.35)
	2022	0.15	0.09	2.69	0.55
		(0.140)	(0.142)	(6.739)	(1.37)
Dairy	2020	-0.02	0.25	3.31	0.9
		(0.180)	(0.154)	(4.202)	(1.15)
	2021	-0.08	0.32***	7.54*	2.06*
		(0.148)	(0.115)	(4.446)	(1.21)
	2022	0.03	0.23*	4.78	1.3
		(0.143)	(0.123)	(3.035)	(0.83)
Fruits	2020	0.03	-0.12	17.80**	4.19***
		(0.168)	(0.208)	(7.462)	(1.76)
	2021	0.02	0.29*	29.34***	6.91***
		(0.152)	(0.165)	(6.625)	(1.56)
	2022	0.22	0.31*	16.23***	3.82***
		(0.179)	(0.154)	(4.648)	(1.09)
Vegetables	2020	-0.13	-0.19	34.71***	7.21***
		(0.187)	(0.203)	(8.688)	(1.8)
	2021	0.02	0.26*	38.18***	7.93***
		(0.146)	(0.136)	(6.304)	(1.31)
	2022	0.16	0.19	25.04***	5.2***
		(0.174)	(0.155)	(7.083)	(1.47)
Fats and oils	2020	0.04	-0.16	1.77	1.32
		(0.179)	(0.171)	(2.738)	(2.04)
	2021	-0.18	0.42**	1.90	1.42
		(0.190)	(0.177)	(2.563)	(1.91)
	2022	0.02	0.08	-0.55	-0.41
		(0.152)	(0.227)	(2.300)	(1.71)
Beverages	2020	-0.07	-0.27	12.91	2.09*
		(0.170)	(0.203)	(7.787)	(1.26)
	2021	-0.01	0.34**	42.43***	6.87***
		(0.131)	(0.136)	(8.525)	(1.38)
	2022	0.08	0.20	32.41***	5.25***
		(0.184)	(0.177)	(6.901)	(1.12)

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	Year	Probit (first part)	GLM (second part)	Marginal effect on real spending	Percentage change in spending compared to 2016–19
Desserts	2020	0.26	0.26	7.91	2.09
		(0.172)	(0.262)	(7.044)	(1.86)
	2021	0.07	0.65***	25.79***	6.8***
		(0.145)	(0.196)	(6.633)	(1.75)
	2022	0.30*	-0.02	15.03***	3.96***
		(0.160)	(0.165)	(5.037)	(1.33)
Prepared meals	2020	0.11	-0.01	29.39***	5.52***
		(0.189)	(0.148)	(8.145)	(1.53)
	2021	0.07	0.57***	58.26***	10.94***
		(0.157)	(0.171)	(9.541)	(1.79)
	2022	0.26*	0.37**	34.50***	6.48***
		(0.137)	(0.143)	(7.089)	(1.33)
Other FAH not elsewhere classified	2020	0.33*	-0.12	39.15***	6.62***
		(0.169)	(0.183)	(9.002)	(1.52)
	2021	0.02	0.33**	51.16***	8.65***
		(0.161)	(0.156)	(8.529)	(1.44)
	2022	0.15	0.21	38.69***	6.54***
		(0.187)	(0.154)	(6.898)	(1.17)

FAH= food at home. GLM = generalized linear model.

Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. Two-part models also include socioeconomic covariates and interactions between the years and these covariates, which were omitted from this table for presentation; marginal effects of these control variables are presented in table C.1. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures were deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year.

Source: USDA, Economic Research Service calculations based on the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Table 3

Estimated coefficients and marginal effects of year relative to prepandemic period (2016–19) from two-part model of U.S. inflation-adjusted FAFH spending per capita

	Year	Probit (first part)	GLM (second part)	Marginal effect on real spending	Percentage change in spending compared to 2016–19
FAFH	2020	-0.13	-0.07	-523.74***	-14.78***
		(0.202)	(0.244)	(35.505)	(1.00)
	2021	-0.21	0.09	-348.67***	-9.84***
		(0.214)	(0.187)	(36.444)	(1.03)
	2022	-0.54***	-0.12	-302.85***	-8.55***
		(0.194)	(0.178)	(29.202)	(0.82)
Limited-service FAFH	2020	-0.20	-0.07	-111.04***	-7.01***
		(0.201)	(0.254)	(19.168)	(1.21)
	2021	-0.15	0.20	-85.95***	-5.43***
		(0.226)	(0.194)	(22.104)	(1.40)
	2022	-0.51***	-0.15	-68.77***	-4.34***
		(0.186)	(0.189)	(16.778)	(1.06)
Full-service FAFH	2020	-0.31*	0.22	-364.90***	-20.15***
		(0.181)	(0.310)	(27.850)	(1.54)
	2021	-0.31	0.20	-213.66***	-11.8***
		(0.186)	(0.225)	(22.935)	(1.27)
	2022	-0.52**	0.32	-191.91***	-10.6***
		(0.203)	(0.225)	(23.205)	(1.28)
Other FAFH	2020	-0.28	3.20***	-42.57***	-28.69***
		(0.275)	(0.975)	(5.811)	(3.92)
	2021	-1.19***	1.04	-47.66***	-32.12***
		(0.312)	(0.888)	(4.236)	(2.85)
	2022	-0.81**	0.30	-37.68***	-25.39***
		(0.286)	(0.781)	(3.115)	(2.10)

FAFH = food away from home. GLM = generalized linear model.

Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. Two-part models also include socioeconomic covariates and interactions between year and these covariates, which were omitted from this table for presentation; marginal effects of these control variables are presented in table C.2. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures were deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year.

Source: USDA, Economic Research Service calculations based on the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Based on the probit and GLM models, the marginal effects on the year variables indicate that in 2021, FAFH spending continued to be lower than 2016–19 levels by 10 percent but has rebounded since 2020 (15 percent less than 2016–19). FAH spending continued to be higher than 2016–19 levels and increased between 2020 and 2021. Despite some movement toward 2016–19 spending levels for both FAH and FAFH in 2022, food spending behaviors had not fully reverted to 2016–19 levels.

The inertia in FAFH spending to prepandemic levels was due to decreased spending at full-service restaurants and other FAFH establishments (table 3, table C.2). Compared to 2016–19, spending at full-service restaurants declined by 20 percent in 2020 and by 29 percent for other FAFH. Although full-service restaurant spending partially rebounded in 2021 and 2022, spending remained 10–12 percent below 2016–19 levels. Spending on limited-service restaurants also declined 7 percent in 2020 but recovered to 4 percent below

2016–19 levels by 2022 (table 3, table C.1). Overall, the decline in FAFH spending was driven primarily by full service and all other types of FAFH establishments, with spending across all FAFH categories failing to fully recover to 2016–19 levels by 2022. Spending on other FAFH continued to lag significantly, remaining 25 percent below that of 2016–19 levels in 2022. By 2022, the number of people teleworking and doing remote work continued to be well above the 2016–19 rates. This partially explains the slow recovery of other FAFH—as this category consists of food purchased at employee sites, vending machines, and mobile vendors (Jones, 2024).

The shift to FAH in 2020 did not uniformly affect the categories within FAH (table 2, table C.1). On the one hand, 2020 had little to no association with spending on dairy, fats and oils, poultry, eggs, fish and seafood, beverages, and desserts. On the other hand, spending during 2020 was higher than 2016–19 levels for vegetables (7 percent), other FAH not elsewhere classified (7 percent), grains (6 percent), and prepared meals (6 percent). Many of these associations were sustained in 2021, especially for grains (8 percent above 2016–19 spending), processed red meats (7 percent), and vegetables (8 percent), while some associations were strengthened, especially for fruit (7 percent), beverages (7 percent), desserts (7 percent), and prepared meals (11 percent). In 2022, spending in many of these FAH categories began to move toward 2016–19 levels. However, spending on prepared meals was still well above 2016–19 levels (6 percent above 2016–19 spending), other FAH not elsewhere classified (7 percent), beverages (5 percent), and vegetables (5 percent).

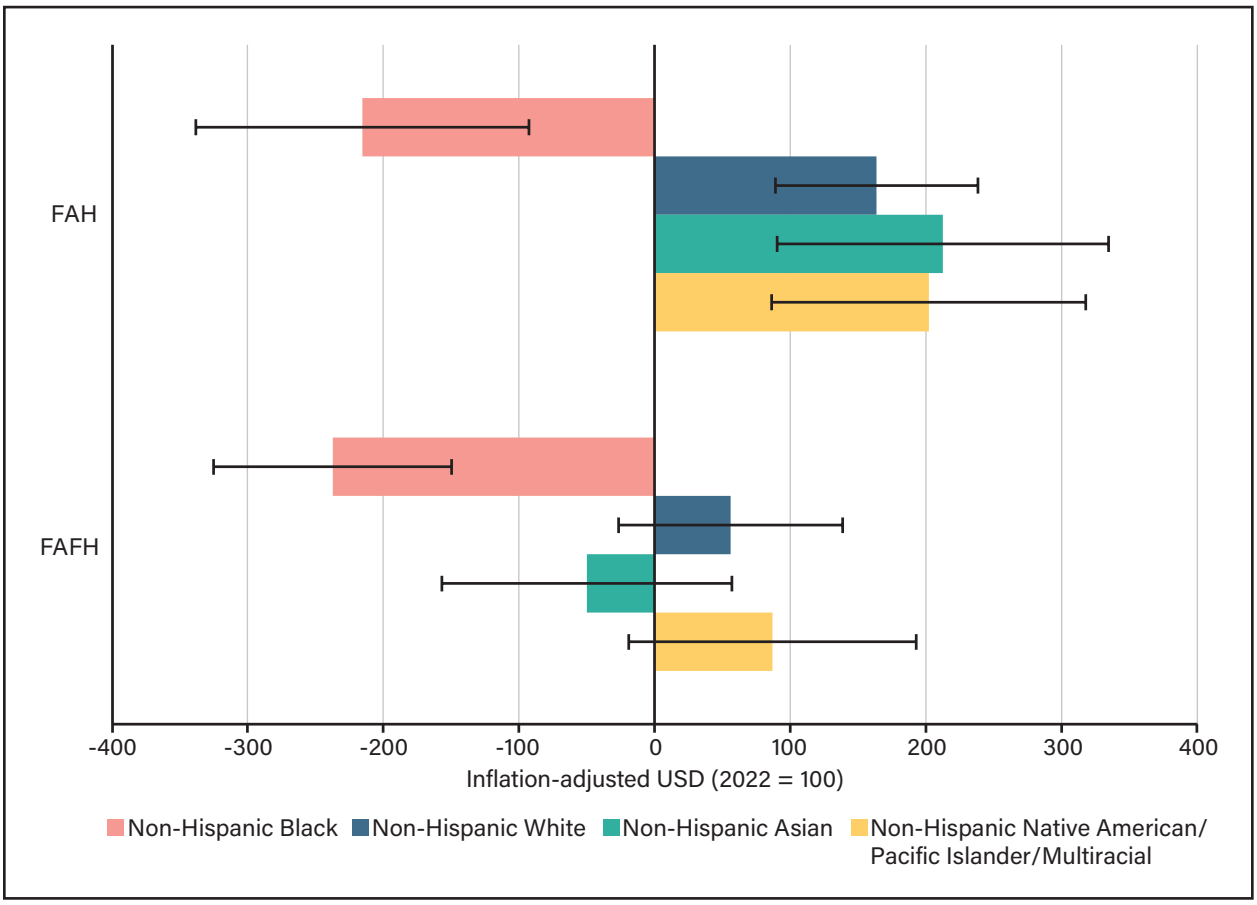
The Association of Household Socioeconomic Status on Food Spending Across All Years

Regardless of year, household income and SNAP participation influenced food spending. Compared to SNAP households (base group), non-SNAP households in the first income quartile spent $209 less per capita on FAH, whereas there was no statistical difference in FAH spending between SNAP and non-SNAP households in the second income quartile (table C.1). Not surprisingly, all non-SNAP households spent more on FAFH ($157 to $1,548 per capita) compared to SNAP households (table C.2). This reflects the discretionary income available to higher income households for more expensive prepared foods at foodservice establishments (Todd & Scharadin, 2016; Tiehen et al., 2017; Mancino et al., 2018).

Independent of income and other covariates, the racial and ethnic composition of the household was also predictive of FAH spending but less so for FAFH. Compared to Hispanic households (base), non-Hispanic White, non-Hispanic Asian, and non-Hispanic Native American/Pacific Islander/multiracial households spent more on FAH (between $164 and $212 more per capita per year). In contrast, non-Hispanic Black households spent $215 less on FAH than Hispanic households. Similarly, non-Hispanic Black households spent considerably less on FAFH as well ($237 per capita), whereas all the non-Hispanic Native American/Pacific Islander/multiracial household heads spent about the same amount (figure 2).

Figure 2

Marginal effect of race and ethnicity on U.S. inflation-adjusted spending per capita for 2016–22, by FAH and FAFH



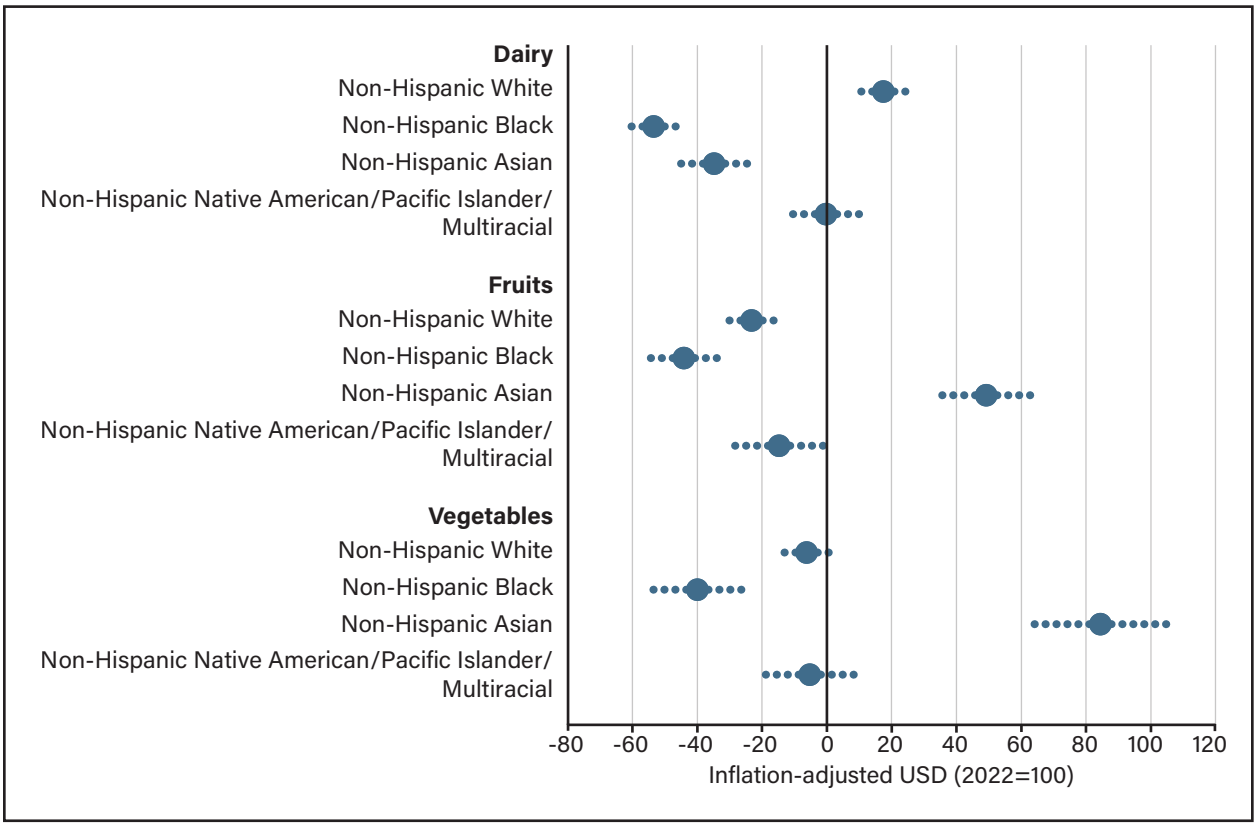
FAH = food at home. FAFH = food away from home.

Note: Hispanic households were the base comparison group for interpretation of the marginal effects. Nominal expenditures were deflated by regional Consumer Price Indexes for the different food categories. Error bars represent 95-percent confidence intervals. See tables C.1 and C.2.

Source: USDA, Economic Research Service calculations based on the two-part model using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Certain socioeconomic characteristics were consistently associated with increased consumption of foods recommended in the Dietary Guidelines for Americans (figure 3, table C.1). Independent of income and other covariates, non-Hispanic Asian households spent more on fruits, vegetables, poultry, fish and seafood, and eggs, and less on processed red meats and beverages than non-Hispanic White, Black, and Native American/Pacific Islander/multiracial households. In addition, they spent about the same as Hispanic households on desserts but more than Hispanic households on prepared meals ($16 more per capita per year) and other FAH not elsewhere classified ($26 more per capita per year). In contrast, non-Hispanic Black households spent comparatively less on fruits and vegetables per capita per year than non-Hispanic White, Asian and Native American/Pacific Islander/multiracial households, whereas non-Hispanic White and non-Hispanic Native American/Pacific Islander/multiracial households spent more on processed meats, desserts, prepared meals, and other FAH not elsewhere classified than Hispanic and non-Hispanic Asian and Black households. Urban households also spent more on healthier food categories compared to their rural counterparts.

Figure 3
Marginal effects of race and ethnicity on U.S. inflation-adjusted food spending per capita for 2016–22 and select FAH categories



Note: Hispanic households were the base comparison group for interpretation of the marginal effects. Dotted lines are 95-percent confidence intervals. Nominal expenditures were deflated by regional Consumer Price Indexes for the different food categories. See table C.1.

Source: USDA, Economic Research Service calculations based on the two-part model using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

In contrast, the distribution of FAFH spending across categories within FAFH was roughly the same across race and ethnicity, with some exceptions (table C.2). Non-Hispanic Black households spent $237 less per capita on total FAFH driven by reduced spending at full-service restaurants. In particular, non-Hispanic Black households spent $210 less on full-service restaurants compared to Hispanic and Non-Hispanic White,

Asian, and Native American/Pacific Islander and multiracial households, whereas spending on limited-service restaurants and other FAFH was about the same across most households. Spending on limited-service restaurants by non-Hispanic Asian households was $116 less than Hispanic and non-Hispanic White, Black, and Native American/Pacific Islander/multiracial households.

Household structure and size also affected food spending over the entire sample period (tables C.1 and C.2). In particular, an additional household member was associated with a $289 reduction in FAH spending per capita and a $276 reduction in FAFH per capita. Similarly, households with children and other households (which include multigenerational households) spent considerably less on both FAH and FAFH per capita compared to households without children (single and married (base)). This result may be due to larger households purchasing more economical packages (i.e., items at bulk discounts and value sizes) or having younger children who tend to eat less (Kumcu & Kaufman, 2011).

Seasonal patterns were observed in FAH spending but not for FAFH (tables C.1 and C.2). In particular, spending on fruits tended to be higher in the spring ($20 more per capita) and summer months ($20) compared to fall (-$6) and winter months (base), whereas vegetable consumption was unaffected by the seasons. Given expanded trade and increased accessibility of fresh fruits and vegetables throughout the year (Davis & Lucier, 2021; Kramer, 2021), the seasonality in fruit consumption may indicate consumers prefer to eat seasonal fruit produced within the United States. Compared to other seasons, households tended to spend more in the fall season (fourth quarter) on desserts ($17 more per capita) and other FAH not elsewhere classified ($22), coinciding with major holidays (Halloween, Thanksgiving, and Christmas).

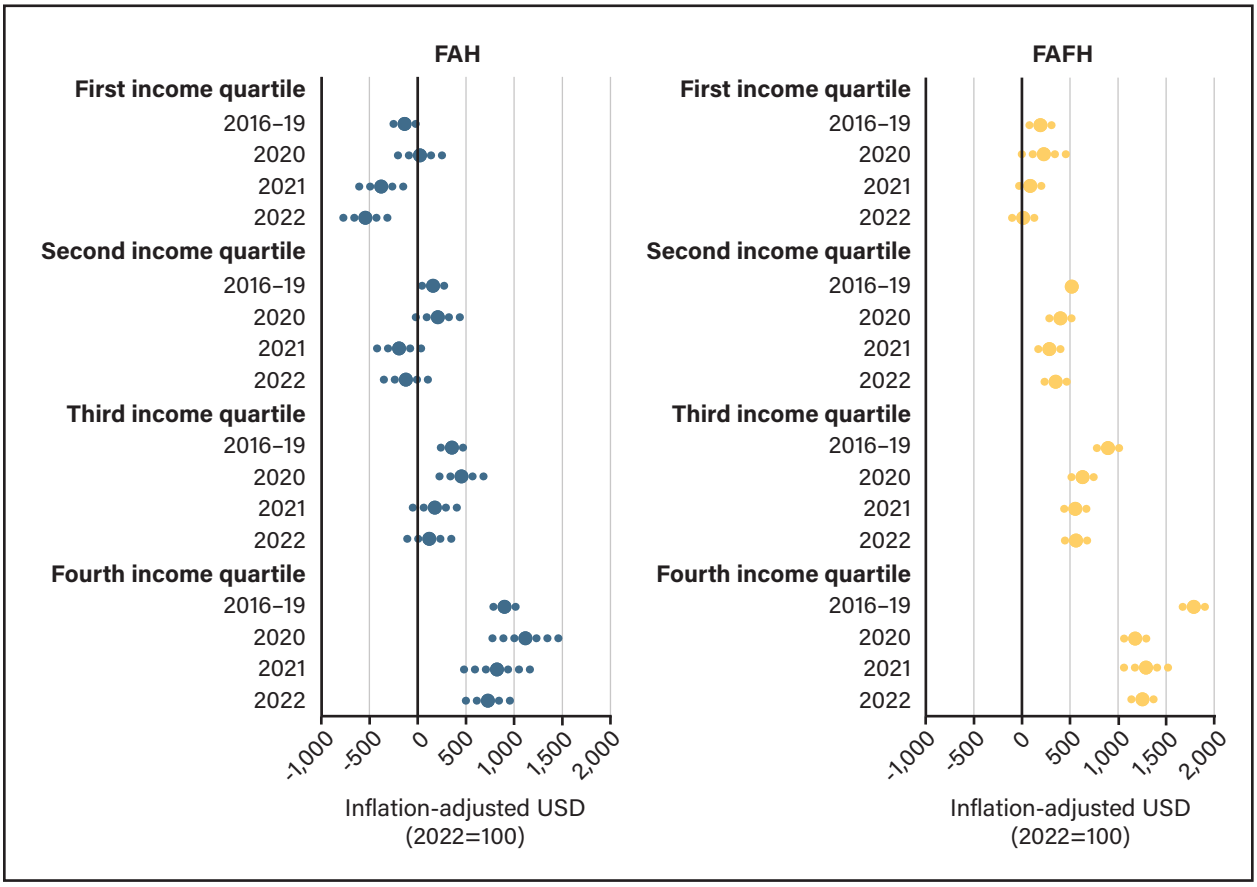
Regional differences also existed across FAH and FAFH (tables C.1 and C.2). Spending across most of the FAH categories in the western United States was roughly equivalent to that in the Northeast (base), with some notable exceptions. Households in the West spent considerably more on fruits ($17 more per capita) and prepared meals ($57) than those in the Northeast, South, and Midwest. No differences in spending were found for nonprocessed red meats across regions, but spending on processed red meats was lower in the Midwest, South, and West compared to the Northeast. Households in the Midwest and South also spent considerably less on poultry, seafood, and eggs compared to the Northeast. Households in the West spent notably more on FAFH than households in the Northeast, Midwest, and South ($182 per capita per year), led mostly by spending at limited-service restaurants ($134 per capita).

Differential Changes in Food Spending Over Time and by Socioeconomic Groups

Controlling for all other socioeconomic covariates, the marginal effect of 2021 and 2022 on food spending differed across household income and SNAP participation (see table C.3). Non-SNAP households in the lowest income quartile spent less ($137 per capita in 2016–19) or about the same ($24 per capita in 2020) on FAH as SNAP households, but these differences widened in 2021 ($379 per capita) and 2022 ($544 per capita) (figure 4). The difference between SNAP and low-income non-SNAP households on FAH spending in 2022 occurred across most FAH categories, except for nonprocessed red meats and fats and oils. This difference is consistent with the trends seen in figure 1 for FAH between SNAP and non-SNAP households in the lowest income quartile.

Figure 4

Marginal effects of the years on inflation-adjusted food spending for non-SNAP households, by income quartile



SNAP = Supplemental Nutrition Assistance Program. Non-SNAP = households that do not receive SNAP benefits. FAH = food at home. FAFH = food away from home. USD = U.S. dollars.

Note: If a household reported income from SNAP, the household was placed in its own category, and the rest of the households were categorized into quantiles of income based on mean imputed income before taxes. SNAP households were the base comparison group for interpretation of the marginal effects. Dotted lines are 95-percent confidence intervals. See tables C.3 and C.4.

Source: USDA, Economic Research Service calculations based on the two-part model using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Spending on FAFH changed the most in 2020 for the highest income non-SNAP households (table C.4). Compared to SNAP households, all non-SNAP households spent more on FAFH in the 2016–19 phase: $195 more for households in the lowest income quartile and $1,789 more for households in the highest income quartile. Although FAFH spending declined modestly (albeit mostly statistically insignificant) for all the non-SNAP households relative to SNAP households in 2020, the FAFH spending by the highest income households declined the most (52 percent) from $1,789 to $1,178. This relative decline in FAFH spending among the highest income households was maintained over 2021 and 2022.

In contrast to income and SNAP participation, little evidence was found that food spending changes in 2020 differed by race and ethnicity (tables C.3 and C.4). The marginal effects of race and ethnicity on food spending were mostly stable across the years, with some exceptions. Non-Hispanic Native American/Pacific Islander/multiracial households spent more on FAH in 2020 ($645 per capita) and 2022 ($345 per capita) compared to Hispanic households, which is driven by shifts into desserts, prepared meals and snacks, and other FAH not elsewhere classified. The marginal effects of the years on food spending (overall and across food categories) were also stable across household structure, urban/rural, Census region, age, employment, and quarter.

Implications for U.S. Diet Quality

Despite these shifts, it remains unclear whether the transition away from less healthy FAFH to FAH of mixed healthfulness contributed significantly to increased body weight and the prevalence of obesity during this period (Ehmke & Restrepo, 2023). To gain insight into this, we applied the estimated changes in spending for the FAH and FAFH categories to food intake data from the 2017–March 2020 National Health and Examination Survey. In the spirit of Diewert (International Monetary Fund, 2004), the estimated changes in spending attributable in each year can be interpreted as changes in quantity indexes. We developed rough calculations of how the change in consumption between 2016−19 and 202 2 affected the energy and nutrient intake.

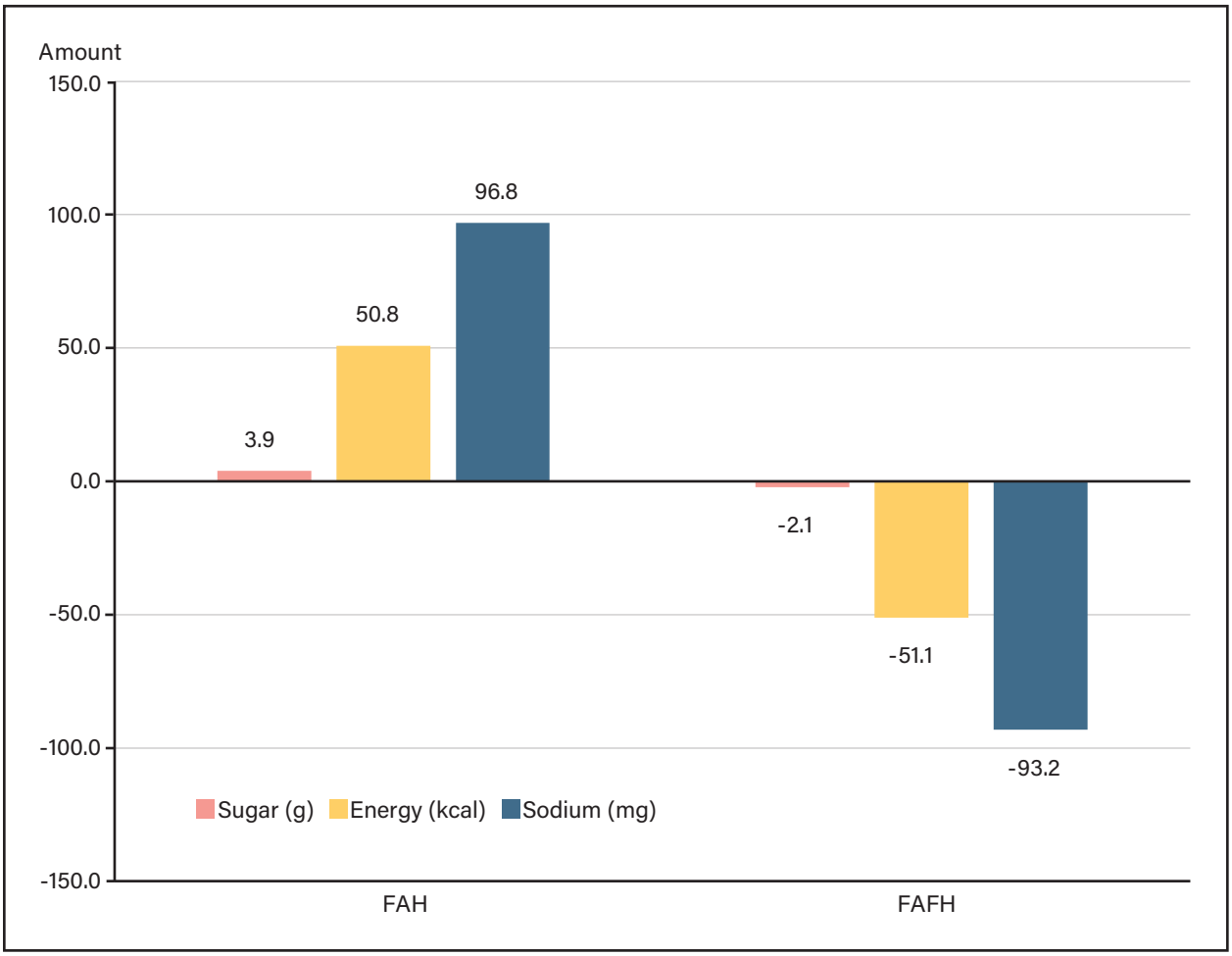
Because the nutritional composition of the 12 FAH and 3 FAFH categories in the Consumer Expenditure Diary is unknown, we used the average energy and nutrient composition of similar food categories based on the 2016−March 2020 National Health and Nutrition Examination Survey. This process is done by first estimating the average daily calorie intake, grams of saturated fat, sugar, protein and dietary fiber, and milligrams of calcium and sodium for those 2 years of age and above for the food categories. We then applied the estimated marginal effect of 2022 on the quantity index for each food (in percent changes and presented in tables 2 and 3) to the 2016–19 average grams consumed and associated energy and nutrient content of the corresponding food. This process resulted in predicted changes in average energy and nutrient intake associated with 2022. Appendix B gives more details about this method.

These calculations assume that the average nutrient and energy composition of the FAH and FAFH categories in 2022 is similar to that of 2016–19. Changes in energy and nutrient intake are driven exclusively by changes in quantities consumed of each food category, holding the nutrient composition of each food category constant in 2016–19 values. Hence, within-category changes in nutrient composition post-2019 are not captured, which is a limitation of using this type of method and purchase data like the Consumer Expenditure Diary.

The calculations suggest minimal changes in energy and nutrient composition in 2022 compared to 2016–19 levels. Although energy intake from FAFH was below the 2016–19 level in 2022, it was almost completely offset by increased energy intake from FAH—in particular, other FAH not elsewhere classified, prepared meals, and fruits (figure 5). Overall, changes in energy, saturated fat, and protein in 2022 were lower than what they were in 2016–19 (figure 6). In contrast, elevated sugar consumption from FAH in 2022 (compared

to 2016–19 levels) outpaced lowered sugar consumption from FAFH. This result led to an overall 1.6-percent increase in sugar consumption (1.7 grams or ½ teaspoon of sugar) in 2022 compared to 2016–19. Although we noted some small differences in energy and nutrient consumption in 2022, the differences remained minimal. This finding is consistent with a recent study that found little overall change in diet quality for retail food purchases made by loyalty card holders at a U.S. supermarket chain by 2021 (Conlin et al., 2024).

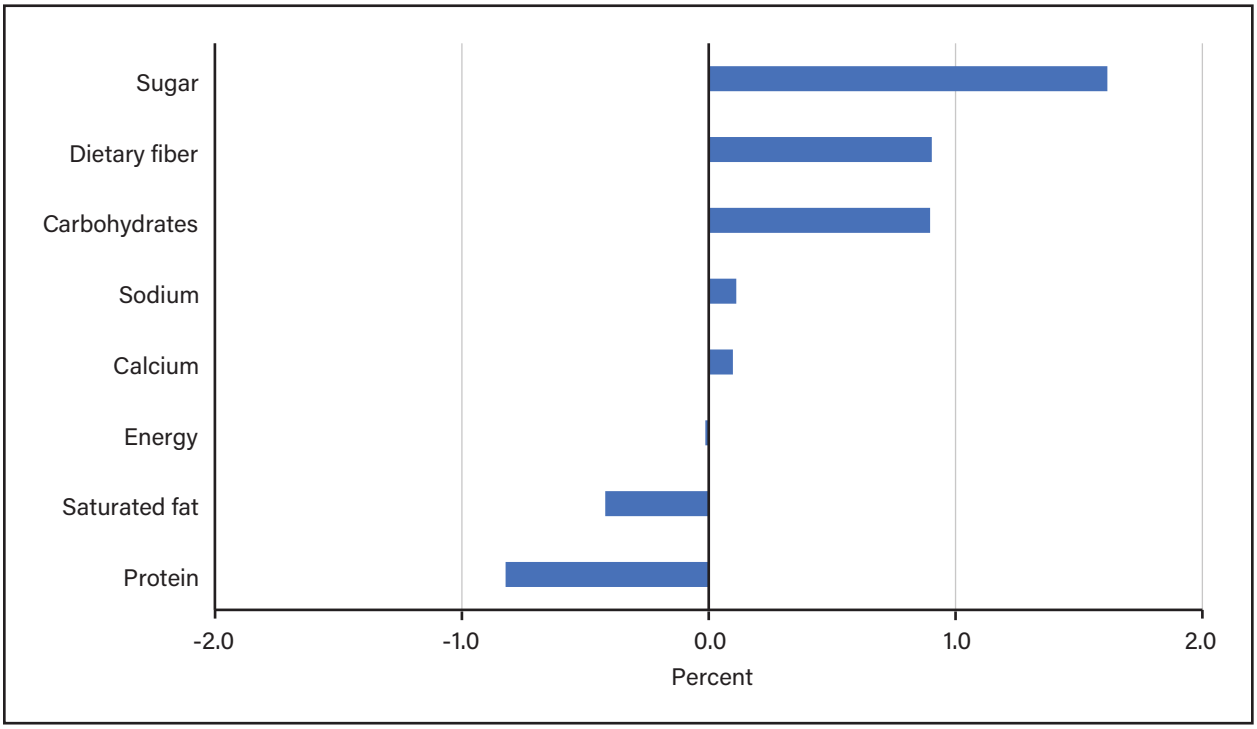
Figure 5
Predicted changes in daily calorie intake and select nutrients between 2016–19 and 2022 for individuals aged 2 and above, by FAH and FAFH



FAH = food at home. FAFH = food away from home. g = grams. mg = milligrams. kcal=kilocalories.

Source: USDA, Economic Research Service calculations based on estimated marginal effects in tables 2 and 3 and average daily intakes by individuals calculated from the 2017–March 2020 National Health and Nutrition Examination Survey (see appendix B for more details).

Figure 6
Predicted percentage change in overall daily calorie intake and select nutrients between 2016–19 and 2022 for individuals aged 2 and above



Source: USDA, Economic Research Service calculations based on estimated marginal effects in tables 2 and 3 and average daily intakes by individuals calculated from the 2017–March 2020 National Health and Nutrition Examination Survey (see appendix B for more details).

Discussion

The shifts in food spending by U.S. households in 2020–22 have raised questions about their lasting impact on diets. Existing studies presented mixed evidence regarding the effect of these changes on food consumption patterns, primarily focusing on 2020. While some studies indicated unhealthy shifts, others reported healthier trends, such as increased consumption of fruits and vegetables and reduced reliance on FAFH. Using a large probability sample of the Consumer Expenditure Survey, this analysis echoes many of these mixed results during 2021 and 2022.

Some shifts observed in 2020 in food purchasing shrunk but did not fully disappear in 2022. Previous research showed that shifts in food spending patterns during the Great Recession lasted up to 5 years after the recession concluded (Cho & Todd, 2018). Even though the magnitude of the shifts in food spending in 2020 was larger than those associated with the Great Recession, the return to consumption patterns before the shock appeared to be faster. This finding could be due to a larger Government stimulus during the COVID-19 pandemic compared to the Great Recession, spurring consumer demand after lockdowns. It may also be associated with the vaccine rollouts, which reduced the risk of contracting COVID-19 and eased fears of shopping in person at grocery stores or going to restaurants (Conlin et al., 2024). Some argued that the surge in spending in 2022 was "revenge spending," where those who could not spend money on travel, dining out, or shopping at the same scale as before the outbreak responded with aggressive spending when the opportunities emerged (Park et al., 2022). However, this analysis found little evidence supporting this claim, particularly concerning FAFH in 2022.

After a precipitous drop in 2020, visits to and inflation-adjusted spending at all types of FAFH establishments (e.g., full- and limited-service restaurants and other FAFH) grew through 2022 but did not fully recover. The reduction in FAFH could potentially lead to improvements in diet quality. Before the pandemic, FAFH contributed nearly a third of the average daily calorie intake for U.S. consumers but tended to be lower in several under consumed nutrients and foods (fiber, calcium, iron, fruits, dairy, whole grains, nuts, seeds, and soy products) but higher in nutrients and foods that are overconsumed (saturated fats, sodium, and refined grains) (Lin et al., 2023). Also, FAFH meals were of lower diet quality, as measured by the Healthy Eating Index and the American Heart Association diet score (Lin et al., 2023; Liu et al., 2020; Todd et al., 2010).

However, once accounting for substitution from FAFH and into FAH, which is heterogenous in terms of nutritional quality, the dietary implications are less clear. Because the Consumer Expenditure Diary Survey does not contain sufficient information to explicitly assess the dietary impacts of substitution between FAFH and FAH, rough estimates of changes in energy and nutrient intake based on changes in food purchasing behaviors are made, assuming constant average energy and nutrient composition of the food categories across the study period. These rough estimates indicated little to no change in energy and nutrient consumption between 2016–19 and 2022. This finding was largely due to declines in nutritional intake from FAFH being offset by its FAH counterparts, a finding similarly argued by Lusk and McFadden (2021). Although these rough estimates do not account for potential changes in energy and nutrient composition within the food categories across the study period (e.g., consumers choosing less healthy or more healthy prepared meals and salads), they demonstrate the importance of considering both FAH and FAFH when analyzing pandemic-related changes in diet quality.

Notably, spending on fruits and vegetables from retail establishments increased during all years compared to 2016–19. Given that vegetable and fruit consumption has largely been flat over the past few decades and well below DGA recommendations overall, such a shift in spending could lead to better adherence to DGA recommendations (Lin et al., 2023). However, it's crucial to recognize that full-service restaurants and schools were major sources of vegetable and fruit consumption before 2020 (Lin et al., 2023). Thus, the shift away from these sources may partially explain the significant increase in spending on fruits and vegetables from retail stores.

Not unexpectedly, we also found substantial increases in spending on prepared foods (meals and salads), desserts, and other FAH not elsewhere classified (including snacks, sweets, and sweeteners) across all years since 2020 compared to 2016–19. These foods, which are largely considered "convenience foods" (ready to cook and ready to eat), are often high in saturated fats, sugar, and sodium, and highly substitutable for FAFH (Okrent & Kumcu, 2016), highlighting potential nutritional concerns (Poti et al., 2015; Petimar et al., 2023).

Food spending varied among some socioeconomic groups but remained stable with other groups. We found evidence that differences in food spending increased overall in 2020 and across food categories between SNAP and non-SNAP households within the lowest income quartile. However, other socioeconomic groups were not found to be differentially changed by the year. This finding contrasts with some of the existing literature that found differential responses in food spending across race and ethnicity, age, residency, household structure, and household size (Chenerides et al., 2021; Miller et al., 2021; Park et al., 2022; Conlin et al., 2024). Differences in sample design (i.e., probability versus nonprobability samples), sample administration (i.e., United States versus specific geographic area), and what type of questions were asked on the surveys (i.e., all foods versus a selection of foods) may account for these differences.

Despite the year, differences in food spending patterns were observed across income groups, although pandemic-related food assistance payments seem to have mitigated some of these differences. In 2016–19, spending by SNAP households and non-SNAP households in the first income quartile was comparable. Previous studies based on FoodAPS, a 2012 sample of households that oversamples the SNAP population, generally found income-eligible SNAP nonparticipants spent about the same or slightly more on FAH

compared to SNAP participants (Todd & Scharadin, 2016; Tiehen et al., 2017; Mancino et al., 2018). However, during 2021 and 2022, food spending increased for SNAP households, while spending either stagnated or declined for non-SNAP households in the first income quartile. Furthermore, in 2022, food spending decreased for all non-SNAP households, reflecting reduced purchasing power due to unprecedented food price inflation. Consequently, non-SNAP households in the first income quartile spent less on most FAH items (excluding fruits, vegetables, and grains) compared to SNAP households throughout the study period.

Increased benefits from the Federal Pandemic Electronic Benefit Transfer program, along with augmented SNAP maximum benefits tied to the 2021 Thrifty Food Plan reevaluation (Toossi & Jones, 2023), may have served as a buffer against inflationary pressures in 2022. Many studies have found that SNAP improved the food security of low-income households before the pandemic (Gundersen et al., 2017). Even though food insecurity among SNAP households rose from 39.9 percent in 2021 to 46.7 percent in 2022 despite the expanded benefits, these estimates obscured how much worse off (i.e., higher food insecurity) SNAP households would have been without the expanded benefits. It is widely documented in the food security literature that households that are prone to greater food and economic hardship are more likely to seek food assistance than non-SNAP households with comparable incomes (Rabbitt et al., 2024). When controlling for this "self-selection" effect, Restrepo (2023) found that expanded SNAP benefits related to the pandemic lowered food insecurity. In a qualitative analysis, Leung and Wolfson (2023) found SNAP participants described the added benefits from the Thrifty Food Plan reevaluation as helpful in purchasing food and offsetting other household costs during the historically high food price inflation in 2022. In other words, food insecurity may have been much higher without these expanded benefits.

This analysis underscores differences in food spending behaviors found across races and ethnicities over the entire sample period. Non-Hispanic Black and Hispanic households exhibited lower spending in dollars on both FAH and FAFH, with non-Hispanic Black households also spending less toward FAFH, consistent with previous findings based on the same data from decades earlier (Blisard & Stewart, 2004; Walker et al., 2010). In comparison to non-Hispanic White households, non-Hispanic Black and Hispanic households were found to be lower access, meaning they were more than one-half mile to the nearest grocery store and relied on a form of transportation other than their own to get to the store (Ver Ploeg et al., 2017).

In addition, spending across FAH categories varied by the racial and ethnic composition of the household, aligning with documented differences in food consumption behaviors. A review by Bennett et al. (2022) assessed 30 studies on food and nutrient consumption among different racial and ethnic groups. Many of the findings in this report resonated with Bennett's conclusions. Specifically, the Bennett review highlighted that U.S. Black adults tend to consume significantly fewer vegetables compared to non-Hispanic White and Hispanic adults, while Hispanic adults exhibit higher fruit intake than non-Hispanic White adults. Analysis based on the 2012 FoodAPS also found that differences in food consumption led to substantial differences in diet quality across racial and ethnic groups that were further widened by geographic region (Vadiveloo et al., 2019). This analysis echoes these findings such that non-Hispanic Black households spent considerably less money on vegetables over the entire sample period than non-Hispanic White, non-Hispanic Asian, and Hispanic households. Additionally, Hispanic households spent more than non-Hispanic White, non-Hispanic Black, and non-Hispanic Native American/Pacific Islander/multiracial households on fruits. In addition, this analysis points to non-Hispanic Asian households generally purchasing more healthful foods, consistent with studies that found the diet quality of non-Hispanic Asian adults to be higher than all other races and ethnicities (Tao et al., 2022; McCullough et al., 2022).

However, this study diverged from Bennett et al. (2022) regarding racial and ethnic differences in prepared foods. We did not find statistically significant differences in spending on limited-service FAFH across races and ethnicities (except for non-Hispanic Asian households, which spent less than non-Hispanic Native American/Pacific Islander/multiracial households). In contrast, Bennett et al. (2022) noted that U.S. Black adults were more frequent consumers of fast foods than White adults. Additionally, Bennett noted that Black

adults tended to consume more snacks and desserts compared to White adults, whereas this analysis found that non-Hispanic White households spent more on these categories than non-Hispanic Black households. These differences may arise due to inflation-adjusted household food purchasing being an imperfect proxy for actual quantities of prepared foods consumed. Although the inflation adjustment controls for supply-induced changes in prices, inflation adjustment ignores demand-induced movements in prices. For example, some households may be willing to pay higher prices for prepared foods that have certain quality attributes (e.g., organic or branded FAH desserts). Preferences for quality of prepared foods may vary by race and ethnicity, and our price adjustment does not account for this.

Urbanicity also appears to partially explain differences in food spending as well, possibly linked to access differences. Urban households typically exhibited higher per capita food spending compared to rural counterparts, which could be attributed to higher prices in urban areas (Kaufman et al., 2007). However, this study found that urbanicity primarily influenced spending on FAFH rather than FAH, which is consistent with another analysis based on the 2012 FoodAPS (Todd & Scharadin, 2016). This discrepancy may be driven by limited access to restaurants in rural areas (Powell et al., 2007), alongside a greater assortment and variation in FAFH offerings in urban areas.

The availability of timely and high-quality data to investigate shifts in food consumption since 2020 across socioeconomic groups is limited. However, alternative data sources on food purchasing behaviors can shed light on these changes. Leveraging the Consumer Expenditure Diary Survey, a large probability sample of U.S. households, we were able to validate several trends highlighted in pandemic-related literature and long-standing differences across socioeconomic groups documented in prepandemic studies.

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Appendix A: Selecting the Optimal Model for Consumer Expenditure Survey Data

We estimated the relationship between inflation-adjusted per capita spending on N foods and income alongside other socioeconomic covariates and the time periods as:

$$(A.1) \quad w_n = \mathrm{x}'\boldsymbol{\beta}_n + u_n$$

where w_n represents inflation-adjusted per capita spending on food n, $\mathbf{x}$ is a matrix encompassing K covariates, $\boldsymbol{\beta}_n$ is a vector of estimated coefficients for the nth good, and u_n represents the error term. The matrix $\mathbf{x}$ includes socioeconomic variables outlined in the data section (table 1), indicators for year and quarter, and interactions between year and all the socioeconomic and quarter variables. Most of the socioeconomic variables are incorporated into the model as indicator variables, and base group variables are excluded to avoid multicollinearity. The omitted base groups are the 2016–19 time period, received Supplemental Nutrition Assistance Program (SNAP), Hispanic, married without children, rural, Northeast, employed, blue collar job, and first quarter.

Typically, employing ordinary least squares (OLS) estimation of equation (A.1) for each of the N foods would yield consistent and unbiased estimates of $\boldsymbol{\beta}_n$. However, several challenges arise when using OLS with household spending data constructed from the Consumer Expenditure Diary Survey. First, these data contain a substantial number of zero observations, often referred to as zero inflation. In the 2016–22 Consumer Expenditure Diary Survey, zero inflation varies across food groups, ranging from 34.3 percent for grains to 88 percent for other food away from home (FAFH). This result renders the conditional mean of the spending level equations in (A.1) to be nonlinear, leading to inconsistent estimators for $\boldsymbol{\beta}_n$ via OLS. Second, nonzero spending across all N goods is right skewed, and OLS tends to overemphasize extreme cases when data are right skewed. Lastly, the heteroskedastic nature of nonzero dependent variables in microdata like the Consumer Expenditure Diary Survey further compromises the efficiency of OLS estimates (Liu et al., 2019).

Numerous models are available to address the high prevalence of zero observations, with Tobit (and its generalizations) and two-part models being particularly notable. Tobit models assume that the presence of a large proportion of zeros in the dependent variable arises due to censoring, while the two-part models posit that zeros originate from genuine non-purchases, representing a corner solution (Liu et al., 2019). Given the plausibility of the latter assumption in explaining the absence of purchasing a specific food group, we opted for a two-part model.

In the two-part model, the decision to purchase a food group is initially determined (first part), followed by the assessment of how much to purchase conditional on purchasing (second part) (Cragg, 1971). Representing the purchase decision as binary variable d (indicating purchase, $d = 1$, or zero purchase, $d = 0$), we observe $\Pr[d=0|\mathbf{x}_h]$ solely for non-purchasers. For purchasers, we observe $\Pr[d=1|\mathbf{x}_h]$ and the conditional density of w_n specified as $f(w_n|d = 1,\mathbf{x})$. The two-part model is thus expressed as:

$$(A.2) \quad \Pr[d = 1|\mathbf{x}] = F(\boldsymbol{x'w}),$$
$$f(\mathrm{w}_n|\mathrm{d} = 1,\mathbf{x}) = g(w_n|\boldsymbol{x'\beta}),$$

where F represents the cumulative distribution function of a standard normal distribution, and g represents a specified density function.

The purchase decision, d, can be modeled using a probit or logit approach, though it is typically modeled as a probit model for expenditure data (Deb & Norton, 2018). Assuming a probit model for the binary variable, d, then the purchase decision equation becomes:

$$\text{(A.3)} \quad \Pr[d = 1|\mathbf{x}] = \Pr[\mathbf{x}'\boldsymbol{\gamma}_n + v > 0] = \Phi[\mathbf{x}'\boldsymbol{\gamma}_n],$$

where $v|\mathbf{x} \sim N(0,1)$ and $\Phi[\cdot]$ is the standard normal cumulative distribution function.

The density of the positive-valued spending levels, $f(w_n|d = 1,\mathbf{x})$, or the second part, can be modeled as any distribution ensuring positivity for purchasers.[3] We opted to specify this distribution within a generalized linear model (GLM) framework, accommodating various distributional families to address the right skewness and heteroskedasticity of the positive-valued spending levels.[4]

The GLM generalizes the OLS model by allowing the expectation of the dependent variable to be a function of the linear index of covariates and coefficients, known as the link function (Deb & Norton, 2018). For positive-valued spending levels, this translates to:

$$\text{(A.4)} \quad \mathrm{E}[w_n \,|\, \mathbf{x}, w_n > 0] = g^{-1}(\mathbf{x}'\boldsymbol{\beta}_n),$$

where $g^{-1}(\cdot)$ represents the link function and can take forms such as log, linear, and square root (Deb & Norton, 2018). Additionally, the choice of distribution family in the GLM determines the relationship between the mean and the variance and, thus, the structure of heteroskedasticity (Deb & Norton, 2018). For instance, selecting a gamma distribution models the right-skewed, non-negative data with variance proportional to the square of the means.[5]

Following the approach outlined by Deb and Norton (2018), we employed a Box-Cox test to select the link function and a modified Park test to choose the distribution family. The Box-Cox test identifies the power function that transforms spending levels closest to a symmetric distribution. With and without covariates, this test indicates that a log-link function is most appropriate for modeling (A.4).[6] The modified Park test empirically evaluates the relationship between the mean and the variance and suggests that the gamma distribution best fits the data.[7]

The magnitude of the resulting parameter estimates from the two-part model is not directly interpretable. The conditional mean and marginal effect of the years and covariates depend on estimates from both parts of the two-part model. In particular, the mean conditional on the covariates and marginal effects for the two-part probit-GLM with log link and gamma distribution are expressed as:

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[3] Here, we assumed that the covariates, $\mathbf{x}_h$ are the same in the participation equation and the outcome equation conditional on participation. However, this assumption can be relaxed, especially if one can identify exclusion restrictions based on theoretical or statistical reasons for using different covariates in the two equations.

[4] Transforming the spending levels into log form or using a Box-Cox retransformation can also accommodate issues with right skewness and heteroskedasticity but requires a retransformation of the estimated parameters back to the scale of interest. This transformation can be using Duan's smearing estimate but only holds under very stringent assumptions (normality and homoscedasticity of errors), which are generally untenable.

[5] We estimated the two-part probit-GLM with log link and gamma distribution using the user-written program twopm in Stata 17 (Belotti et al., 2015). This command estimates the two-part model in two steps following Heckman (1978). The command also allows the estimation of the model coefficients and covariance matrix using the Consumer Expenditure Dairy Survey sample weights and balanced repeated replicates with the svy suffix.

[6] The Box-Cox tests which scaler power (θ) of the spending level, w^{θ}, results in the most symmetric distribution. A power of $\theta = 1$ corresponds to a linear model, $\theta = 0.5$ to a square-root transformation, and $\theta \to 0$ to a logarithmic transformation. This test was conducted in Stata using the command boxcox.

[7] After running a GLM with log link and gamma distribution, we computed the expected value and squared error for each observation, conditional on the covariates. A linear regression of the logged estimated squared errors on the estimated expected value provides the test where the estimated coefficient on the expected value indicates (1) Gaussian distribution if close to 0 (i.e., no relationship between mean and variances); (2) Poisson distribution if close to 1; (3) Gamma distribution if close to 2; and (4) inverse Gamma distribution if close to 3.

$$\text{(A.5)}\quad E[w_n|\mathbf{x}] = \Phi[\mathbf{x}'\boldsymbol{\gamma}_n]\exp(\mathbf{x}'\boldsymbol{\beta}_n),$$

$$\text{(A.6)}\quad \frac{\partial E[w_n|\mathrm{x}]}{\partial \mathrm{x}_k} = \gamma_{nk}\varphi[\mathbf{x}'\boldsymbol{\gamma}_n]\exp(\mathbf{x}'\boldsymbol{\beta}_n) + \beta_{nk}\Phi[\mathbf{x}'\boldsymbol{\gamma}_n]\exp(\mathbf{x}'\boldsymbol{\beta}_n),$$

where $\boldsymbol{\gamma}$ represents estimated coefficients from the probit model on the purchase decision (first part), $\boldsymbol{\beta}$ signifies estimated coefficients from the GLM conditional on positive purchase (second part), represents the standard normal cumulative distribution function, and signifies the standard normal probability function.

Appendix B: Modeling Changes in Energy and Nutrition Composition of Purchased Food in the Consumer Expenditure Survey Using NHANES Data

This analysis is based on the Consumer Expenditure Diary data juxtaposed with the 2017–March 2020 National Health and Nutrition Examination Survey (NHANES). The process entails (1) delineating food codes from NHANES into food at home (FAH) and food away from home (FAFH), (2) converting FAH food codes into ingredients, (3) assigning FAH ingredients in NHANES to the 12 FAH categories used in this study, (4) calculating the average energy, macro, and micronutrient content for 3 FAFH and 12 FAH categories, and (5) predicting changes in dietary intake by applying changes in quantity indexes implied by this study to average nutrition and energy intake based on the 2017–March 2020 NHANES. The comprehensive steps are as follows:

1. **Allocation between FAH and FAFH:** Following a methodology that is akin to Lin et al. (2023), food codes are categorized into FAH and FAFH as follows:

FAH

- Store-grocery/supermarket
- Mail order purchase
- Fundraiser sales
- Store—no convenience
- Store—no additional information
- From someone else/gift
- Grown or caught

FAFH

Full-service restaurants

- Restaurant with waiter/waitress
- Bar/tavern/lounge
- Restaurant—no additional information

Limited-service restaurants

- Restaurant fast food/pizza
- Sport, recreation, or entertainment facility

Other FAFH

- Cafeteria not in a K–12 school
- Cafeteria in a K–12 school
- Child/adult care center
- Child/adult home care
- Soup kitchen
- Meals on Wheels
- Community food program—other
- Community program—no additional information
- Vending machines
- Common coffee pot or snack tray
- Residential dining facility
- Street vendor, vending truck

2. **Conversion of FAH foods into ingredients:** Foods listed in NHANES are reported as consumed, meaning foods are combinations of ingredients, and need to be further broken down into ingredients to best match what individuals purchase at grocery stores. The 2017–18 and 2019–20 Food and Nutrition Database for Dietary Studies (FNDDS) contains a list of ingredients for all the food codes in NHANES, as well as the edible ingredient weight. FAFH items are only identified by source, which is completed in step 1.

3. **Assignment of ingredients to FAH purchase categories:** More than 3,000 ingredients listed in the FNDDS are allocated to 12 FAH purchase categories based on the Consumer Expenditure Diary Survey, as outlined in Okrent and Zeballos (2022). Alcohol, human milk, and tap water (as ingredients) were excluded from the analysis. Nutrient values from the FNDDS databases are also mapped to these purchase categories, allowing for the calculation of energy, carbohydrate, protein, added sugar, saturated fat, calcium, and sodium per 100 grams.

4. **Calculation of average daily energy and nutrient content:** Ingredient weights from step 2 are applied to the grams reported for each food code in the day 1 dietary recall data from the 2017–March 2020 NHANES. Grams per purchase category are then aggregated for each individual, excluding children of age 2 or less. Using the day 1 recall sample weights (WTDRD1PP), pseudo stratum (SDMVSTRA), and pseudo psu (SDMPSU), we calculated the average daily grams, energy, protein, carbohydrate, added sugars, dietary fiber, saturated fat, calcium, and sodium across the 15 FAH and FAFH food purchase categories (table B.1).

Table B.1
Average daily intake for individuals older than 2 years of age in the United States, 2017–March 2020, by purchase category

	Grams (g)	Energy (kcal)	Protein (g)	Carbo-hydrates (g)	Added sugars (g)	Dietary fiber (g)	Saturated fats (g)	Calcium (mg)	Sodium (mg)
Beverages	1,123.72	113.65	0.76	27.05	24.26	0.16	0.06	79.76	67.46
Dairy products	145.09	130.20	8.36	7.74	7.31	0.04	4.25	282.34	189.52
Desserts	48.63	167.45	2.06	23.78	14.68	0.74	3.13	35.66	106.64
Fats and oils	20.28	124.73	1.94	2.46	0.95	0.70	1.94	9.61	75.13
Fruits	90.75	59.10	0.58	14.36	10.84	1.61	0.05	10.71	2.97
Grains	107.87	263.84	7.99	48.84	4.27	3.31	1.06	85.10	297.90
Prepared meals	68.84	114.69	5.07	12.20	1.75	0.94	1.63	41.25	328.38
Nonprocessed red meat	31.72	69.92	8.46	0.02	0.01	0.00	1.42	4.91	50.39
Poultry, fish and seafood, eggs	45.21	66.50	8.12	0.36	0.09	0.00	1.01	13.80	101.94
Processed red meat	16.21	40.23	2.88	0.35	0.15	0.00	1.06	3.97	180.56
Vegetables	106.89	61.51	2.33	11.62	3.43	2.64	0.20	28.70	81.41
Other FAH not elsewhere classified	91.49	221.26	4.35	28.73	16.47	1.59	3.41	83.67	706.45
FAFH full service	163.33	191.40	7.99	18.04	5.53	1.26	2.55	57.81	389.97
FAFH limited service	232.53	316.81	12.06	34.03	11.68	1.95	4.97	127.98	575.14
FAFH other	82.67	67.17	2.59	8.40	4.14	0.53	0.89	36.92	105.85
Excluded	190.98	57.67	0.34	2.71	0.56	-	0.02	7.26	7.67

g = grams. kcal = kilocalories. mg = milligrams. FAH = food at home. FAFH = food away from home. FNDDS = Food and Nutrition Database for Dietary Studies. NHANES = National Health and Nutrition Examination Survey.

Source: USDA, Economic Research Service calculations using the 2017–18 and 2019–2020 FNDDS databases and the 2017–March 2020 NHANES.

5. **Predicting changes in energy and nutrient composition using marginal effects of the years:** In price index theory (see International Monetary Fund, 2004), the ratio of value aggregates between two time periods (or, in this case, spending or expenditures for each purchase category) is:

$$\frac{V^1}{V^0} = P(p^0,p^1,q^0,q^1)Q(p^0,p^1,q^0,q^1),$$

where $P(\cdot)$and $Q(\cdot)$are price and quantity indexes, which measure changes in prices and quantities, respectively. Solving for the quantity index, we have

$$Q(p^0,p^1,q^0,q^1) = \frac{V^1}{P(p^0,p^1,q^0,q^1)} \times \frac{1}{V^0},$$

where the first term on the right-hand side is inflation-adjusted spending times the inverse of spending in the original period (V^0). Hence, the marginal effects from year on spending expressed relative to 2016−19 (tables 2 and 3) yields quantity indexes induced by each phase, controlling for all the covariates. Applying the quantity indexes to the grams consumed and noted in table B.1, yields predicted changes in quantities consumed of each purchase category in 2022 (table B.2). The predicted changes in grams consumed are then applied to the ratio of energy to grams consumed and nutrient content per grams consumed to estimate changes in energy and nutrient content for each phase. All changes in dietary energy and nutrient content are presented relative to 2016–19 levels.

This detailed analysis offers insights into how shifts in purchasing patterns in 2022 affected the nutritional composition of purchased foods across various categories.

Table B.2

Predicted changes in consumption and nutrient content in 2022

	Grams (g)	Energy (kcal)	Protein (g)	Carbo-hydrates (g)	Added sugars (g)	Dietary fiber (g)	Saturated fats (g)	Calcium (mg)	Sodium (mg)
Beverages	59.01	5.97	0.04	1.42	1.27	0.01	0.00	4.19	3.54
Dairy products	1.89	1.70	0.11	0.10	0.10	0.00	0.06	3.68	2.47
Desserts	1.93	6.64	0.08	0.94	0.58	0.03	0.12	1.41	4.23
Fats and oils	-0.08	-0.51	-0.01	-0.01	0.00	0.00	-0.01	-0.04	-0.31
Fruits	3.47	2.26	0.02	0.55	0.41	0.06	0.00	0.41	0.11
Grains	3.08	7.54	0.23	1.40	0.12	0.09	0.03	2.43	8.51
Prepared meals	4.46	7.43	0.33	0.79	0.11	0.06	0.11	2.67	21.28
Nonprocessed red meat	0.23	0.52	0.06	0.00	0.00	0.00	0.01	0.04	0.37
Poultry, fish and seafood, eggs	0.25	0.36	0.04	0.00	0.00	0.00	0.01	0.08	0.56
Processed red meat	0.51	1.26	0.09	0.01	0.00	0.00	0.03	0.12	5.64
Vegetables	5.56	3.20	0.12	0.60	0.18	0.14	0.01	1.49	4.23
Other FAH not elsewhere classified	5.98	14.47	0.28	1.88	1.08	0.10	0.22	5.47	46.19
FAFH full service	-17.31	-20.29	-0.85	-1.91	-0.59	-0.13	-0.27	-6.13	-41.34
FAFH limited service	-10.10	-13.76	-0.52	-1.48	-0.51	-0.08	-0.22	-5.56	-24.98
FAFH other	-20.99	-17.06	-0.66	-2.13	-1.05	-0.14	-0.22	-9.38	-26.88

g = grams. kcal = kilocalories. mg = milligrams. FAH = food at home. FAFH = food away from home. FNDDS= Food and Nutrition Database for Dietary Studies. NHANES = National Health and Nutrition Examination Survey.

Source: USDA, Economic Research Service calculations using estimates from table B.1 and marginal effects of 2022 relative to 2016–19 (in percentage changes) on each FAH and FAFH category in tables 2 and 3.

Appendix C: Tables

Table C.1
Marginal effect of year and socioeconomic covariates on annual inflation-adjusted per capita spending, by FAH category

Variables	FAH	Grains	Processed red meat	Nonprocessed red meat	Chicken, fish and seafood, and eggs
2020	225.71***	30.42***	13.30**	15.09	7.19
	(63.241)	(6.162)	(5.480)	(9.162)	(6.733)
2021	331.72***	38.58***	18.62***	9.49	10.89
	(61.390)	(7.679)	(5.804)	(8.462)	(6.610)
2022	201.57***	14.34***	8.85**	3.14	2.69
	(35.259)	(5.297)	(4.188)	(8.867)	(6.739)
Did not receive SNAP and first income quartile	-209.35***	-7.91	-20.22***	-22.23**	-31.98***
	(47.349)	(5.514)	(6.623)	(9.496)	(7.151)
Did not receive SNAP and second income quartile	73.17	13.63**	-0.89	-1.07	0.85
	(52.170)	(5.712)	(6.893)	(9.355)	(8.191)
Did not receive SNAP and third income quartile	308.56***	33.20***	7.82	14.70	17.58**
	(51.820)	(6.051)	(7.308)	(9.303)	(7.091)
Did not receive SNAP and fourth income quartile	895.44***	82.38***	33.27***	53.19***	93.00***
	(61.477)	(6.655)	(8.832)	(11.455)	(9.902)
Non-Hispanic White	163.53***	34.73***	19.28***	-23.10***	-58.10***
	(45.489)	(5.749)	(3.597)	(6.209)	(6.632)
Non-Hispanic Black	-215.15***	-2.98	-3.87	-26.36**	5.51
	(74.828)	(10.165)	(6.021)	(10.803)	(11.265)
Non-Hispanic Asian	212.25***	51.14***	-26.90***	13.08	59.06***
	(74.463)	(7.849)	(5.726)	(11.992)	(13.243)
Non-Hispanic Native American/ Pacific Islander/Multiracial	201.93***	28.26***	20.61**	-3.04	-21.69**
	(70.618)	(8.088)	(8.755)	(10.591)	(8.893)
Married with children	-254.03***	-17.56***	-8.76*	-34.00***	-31.21***
	(44.917)	(5.739)	(5.141)	(6.653)	(5.774)
Single without children	247.39***	29.79***	3.48	-15.51*	31.91***
	(45.951)	(6.307)	(3.976)	(8.636)	(8.062)
Single with children	-368.42***	-24.48***	-23.57***	-49.47***	-40.76***
	(75.978)	(8.862)	(5.877)	(12.305)	(9.399)
Other household types	-436.07***	-41.76***	-22.17***	-48.59***	-37.16***
	(47.279)	(5.919)	(4.128)	(7.629)	(4.953
Urban	131.26	5.13	-17.24***	4.70	57.47***
	(86.828)	(10.367)	(5.347)	(11.775)	(7.647)
Midwest	-245.94***	-47.71***	-11.22***	-8.61	-63.21***
	(45.520)	(6.362)	(3.702)	(6.837)	(7.751)
South	-299.43***	-56.64***	-16.70***	-0.66	-43.20***
	(55.997)	(7.018)	(3.864)	(5.482)	(8.326)
West	57.84	-26.75**	-13.44**	7.08	-9.96
	(98.170)	(11.158)	(6.337)	(7.799)	(11.181)

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Variables	FAH	Grains	Processed red meat	Nonprocessed red meat	Chicken, fish and seafood, and eggs
Age	14.72***	1.38***	1.02***	1.41***	1.26***
	(0.921)	(0.125)	(0.077)	(0.145)	(0.153)
Family size	-289.47***	-18.45***	-14.47***	-16.62***	-25.23***
	(18.157)	(2.062)	(1.533)	(2.432)	(2.310)
Unemployed	276.82*	16.87	41.90*	15.76	53.02*
	(161.596)	(19.194)	(20.918)	(25.677)	(28.244)
White collar job	183.58***	17.45***	5.01	-9.34	14.00***
	(43.948)	(4.960)	(3.523)	(5.907)	(5.131)
Second quarter	-19.06	-10.56**	2.53	8.48	-8.37*
	(34.793)	(3.961)	(4.090)	(6.170)	(4.904)
Third quarter	-29.56	-4.08	-0.76	3.00	-15.48***
	(36.567)	(3.854)	(3.832)	(5.684)	(4.681)
Fourth quarter	79.52**	7.92	13.94***	9.15	4.45
	(36.241)	(4.771)	(3.847)	(7.471)	(4.784)
Observations	77,676	77,676	77,676	77,676	77,676

Variables	Dairy	Fruits	Vegetables	Fats and oils	Beverages
2021	3.31	17.80**	34.71***	1.77	12.91
	(4.202)	(7.462)	(8.688)	(2.738)	(7.787)
2021	7.54*	29.34***	38.18***	1.90	42.43***
	(4.446)	(6.625)	(6.304)	(2.563)	(8.525)
2022	4.78	16.23***	25.04***	-0.55	32.41***
	(3.035)	(4.648)	(7.083)	(2.300)	(6.901)
Did not receive SNAP and first income quartile	-11.73***	-2.29	-5.99	-1.42	-30.46***
	(3.766)	(4.353)	(5.564)	(2.860)	(10.275)
Did not receive SNAP and second income quartile	3.44	21.59***	17.81**	3.86	-0.72
	(4.121)	(4.959)	(7.473)	(2.568)	(9.002)
Did not receive SNAP and third income quartile	18.56***	42.60***	36.28***	8.16***	29.73***
	(3.707)	(5.049)	(5.256)	(2.527)	(9.169)
Did not receive SNAP and fourth income quartile	58.73***	105.73***	96.64***	32.22***	94.79***
	(5.147)	(5.679)	(7.044)	(3.002)	(10.331)
Non-Hispanic White	17.44***	-23.23***	-6.31	3.95	13.90*
	(4.181)	(5.753)	(5.435)	(2.651)	(7.139)
Non-Hispanic Black	-53.53***	-44.18***	-40.02***	-2.61	-30.29**
	(4.811)	(8.090)	(10.121)	(3.554)	(11.270)
Non-Hispanic Asian	-34.87***	49.19***	84.44***	20.13***	-57.89***
	(6.718)	(10.220)	(12.663)	(5.200)	(12.948)
Non-Hispanic Native American/Pacific Islander/ Multiracial	-0.26	-14.83*	-5.35	1.16	18.96
	(6.344)	(8.376)	(8.522)	(3.917)	(11.378)
Married with children	-8.07**	-23.57***	-37.90***	-18.73***	-23.37***
	(3.522)	(6.136)	(5.330)	(2.490)	(7.697)
Single without children	25.40***	23.69***	4.57	-0.12	49.44***
	(3.922)	(5.884)	(7.092)	(2.823)	(8.464)

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Variables	Dairy	Fruits	Vegetables	Fats and oils	Beverages
Single with children	-25.07***	-48.33***	-63.40***	-23.08***	-23.95**
	(5.538)	(7.265)	(8.092)	(3.815)	(11.628)
Other household types	-34.88***	-59.03***	-55.41***	-22.54***	-22.55***
	(3.353)	(5.366)	(5.207)	(2.239)	(8.019)
Urban	0.80	30.46***	19.88*	6.16	4.19
	(7.967)	(10.941)	(10.300)	(3.982)	(18.822)
Midwest	-21.79***	-24.97***	-39.43***	-8.24***	-19.23***
	(4.416)	(4.985)	(6.580)	(2.037)	(6.232)
South	-36.54***	-41.71***	-46.45***	-10.81***	-11.68
	(4.308)	(6.279)	(7.088)	(2.231)	(7.732)
West	1.84	17.39*	3.56	1.98	2.75
	(6.164)	(9.638)	(11.291)	(3.438)	(16.286)
Age	0.84***	1.61***	1.37***	0.65***	1.54***
	(0.074)	(0.109)	(0.122)	(0.046)	(0.134)
Family size	-17.79***	-22.57***	-30.62***	-5.99***	-39.93***
	(1.263)	(2.560)	(2.125)	(1.015)	(3.109)
Unemployed	23.96*	31.95	29.62	9.78	3.09
	(13.238)	(20.924)	(18.638)	(12.965)	(19.266)
White collar job	18.76***	21.82***	28.95***	8.41***	10.91
	(3.073)	(4.916)	(5.786)	(1.764)	(8.084)
Second quarter	-10.28***	20.02***	-2.34	-0.56	4.47
	(2.478)	(3.807)	(4.539)	(2.358)	(6.416)
Third quarter	-9.98***	20.45***	-3.76	-2.70	4.03
	(2.498)	(3.869)	(5.381)	(2.251)	(7.033)
Fourth quarter	1.77	-6.09*	6.17	4.80**	4.67
	(2.839)	(3.222)	(4.359)	(2.142)	(6.405)
Observations	77,676	77,676	77,676	77,676	77,676

Variables	Desserts	Prepared meals	Other FAH not elsewhere classified
2020	7.91	29.39***	39.15***
	(7.044)	(8.145)	(9.002)
2021	25.79***	58.26***	51.16***
	(6.633)	(9.541)	(8.529)
2022	15.03***	34.50***	38.69***
	(5.037)	(7.089)	(6.898)
Did not receive SNAP and first income quartile	-9.56*	-24.87***	-32.35***
	(5.331)	(8.743)	(7.656)
Did not receive SNAP and second income quartile	6.48	3.56	-3.12
	(5.478)	(8.471)	(7.901)
Did not receive SNAP and third income quartile	22.75***	39.53***	29.14***
	(6.061)	(9.636)	(7.895)
Did not receive SNAP and fourth income quartile	62.04***	127.76***	84.78***
	(7.032)	(12.156)	(10.267)

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Variables	Desserts	Prepared meals	Other FAH not elsewhere classified
Non-Hispanic White	39.16***	84.14***	77.61***
	(6.525)	(6.967)	(6.588)
Non-Hispanic Black	-16.48**	-24.29***	16.62
	(7.476)	(7.860)	(10.947)
Non-Hispanic Asian	3.83	15.86*	28.55**
	(8.031)	(9.374)	(11.173)
Non-Hispanic Native American/Pacific Islander/ Multiracial	28.73***	76.74***	80.99***
	(7.715)	(9.811)	(14.193)
Married with children	-18.70***	-20.04**	-16.82***
	(5.156)	(7.472)	(6.121)
Single without children	31.11***	89.56***	20.53***
	(6.256)	(9.158)	(5.570)
Single with children	-15.06*	-5.38	-33.87***
	(7.544)	(11.324)	(11.591)
Other household types	-34.41***	-15.93**	-46.17***
	(5.175)	(7.742)	(6.973)
Urban	7.87	42.80***	-11.78
	(6.351)	(8.008)	(12.664)
Midwest	-17.15**	12.77	-6.30
	(6.865)	(8.581)	(7.100)
South	-25.16***	-2.13	-20.19**
	(7.031)	(10.319)	(8.282)
West	-7.40	57.25***	11.67
	(9.261)	(11.613)	(12.252)
Age	1.87***	0.96***	0.89***
	(0.094)	(0.120)	(0.141)
Family size	-15.08***	-39.64***	-30.01***
	(2.227)	(3.005)	(2.426)
Unemployed	24.80	7.37	20.72
	(19.564)	(21.941)	(22.540)
White collar job	14.97***	36.26***	26.14***
	(4.278)	(6.727)	(5.600)
Second quarter	-5.72	-22.37***	0.70
	(4.183)	(5.438)	(6.397)
Third quarter	-8.20**	-14.61**	-1.93
	(3.766)	(6.334)	(5.181)
Fourth quarter	17.02***	-2.47	21.98***
	(4.975)	(7.089)	(5.127)
Observations	77,676	77,676	77,676

FAH = food at home. SNAP = Supplemental Nutrition Assistance Program.

Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures are deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. Base categories for socioeconomic covariates are omitted and include: the 2016–19 time period, received SNAP, Hispanic, married without children, rural, Northeast, employed, blue collar job, and first quarter. These are only the marginal effects on the intercept shifters in the two-part models.

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Source: USDA, Economic Research Service calculations based on the two-part model using the U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Table C.2

Marginal effect of year and sociodemographic characteristics on annual inflation-adjusted per capita spending, by FAFH category

Variables	FAFH	Limited-service FAFH	Full-service FAFH	Other FAFH
2020	-523.74***	-111.04***	-364.90***	-42.57***
	(35.505)	(19.168)	(27.850)	(5.811)
2021	-348.67***	-85.95***	-213.66***	-47.66***
	(36.444)	(22.104)	(22.935)	(4.236)
2022	-302.85***	-68.77***	-191.91***	-37.68***
	(29.202)	(16.778)	(23.205)	(3.115)
Did not receive SNAP and first income quartile	156.75***	49.50**	95.80***	6.72
	(44.685)	(21.002)	(33.032)	(5.306)
Did not receive SNAP and second income quartile	445.02***	174.98***	258.23***	12.75**
	(41.095)	(18.024)	(32.008)	(4.608)
Did not receive SNAP and third income quartile	757.29***	262.71***	476.38***	23.43***
	(50.099)	(21.134)	(39.324)	(4.196)
Did not receive SNAP and fourth income quartile	1,548.44***	485.90***	1,036.43***	51.03***
	(62.791)	(26.214)	(49.237)	(4.421)
Non-Hispanic White	56.09	-16.98	57.26*	2.13
	(50.328)	(27.118)	(28.947)	(4.184)
Non-Hispanic Black	-237.21***	-42.65	-209.77***	-2.41
	(53.479)	(28.198)	(42.451)	(6.232)
Non-Hispanic Asian	-50.00	-116.22***	65.36	0.45
	(65.140)	(33.201)	(44.422)	(6.724)
Non-Hispanic Native American/Pacific Islander/Multiracial	86.75	39.12	30.02	9.21
	(64.573)	(34.957)	(44.740)	(8.406)
Married with children	-273.19***	-23.33	-224.14***	8.34**
	(30.976)	(18.468)	(23.027)	(3.572)
Single without children	327.80***	226.62***	80.78**	38.45***
	(43.665)	(22.195)	(30.837)	(4.889)
Single with children	-275.11***	-2.99	-291.80***	27.53***
	(44.632)	(19.592)	(35.022)	(6.966)
Other household types	-265.31***	5.92	-252.02***	6.34
	(39.864)	(20.062)	(24.715)	(3.733)
Urban	385.62***	142.88***	236.01***	2.27
	(72.056)	(26.623)	(48.474)	(4.027)
Midwest	-41.05	23.25	-73.63**	14.66***
	(49.046)	(23.433)	(32.564)	(3.821)
South	-24.83	17.58	-33.14	0.43
	(45.599)	(25.449)	(26.195)	(3.625)
West	182.23***	134.35***	49.40	2.79
	(55.553)	(24.795)	(35.158)	(4.077)

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Variables	FAFH	Limited-service FAFH	Full-service FAFH	Other FAFH
Age	-7.66***	-8.06***	1.74***	-0.93***
	(0.770)	(0.308)	(0.601)	(0.095)
Family size	-276.15***	-110.22***	-167.91***	-7.80***
	(17.822)	(8.447)	(12.317)	(1.285)
Unemployed	-292.98***	-140.80***	-124.79*	-14.45
	(92.064)	(52.019)	(64.425)	(11.720)
White collar job	213.98***	104.51***	103.97***	12.76***
	(29.415)	(14.191)	(20.119)	(2.219)
Second quarter	-24.68	1.18	-17.60	-11.44***
	(28.024)	(14.900)	(19.020)	(3.488)
Third quarter	3.02	23.96	-19.09	-6.22**
	(31.385)	(15.607)	(21.560)	(2.692)
Fourth quarter	-6.59	10.74	-16.53	-5.36
	(35.932)	(15.446)	(26.354)	(4.311)
Observations	77,676	77,676	77,676	77,676

FAFH = food away from home.

Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures are deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. Base categories for socioeconomic covariates are omitted and include: the 2016–19 time period, received SNAP, Hispanic, married without children, rural, Northeast, employed, blue collar job, and first quarter. These are only the marginal effects on the intercept shifters in the two-part models.

Source: USDA, Economic Research Service calculations based on the two-part model using U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Table C.3

Marginal effect of the sociodemographic characteristics interacted with year on annual inflation-adjusted per capita spending, by FAH category

	Food at home				Grains			
Variables	2016–19	2020	2021	2022	2016–19	2020	2021	2022
Did not receive SNAP and first income quartile	-136.66**	24.20	-378.73**	-544.18***ce	2.31	-4.67	-17.28	-40.38***c
	(65.277)	(163.112)	(148.975)	(151.203)	(7.629)	(18.509)	(18.316)	(14.965)
Did not receive SNAP and second income quartile	160.35***	208.76	-193.26	-123.15bcd	23.61***	6.56	-7.32	3.62
	(59.256)	(154.930)	(129.732)	(123.501)	(6.364)	(20.034)	(19.210)	(13.035)
Did not receive SNAP and third income quartile	355.77***	453.94**	177.41	120.14	40.39***	40.01*	11.82	20.74
	(59.712)	(171.043)	(143.473)	(131.405)	(7.354)	(20.148)	(19.770)	(14.223)
Did not receive SNAP and fourth income quartile	901.88***	1,118.12***	821.95***	729.49***	82.35***	90.65***	75.74***	81.20***
	(60.859)	(197.549)	(185.462)	(159.428)	(7.467)	(24.317)	(21.201)	(16.424)

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	Food at home				Grains			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Non-Hispanic White	158.98**	303.77**	-39.75	245.90**[d]	30.69***	60.17***	12.58	47.24***[df]
	(64.868)	(116.392)	(113.675)	(99.928)	(7.019)	(13.838)	(12.954)	(11.211)
Non-Hispanic Black	-308.57***	159.50	-353.93**	-88.54	-16.87*	47.51	-12.82	10.17
	(82.765)	(270.050)	(160.373)	(155.984)	(9.495)	(32.128)	(22.608)	(15.784)
Non-Hispanic Asian	177.89**	165.07	434.16*	167.82	46.73***	56.23**	56.00**	58.00***
	(86.084)	(182.605)	(238.959)	(204.197)	(9.421)	(22.980)	(23.508)	(21.099)
Non-Hispanic Native American/Pacific Islander/ Multiracial	94.43	645.18***	32.99	345.17**[ad]	16.50	62.11**	23.17	44.92***
	(87.986)	(232.974)	(158.787)	(157.525)	(10.011)	(23.529)	(18.421)	(15.124)
Married with children	-224.64***	-233.71**	-257.94*	-383.55***	-14.00**	-9.18	-28.36*	-28.71**
	(45.376)	(115.127)	(129.307)	(110.733)	(6.021)	(18.320)	(16.025)	(11.686)
Single without children	132.76**	481.37***	453.91***	252.13**[ab]	24.67***	37.19*	47.71**	24.42*
	(50.703)	(168.938)	(137.040)	(117.308)	(6.652)	(19.176)	(17.747)	(13.581)
Single with children	-415.47***	-405.00*	-69.67	-452.14***	-29.74**	-28.17	11.06	-36.21*
	(101.111)	(212.535)	(182.343)	(150.783)	(11.274)	(27.034)	(25.185)	(18.536)
Other household types	-434.31***	-369.90***	-400.69***	-544.18***	-39.64***	-34.29*	-50.56***	-48.51***
	(41.243)	(128.634)	(121.463)	(107.013)	(5.968)	(17.150)	(14.239)	(13.203)
Urban	80.93	158.93	189.50	237.04	0.23	5.77	8.33	19.76
	(79.756)	(179.589)	(213.817)	(165.429)	(11.519)	(17.082)	(25.867)	(14.648)
Midwest	-173.89***	-377.15***	-371.83**	-265.99***	-42.49***	-57.89***	-62.07***	-43.27***
	(57.592)	(134.717)	(145.896)	(96.974)	(6.530)	(14.367)	(20.116)	(13.630)
South	-205.68***	-484.72***	-377.22**	-396.75***	-45.33***	-82.45***	-70.51***	-60.55***[a]
	(52.587)	(155.109)	(160.232)	(100.263)	(6.147)	(14.495)	(18.871)	(13.340)
West	109.46	37.64	-68.14	6.85	-21.10**	-37.78*	-51.77**	-12.55
	(77.848)	(179.901)	(218.057)	(145.935)	(8.577)	(21.052)	(22.760)	(18.594)
Age	15.99***	15.86***	13.00***	10.50***	1.52***	1.54***	1.28***	0.79**
	15.99***	(4.344)	(2.678)	(2.342)	1.52***	(0.445)	(0.316)	(0.298)
Family size	-276.67***	-259.77***	-368.17***	-288.94***	-15.60***	-19.97***	-24.73***	-21.60***
	(19.645)	(48.137)	(58.588)	(38.395)	(2.003)	(5.940)	(8.180)	(4.362)
Unemployed	445.08**	549.69	-96.78	-255.18	24.59	55.07	-6.84	-25.93
	445.08**	(564.640)	(289.249)	(323.075)	24.59	(66.867)	(35.349)	(33.908)
White collar job	167.84***	267.18***	260.58***	85.17	13.71**	21.10*	36.89***	8.78
	167.84***	(78.185)	(89.533)	(101.276)	13.71**	(11.904)	(13.213)	(11.828)
Second quarter	67.75	-142.86	-93.35	-153.56	-4.52	-24.95**	-20.15*	-9.95
	(46.802)	(101.657)	(75.764)	(101.609)	(4.938)	(11.546)	(11.915)	(9.609)
Third quarter	-67.20	85.21	10.88	-39.04[c]	-10.75**	7.22	-1.06	7.09
	(45.597)	(122.134)	(96.009)	(109.812)	(5.186)	(14.305)	(11.443)	(9.936)
Fourth quarter	59.89	100.64	74.61	138.11	3.41	13.83	-1.15	28.27**
	(50.815)	(112.526)	(103.160)	(99.529)	(6.118)	(16.894)	(10.188)	(11.890)
Observations		77,676				77,676		

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	Processed red meat				Nonprocessed red meat				Chicken, fish and seafood, and eggs			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Did not receive SNAP and first income quartile	-19.16***	-20.61	-17.39	-26.67*	-26.25**	1.30	-19.17	-32.87	-24.95**	-17.28	-31.74	-72.81***[c]
	(7.043)	(30.231)	(13.210)	(13.912)	(12.561)	(26.978)	(23.285)	(20.025)	(9.753)	(19.991)	(19.250)	(20.336)
Did not receive SNAP and second income quartile	-1.93	1.10	0.84	-0.56	-5.56	18.81	-24.80	20.15	6.36	16.97	-0.46	-34.14*
	(6.151)	(29.896)	(11.309)	(13.360)	(10.712)	(27.796)	(15.567)	(21.137)	(9.569)	(21.367)	(22.032)	(19.192)
Did not receive SNAP and third income quartile	5.08	12.81	11.61	9.64	12.93	28.75	4.46	17.95	21.66**	31.07	17.44	-10.67
	(7.609)	(33.454)	(13.988)	(13.541)	(12.019)	(27.473)	(18.493)	(18.431)	(9.086)	(21.129)	(17.559)	(19.536)
Did not receive SNAP and fourth income quartile	29.88***	36.91	53.39***	22.65*	53.29***	60.26*	40.85	58.18**	95.81***	116.93***	89.32***	62.79**
	(8.219)	(35.642)	(16.776)	(12.930)	(11.685)	(29.883)	(26.048)	(25.975)	(10.639)	(29.602)	(26.358)	(27.925)
Non-Hispanic White	18.45***	23.73*	8.37	29.01***	-11.15	-0.45	-62.70***	-50.91**[bd]	-61.77***	-30.51*	-79.25***	-49.81***[d]
	(5.086)	(12.451)	(10.119)	(9.060)	(8.165)	(21.664)	(19.773)	(20.709)	(8.387)	(16.991)	(14.641)	(16.793)
Non-Hispanic Black	-13.13*	15.12	-13.40	22.15*[c]	-20.13	3.27	-41.83	-63.34***	-9.40	59.01*	-1.24	16.41[a]
	(6.643)	(24.677)	(14.570)	(13.167)	(15.059)	(27.816)	(30.425)	(21.773)	(13.465)	(30.852)	(18.857)	(22.393)
Non-Hispanic Asian	-28.57***	-32.29**	-32.77**	-9.62	13.71	14.31	9.69	12.78	51.46**	42.60	88.81**	73.84**
	(6.817)	(13.683)	(15.189)	(15.845)	(15.607)	(29.331)	(33.798)	(35.345)	(19.745)	(28.876)	(40.710)	(34.764)
Non-Hispanic Native American/Pacific Islander/Multiracial	13.15	36.35*	-3.74	57.83**	0.66	79.80	-57.86**	-43.15[de]	-30.44**	39.70	-29.54	-40.36**[ae]
	(9.050)	(19.844)	(20.276)	(25.199)	(11.737)	(55.089)	(27.692)	(28.699)	(14.002)	(32.815)	(23.425)	(18.550)
Married with children	-5.24	2.91	-21.53*	-20.91	-36.37***	-42.97*	-15.18	-35.01*	-28.44***	-51.42***	-24.58	-28.76**
	(5.307)	(14.471)	(12.200)	(13.617)	(8.357)	(24.699)	(16.142)	(20.637)	(6.986)	(17.725)	(16.211)	(13.999)
Single without children	-3.71	12.59	27.67*	-2.14	-24.29**	-7.54	15.53	-20.89	23.46**	49.96**	39.79**	38.54
	(5.607)	(16.462)	(15.431)	(12.216)	(10.350)	(24.267)	(21.799)	(26.071)	(9.184)	(21.804)	(16.767)	(30.768)
Single with children	-28.04***	-7.59	-13.63	-32.23**	-58.46***	-28.74	-19.84	-64.92**	-42.58***	-68.87**	-28.05	-19.43
	(6.892)	(23.007)	(16.478)	(12.490)	(16.507)	(43.115)	(32.914)	(25.844)	(11.710)	(28.811)	(22.847)	(24.063)

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	Processed red meat				Nonprocessed red meat				Chicken, fish and seafood, and eggs			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Other household types	-21.50***	-14.31	-28.99**	-25.77**	-45.65***	-67.74***	-23.38	-66.14***	-38.86***	-29.16*	-36.32**	-39.25***
	(5.026)	(12.048)	(10.800)	(9.883)	(9.150)	(20.132)	(14.942)	(18.510)	(5.757)	(15.920)	(16.339)	(13.703)
Urban	-19.80***	-9.41	-13.41	-19.12	-5.43	31.53	18.04	3.58	55.37***	51.21**	54.41**	74.26***
	(5.824)	(14.074)	(16.092)	(27.828)	(9.983)	(25.751)	(26.693)	(45.885)	(9.683)	(23.314)	(23.473)	(11.986)
Midwest	-6.21	-18.39*	-30.08**	-4.39	1.67	-48.04***	-37.17**	19.26[aef]	-61.83***	-77.93***	-44.42**	-72.65***
	(6.167)	(10.306)	(13.597)	(8.619)	(13.151)	(15.680)	(17.253)	(19.734)	(8.111)	(17.582)	(21.024)	(19.510)
South	-9.27	-18.12	-31.36**	-28.92***[c]	3.07	-30.09*	-8.52	21.63[e]	-35.61***	-66.99***	-32.46*	-59.26***
	(5.540)	(12.149)	(13.210)	(7.733)	(7.669)	(16.010)	(18.441)	(16.641)	(8.102)	(18.203)	(18.881)	(19.211)
West	-10.83*	-4.10	-29.81*	-16.15	7.23	-0.36	8.38	12.36	-6.86	-10.09	-6.06	-25.28
	(6.156)	(11.075)	(15.236)	(13.717)	(10.233)	(19.435)	(21.854)	(19.961)	(9.724)	(22.641)	(24.915)	(20.894)
Age	1.09***	1.15***	0.98***	0.65**	1.54***	1.78***	0.90***	1.04**	1.25***	1.61***	1.14***	1.07***
	1.09***	(0.319)	(0.250)	(0.268)	1.54***	(0.651)	(0.330)	(0.418)	1.25***	(0.459)	(0.330)	(0.358)
Family size	-14.37***	-13.78***	-18.32***	-11.77**	-15.45***	-7.53	-24.59***	-21.91***	-24.02***	-16.49*	-32.44***	-30.98***
	(2.043)	(4.177)	(4.741)	(5.301)	(3.115)	(8.448)	(5.919)	(6.094)	(3.043)	(8.429)	(6.947)	(5.356)
Unemployed	34.68	114.76	14.79	25.11	40.35	71.41	-14.62	-100.59***[ce]	60.11*	119.50	13.27	1.61
	34.68	(90.376)	(29.908)	(35.543)	40.35	(81.877)	(35.998)	(28.792)	60.11*	(92.337)	(39.393)	(47.939)
White collar job	1.34	11.44	12.97*	4.72	-10.83	2.82	10.12	-34.83**[f]	13.30**	28.99**	23.48	-7.20[e]
	1.34	(10.080)	(6.572)	(9.117)	-10.83	(15.769)	(13.031)	(14.872)	13.30**	(12.366)	(14.923)	(10.237)
Second quarter	7.59	-6.41	-6.42	1.03	14.13**	25.84	7.84	-29.00[ce]	-0.97	-5.72	-22.44**	-24.72**
	(4.959)	(10.631)	(7.847)	(10.346)	(6.888)	(18.006)	(13.939)	(17.571)	(6.878)	(13.928)	(9.492)	(11.195)
Third quarter	-4.35	21.51**	-9.15	-0.47[ad]	2.49	23.78	20.29	-32.34[ef]	-22.71***	-8.43	-6.21	-4.34
	(3.605)	(10.215)	(7.994)	(11.954)	(6.995)	(18.808)	(12.499)	(20.234)	(6.077)	(14.280)	(15.849)	(12.419)
Fourth quarter	10.42**	24.14**	11.60	19.81*	17.90*	-3.82	18.44	-20.47	2.53	11.94	1.47	7.39
	(4.343)	(11.946)	(9.996)	(10.351)	(10.536)	(18.660)	(13.765)	(17.927)	(5.838)	(15.142)	(15.382)	(17.830)
Observations		77,676				77,676				77,676		

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	Dairy				Fruits				Vegetables			
Variables	2016–19	2020	2021	2022	2016–19	2020	2021	2022	2016–19	2020	2021	2022
Did not receive SNAP and first income quartile	-5.14	-3.87	-22.99*	-33.15***[c]	6.65	7.54	-19.80	-28.22*[c]	-6.88	34.70**	-9.87	-38.58*[ade]
	(5.003)	(13.036)	(11.696)	(11.055)	(5.928)	(17.102)	(12.572)	(14.927)	(7.594)	(15.330)	(15.347)	(19.800)
Did not receive SNAP and second income quartile	10.47**	2.75	-7.33	-11.80	28.93***	24.16	11.64	1.38	17.94**	34.00**	18.60	0.74
	(4.389)	(13.339)	(11.775)	(11.058)	(7.189)	(18.656)	(11.839)	(13.271)	(8.244)	(16.850)	(17.313)	(17.788)
Did not receive SNAP and third income quartile	23.87***	26.25*	4.78	4.60	50.34***	39.34*	38.55**	20.86	33.73***	55.28***	38.85**	24.89
	(4.206)	(15.307)	(13.326)	(11.889)	(7.465)	(21.073)	(15.013)	(13.577)	(7.390)	(16.019)	(16.644)	(18.795)
Did not receive SNAP and fourth income quartile	66.17***	62.46***	47.12***	38.29***[c]	110.44***	108.60***	98.14***	93.35***	91.38***	138.56***	93.02***	79.27***[a]
	(5.547)	(16.038)	(15.899)	(11.837)	(8.801)	(22.626)	(14.065)	(15.393)	(9.079)	(19.318)	(18.960)	(23.770)
Non-Hispanic White	21.29***	19.86*	5.16	12.67	-26.12***	-6.74	-37.44**	-14.29	-10.40	5.28	-28.43	19.77*[ef]
	(4.648)	(10.430)	(11.368)	(9.986)	(7.835)	(17.539)	(14.681)	(12.191)	(7.491)	(17.826)	(19.851)	(11.141)
Non-Hispanic Black	-55.74***	-42.64***	-54.08***	-55.07***	-57.09***	-10.62	-51.85**	-20.53	-51.68***	-9.56	-44.49*	-21.15
	(5.888)	(13.584)	(13.565)	(12.603)	(8.981)	(23.638)	(22.385)	(19.549)	(10.621)	(36.437)	(22.732)	(19.874)
Non-Hispanic Asian	-35.47***	-42.96***	-16.67	-42.78***	47.68***	39.20	92.38***	21.73	82.61***	81.30***	96.10***	82.78**
	(8.694)	(12.298)	(18.293)	(15.150)	(12.600)	(26.124)	(26.772)	(24.433)	(14.295)	(29.931)	(30.330)	(31.978)

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	Dairy				Fruits				Vegetables			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Non-Hispanic Native American/Pacific Islander/Multiracial	-0.49	13.33	-6.82	-6.11	-24.51**	17.10	-19.33	-4.85	-11.31	21.01	-23.59	9.55
	(6.792)	(17.191)	(14.526)	(12.242)	(10.395)	(29.607)	(22.831)	(16.905)	(10.653)	(27.729)	(24.474)	(17.535)
Married with children	-4.98	-3.90	-10.23	-21.71**	-21.67***	-5.55	-33.52**	-38.61***	-34.40***	-40.50**	-37.70***	-49.00***
	(3.874)	(10.660)	(11.318)	(8.102)	(6.746)	(13.777)	(16.319)	(14.225)	(6.679)	(15.687)	(12.970)	(11.928)
Single without children	22.37***	34.18***	31.19***	22.56**	10.26	61.64***	43.36**	18.52[a]	-11.11	25.21	24.66	24.14
	(4.553)	(12.069)	(9.880)	(9.848)	(7.058)	(22.351)	(19.671)	(13.192)	(7.992)	(24.872)	(16.761)	(21.368)
Single with children	-25.42***	-45.14***	-14.01	-15.07	-51.42***	-57.72***	-24.13	-51.81**	-75.53***	-67.13***	-25.61	-51.54**[b]
	(6.462)	(16.674)	(12.700)	(15.293)	(7.779)	(16.459)	(23.230)	(19.516)	(8.158)	(23.732)	(20.270)	(21.808)
Other household types	-33.07***	-30.89***	-37.17***	-43.28***	-60.66***	-36.49**	-64.61***	-69.53***	-59.58***	-34.83*	-49.48***	-65.74***
	(3.604)	(11.234)	(9.378)	(8.187)	(5.041)	(14.146)	(13.367)	(13.463)	(5.585)	(17.398)	(11.795)	(13.835)
Urban	-1.76	-2.92	-3.14	17.98	28.85**	44.75*	43.58**	9.71	16.87*	14.61	31.60	24.81
	(7.839)	(22.769)	(13.974)	(11.790)	(10.746)	(22.780)	(18.750)	(19.801)	(9.290)	(25.423)	(19.070)	(19.152)
Midwest	-12.87***	-37.38***	-29.48**	-32.62***[ac]	-14.77**	-40.12**	-39.70**	-34.16**	-26.10***	-54.46***	-68.96***	-45.67***[b]
	(4.594)	(11.517)	(13.937)	(6.694)	(6.739)	(16.969)	(17.880)	(14.379)	(7.979)	(19.018)	(17.081)	(15.619)
South	-30.19***	-54.58***	-37.04**	-42.28***[a]	-26.61***	-61.47***	-59.39***	-61.98***[c]	-31.57***	-65.73***	-64.35***	-65.94***
	(4.017)	(11.684)	(15.024)	(6.812)	(7.653)	(16.780)	(17.851)	(13.198)	(7.746)	(20.561)	(16.386)	(15.999)
West	7.23	-11.08	5.22	-9.28	28.07***	6.74	-6.57	11.33	11.81	-2.07	-27.62	8.91
	(6.077)	(10.773)	(17.789)	(9.137)	(8.815)	(21.895)	(20.534)	(14.591)	(11.913)	(23.277)	(24.249)	(16.037)

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	Dairy				Fruits				Vegetables			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Age	0.83***	0.92***	0.96***	0.66***	1.72***	1.57***	1.55***	1.28***	1.39***	2.15***	1.16***	0.71**[e]
	0.83***	(0.241)	(0.204)	(0.177)	1.72***	(0.397)	(0.308)	(0.211)	1.39***	(0.536)	(0.314)	(0.291)
Family size	-17.41***	-18.31***	-19.85***	-16.59***	-23.11***	-22.96***	-24.09***	-18.74***	-30.23***	-28.69***	-34.18***	-30.51***
	(1.474)	(4.345)	(4.612)	(3.483)	(3.135)	(5.158)	(6.567)	(4.740)	(2.844)	(5.716)	(6.410)	(5.165)
Unemployed	24.79	56.79	14.90	-2.33	33.76	97.88	-32.97	25.68	51.26*	19.74	1.58	-14.63
	24.79	(52.809)	(21.728)	(25.089)	33.76	(101.785)	(26.834)	(51.840)	51.26*	(56.459)	(40.015)	(54.494)
White collar job	19.33***	23.23***	17.56**	13.41**	22.65***	28.68**	24.67**	9.34	23.06***	34.81***	43.43***	31.12**
	19.33***	(7.680)	(7.637)	(6.442)	22.65***	(12.775)	(9.894)	(9.686)	23.06***	(11.405)	(12.446)	(14.470)
Second quarter	-1.97	-38.50***	-15.24**	-9.27[ae]	23.22***	24.92**	13.54	9.68	5.96	17.38	-18.05*	-37.24**[bcde]
	(3.447)	(10.753)	(6.834)	(6.205)	(5.078)	(12.300)	(11.856)	(12.732)	(5.161)	(13.280)	(10.355)	(18.456)
Third quarter	-8.04**	-29.78**	-9.58	1.59[e]	6.07	50.05***	39.95***	26.62**[ab]	-10.17	43.24**	-5.06	-24.05[ade]
	(3.575)	(11.081)	(8.258)	(8.687)	(4.943)	(16.164)	(11.182)	(12.249)	(6.427)	(16.408)	(12.971)	(17.792)
Fourth quarter	3.65	-22.96***	7.38	13.14[ade]	-16.34***	16.79	1.60	2.63[a]	3.40	31.72**	-1.02	-1.14[a]
	(4.435)	(8.286)	(8.172)	(8.081)	(4.696)	(10.299)	(11.118)	(11.742)	(5.103)	(12.059)	(13.085)	(16.727)
Observations	77,676				77,676				77,676			

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	Fats and oils				Beverages			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Did not receive SNAP and first income quartile	0.57	5.11	-11.63	-5.14	-22.62*	11.15	-54.39*	-77.04***ce
	(3.765)	(7.612)	(7.179)	(7.999)	(12.329)	(27.437)	(27.729)	(24.845)
Did not receive SNAP and second income quartile	7.34**	10.15*	-8.40	-3.19bd	11.02	26.07	-50.48**	-21.83bd
	(3.285)	(5.881)	(6.958)	(7.161)	(9.945)	(25.988)	(21.299)	(23.178)
Did not receive SNAP and third income quartile	11.04***	11.12	1.33	1.22	37.04***	60.53**	-7.35	8.90
	(2.591)	(6.900)	(8.086)	(8.454)	(10.416)	(25.811)	(26.577)	(22.490)
Did not receive SNAP and fourth income quartile	36.60***	39.99***	22.32**	18.01*	93.94***	124.98***	77.69**	85.67***
	(3.490)	(9.954)	(8.620)	(9.364)	(11.520)	(27.647)	(33.637)	(29.062)
Non-Hispanic White	2.80	10.55*	1.99	3.84	12.44	25.51	2.59	19.33
	(3.803)	(6.160)	(6.800)	(4.718)	(10.425)	(21.814)	(17.345)	(19.604)
Non-Hispanic Black	-3.85	9.01	-5.56	-6.26	-35.71***	-9.25	-37.60	-23.02
	(5.140)	(11.670)	(7.809)	(7.183)	(12.668)	(40.274)	(25.559)	(28.694)
Non-Hispanic Asian	25.70***	9.19	23.59**	6.26	-55.57***	-68.76**	-39.52	-74.24**
	(7.225)	(13.087)	(10.109)	(10.400)	(15.920)	(26.553)	(35.142)	(27.656)
Non-Hispanic Native American/ Pacific Islander/ Multiracial	5.01	3.31	-11.90	-2.51	-0.62	57.95	19.30	54.48*
	(5.982)	(9.237)	(10.708)	(6.720)	(15.209)	(40.975)	(30.985)	(29.258)
Married with children	-18.68***	-17.97**	-10.34*	-28.02***f	-21.55**	-12.16	-14.78	-49.86**
	(3.668)	(7.321)	(5.789)	(6.638)	(8.697)	(23.740)	(21.639)	(19.257)
Single without children	-0.78	5.63	0.96	-4.33	34.84***	93.14***	53.89**	58.10***a
	(3.074)	(7.720)	(6.906)	(7.974)	(9.746)	(23.279)	(20.401)	(18.596)
Single with children	-26.24***	-29.69***	-2.13	-25.61***bd	-30.62	-7.62	22.28	-60.47***f
	(6.206)	(8.557)	(8.018)	(8.947)	(19.155)	(33.509)	(33.774)	(20.509)

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	Fats and oils				Beverages			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Other household types	-25.35***	-12.84*	-12.12*	-31.72***[ef]	-24.49***	-19.97	-6.50	-33.74*
	(2.850)	(6.613)	(6.522)	(6.488)	(6.931)	(22.494)	(21.682)	(16.832)
Urban	3.61	7.58	8.52	12.06**	-6.35	15.06	17.25	20.48
	(3.650)	(9.840)	(8.661)	(5.891)	(16.138)	(31.772)	(40.913)	(28.340)
Midwest	-7.07**	-7.35	-8.66	-13.12**	-16.25	-23.60	-24.01	-21.48
	(2.775)	(7.021)	(5.201)	(6.454)	(9.828)	(19.527)	(24.918)	(16.166)
South	-9.35***	-15.91***	-11.59**	-10.57	0.47	-40.59**	-23.70	-17.43
	(2.685)	(5.027)	(4.920)	(6.849)	(9.681)	(19.277)	(22.384)	(16.403)
West	1.98	3.57	4.75	-2.33	5.56	16.87	-15.27	-3.72
	(3.475)	(6.696)	(7.063)	(6.643)	(13.884)	(22.044)	(35.295)	(30.887)
Age	0.67***	0.61***	0.73***	0.54***	1.65***	1.94***	1.41***	0.89*
	0.67***	(0.181)	(0.144)	(0.116)	1.65***	(0.540)	(0.396)	(0.470)
Family size	-6.18***	-5.97***	-8.86***	-2.41	-39.71***	-28.70***	-55.40***	-36.35***[d]
	(1.309)	(2.134)	(3.166)	(2.357)	(3.229)	(8.476)	(9.133)	(5.920)
Unemployed	14.36	30.87	-2.74	-15.57	38.70	38.12	-60.74*	-102.11**[bc]
	14.36	(59.736)	(15.752)	(13.132)	38.70	(97.995)	(32.517)	(49.908)
White collar job	10.52***	9.12**	2.06	6.14	5.84	18.53	28.67*	5.02
	10.52***	(4.386)	(4.688)	(4.567)	5.84	(14.247)	(14.720)	(17.700)
Second quarter	-0.19	-6.21	2.71	0.30	14.52**	-17.03	-5.71	-2.45
	(2.954)	(4.868)	(5.134)	(6.589)	(7.180)	(19.262)	(16.101)	(20.339)
Third quarter	-4.25	-8.83	5.27	1.17	0.86	12.82	9.69	1.91
	(3.002)	(5.438)	(5.755)	(4.659)	(8.206)	(17.543)	(14.291)	(19.235)
Fourth quarter	3.35	4.29	5.27	10.34*	-6.05	24.38	20.00	10.84
	(3.008)	(6.224)	(4.712)	(5.364)	(8.534)	(19.332)	(17.560)	(17.848)
Observations		77,676				77,676		

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Variables	Desserts 2016–19	Desserts 2020	Desserts 2021	Desserts 2022	Prepared meals 2016–19	Prepared meals 2020	Prepared meals 2021	Prepared meals 2022	Other FAH not elsewhere classified 2016–19	Other FAH not elsewhere classified 2020	Other FAH not elsewhere classified 2021	Other FAH not elsewhere classified 2022
Did not receive SNAP and first income quartile	-0.02	15.55	-48.25**	-31.76*[bd]	-6.36	5.23	-59.57**	-89.92***[bce]	-21.28**	-4.93	-67.00***	-66.85***
	(8.299)	(18.611)	(18.636)	(15.842)	(10.433)	(23.469)	(23.661)	(28.984)	(10.343)	(26.848)	(24.647)	(21.658)
Did not receive SNAP and second income quartile	19.29**	25.86	-50.64***	-4.02[bdf]	25.65**	29.87	-32.56	-69.91***[bcde]	11.45	15.74	-61.46**	-18.87[bd]
	(8.029)	(17.706)	(16.950)	(14.106)	(11.200)	(21.313)	(21.955)	(23.496)	(9.105)	(28.602)	(23.452)	(18.625)
Did not receive SNAP and third income quartile	33.83***	27.72	-2.28	1.12[c]	50.09***	71.50***	31.68	-23.84[ce]	35.87***	41.83	1.87	18.48
	(7.476)	(17.213)	(18.271)	(13.322)	(12.052)	(20.460)	(22.663)	(24.653)	(8.091)	(33.242)	(22.647)	(23.748)
Did not receive SNAP and fourth income quartile	69.22***	80.48***	38.85*	40.33**	115.73***	198.69***	152.72***	79.06**[ae]	84.13***	101.90***	69.94**	85.55***
	(8.065)	(21.988)	(21.230)	(17.848)	(13.579)	(31.536)	(39.193)	(29.572)	(9.659)	(36.863)	(28.352)	(22.799)
Non-Hispanic White	38.82***	40.83**	27.18	50.76***	78.70***	94.68***	71.85***	106.64***	73.34***	88.18***	70.61***	90.14***
	(8.183)	(18.915)	(16.194)	(10.686)	(8.644)	(17.091)	(17.699)	(16.556)	(8.212)	(15.747)	(15.633)	(14.054)
Non-Hispanic Black	-24.74***	11.11	-33.06	4.25	-29.59***	-7.62	-39.26*	-5.68	2.95	79.49*	-13.78	37.42*[d]
	(8.909)	(28.373)	(20.207)	(14.842)	(10.975)	(24.331)	(20.339)	(19.290)	(10.970)	(41.204)	(22.919)	(21.027)
Non-Hispanic Asian	2.57	-18.18	16.01	17.83	8.34	23.82	23.39	28.87	12.59	51.16*	90.35**	5.47
	(9.225)	(19.048)	(30.516)	(15.442)	(12.743)	(24.098)	(25.179)	(24.541)	(12.919)	(28.393)	(38.608)	(25.115)
Non-Hispanic Native American/Pacific Islander/Multi-racial	19.28*	43.52	17.94	60.60***[c]	56.27***	85.18***	111.84***	110.71***[c]	51.49***	194.11***	43.15*	120.14***[acdf]
	(11.176)	(27.995)	(18.501)	(13.269)	(11.859)	(28.248)	(40.181)	(23.600)	(11.982)	(67.592)	(25.091)	(23.605)

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	Desserts				Prepared meals				Other FAH not elsewhere classified			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Married with children	-19.01**	-8.81	-15.98	-29.98**	-10.70	-33.01*	-34.20	-29.04	-17.17**	-12.11	-12.13	-24.91
	(7.356)	(13.305)	(12.830)	(11.724)	(8.083)	(18.136)	(22.872)	(19.474)	(6.489)	(20.242)	(20.278)	(16.728)
Single without children	21.11***	35.17*	57.50***	38.92***[b]	74.75***	113.22***	140.08***	73.10***	3.40	66.47**	36.36**	25.69[a]
	(6.762)	(18.323)	(16.959)	(11.556)	(9.698)	(24.140)	(32.658)	(23.157)	(6.014)	(26.486)	(16.713)	(18.326)
Single with children	-14.96	-20.38	0.20	-25.49	4.29	-34.63	1.83	-20.90	-49.29***	-35.73	34.37	-41.30[bf]
	(12.977)	(20.255)	(19.140)	(15.555)	(14.248)	(33.635)	(26.637)	(30.987)	(12.420)	(30.165)	(24.069)	(25.076)
Other household types	-35.73***	-34.34**	-21.80*	-42.16***	-9.95	-7.64	-32.86	-30.02	-51.24***	-47.32**	-37.63*	-34.31*
	(5.881)	(15.583)	(11.018)	(10.059)	(9.640)	(23.071)	(20.855)	(19.408)	(6.554)	(18.640)	(18.684)	(18.487)
Urban	4.52	5.93	7.04	23.22	35.24***	70.43***	45.85*	41.57**	-15.19	-37.01	10.88	3.09
	(7.601)	(14.878)	(14.247)	(17.713)	(9.361)	(21.029)	(23.416)	(20.431)	(11.009)	(30.443)	(28.465)	(29.119)
Midwest	-10.20	-33.43*	-29.22*	-15.55	18.32**	41.28**	-21.64	-1.75[d]	4.21	-31.11*	-18.81	-9.52
	(7.344)	(18.658)	(16.363)	(12.023)	(8.206)	(16.892)	(23.083)	(19.083)	(7.854)	(16.817)	(19.447)	(21.571)
South	-17.35**	-43.69**	-33.88*	-27.93**	1.40	10.77	-15.64	-14.60	-9.56	-47.24**	-15.66	-38.61**
	(6.950)	(18.032)	(17.630)	(10.947)	(8.815)	(20.073)	(26.029)	(19.051)	(7.399)	(18.154)	(21.374)	(18.385)
West	0.03	-29.35	-16.19	-5.34	65.21***	77.53***	29.78	34.81	19.36*	-1.98	2.80	4.65
	(7.377)	(19.674)	(21.427)	(15.986)	(8.910)	(19.420)	(27.226)	(21.718)	(10.848)	(20.987)	(26.368)	(21.681)
Age	2.10***	1.32***	1.72***	1.69***	1.21***	0.26	0.80	0.87**	0.91***	0.99	1.26***	0.34
	2.10***	(0.395)	(0.293)	(0.267)	1.21***	(0.479)	(0.491)	(0.410)	0.91***	(0.610)	(0.393)	(0.296)
Family size	-12.73***	-18.69***	-22.45***	-13.16***	-37.60***	-35.96***	-47.27***	-43.41***	-27.03***	-24.84***	-42.60***	-33.86***
	(2.521)	(3.803)	(6.242)	(3.981)	(3.403)	(6.214)	(8.769)	(7.948)	(2.944)	(7.649)	(8.967)	(6.585)
Unemployed	47.97*	-24.93	-10.28	20.83	18.22	-54.70	-9.32	43.30	35.94	130.58	-8.61	-114.79***[c]
	47.97*	(58.909)	(32.401)	(64.767)	18.22	(56.373)	(49.696)	(80.659)	35.94	(120.597)	(34.635)	(42.019)
White collar job	15.83***	9.48	25.34**	6.83	35.00***	53.31***	29.82	31.00*	23.91***	32.93**	32.84**	21.34
	15.83***	(10.186)	(9.859)	(10.602)	35.00***	(16.909)	(21.518)	(16.668)	23.91***	(13.632)	(12.782)	(13.352)
Second quarter	-2.62	-23.20**	-9.93	3.77	-2.94	-82.22***	-25.47	-34.65*[ade]	8.36	-5.21	-19.43	-2.57
	(6.195)	(10.762)	(10.853)	(10.720)	(6.751)	(14.344)	(18.617)	(17.859)	(6.495)	(18.976)	(16.422)	(14.636)

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	Desserts				Prepared meals				Other FAH not elsewhere classified			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Third quarter	-11.96*	-13.82	-10.78	13.96[c]	-7.91	-29.26	-19.34	-21.09	-4.09	11.44	-8.70	0.02
	(6.597)	(12.791)	(10.386)	(10.079)	(7.327)	(18.608)	(21.760)	(20.971)	(5.672)	(20.369)	(18.384)	(13.254)
Fourth quarter	11.26	10.82	18.80	43.05***[c]	7.59	-23.97	-29.98	7.70	23.10***	29.80*	-2.32	34.29**
	(7.122)	(13.638)	(13.094)	(12.640)	(8.189)	(16.408)	(21.217)	(18.163)	(6.637)	(16.256)	(15.890)	(14.369)
Observations	77,676				77,676				77,676			

FAH = food at home. SNAP = Supplemental Nutrition Assistance Program.

Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures are deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. Base categories for socioeconomic covariates were omitted and include: the 2016–19 time period, received SNAP, Hispanic, married without children, rural, Northeast, employed, blue collar job, and first quarter, [a] if the difference between 2016–19 and 2020 is statistically different from 0, [b] if the difference between 2016–19 and 2021 is statistically different from 0, [c] if the difference between 2016–19 and 2022 is statistically different from 0, [d] if the difference between 2020 and 2021 is statistically different from 0, [e] if the difference between 2020 and 2022 is statistically different from 0, and [f] if the difference between 2021 and 2022 is statistically different from 0. These are only the marginal effects on the interaction terms in the two-part models.

Source: USDA, Economic Research Service calculations based on the two-part model using U.S. Department of Commerce, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.

Table C.4

Marginal effect of the sociodemographic characteristics interacted with year on annual inflation-adjusted per capita spending, by FAFH category

	Food away from home				Limited-service FAFH			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Did not receive SNAP and first income quartile	194.78***	226.97*	86.93	12.76	56.13**	109.82*	14.15	0.57
	(59.152)	(118.772)	(98.296)	(113.032)	(23.922)	(64.686)	(47.180)	(55.972)
Did not receive SNAP and second income quartile	518.14***	399.91***	303.87***	350.62*** [b]	182.97***	216.44***	105.81**	172.23***
	(49.263)	(100.805)	(86.921)	(100.990)	(20.458)	(54.243)	(48.841)	(54.516)
Did not receive SNAP and third income quartile	893.85***	630.29***	554.94***	562.82***[abc]	284.27***	323.99***	175.26***	207.36***[b]
	(70.260)	(99.991)	(94.469)	(114.519)	(23.692)	(61.323)	(46.392)	(59.741)
Did not receive SNAP and fourth income quartile	1,788.52***	1,177.64***	1,289.15***	1,254.46***[abc]	526.53***	506.27***	363.98***	431.16***[b]
	(84.791)	(111.070)	(121.517)	(114.452)	(30.059)	(60.931)	(54.771)	(61.909)
Non-Hispanic White	76.30	123.07	-25.61	-3.90	0.76	4.01	-129.29*	6.69
	(61.486)	(113.815)	(112.518)	(92.869)	(26.864)	(66.919)	(71.790)	(44.708)
Non-Hispanic Black	-255.18***	-64.75	-292.57**	-279.14**	-38.42	2.26	-168.99*	23.35
	(82.542)	(99.288)	(143.438)	(130.525)	(35.517)	(85.156)	(91.273)	(83.246)
Non-Hispanic Asian	42.31	-131.46	-180.00	-192.57	-83.86**	-198.09**	-190.30**	-86.82
	(87.928)	(140.224)	(150.462)	(134.580)	(39.666)	(78.521)	(76.721)	(76.033)
Non-Hispanic Native American/Pacific Islander/ Multiracial	59.49	167.17	-3.54	201.21	43.20	138.42	-121.63	86.95[d]
	(79.734)	(172.918)	(179.463)	(197.011)	(36.754)	(93.982)	(88.979)	(83.900)
Married with children	-305.25***	-246.60**	-223.86**	-224.91**	1.78	-84.78	-44.04	-39.72
	(42.660)	(100.634)	(89.217)	(91.698)	(19.242)	(57.745)	(57.458)	(57.192)
Single without children	358.59***	214.46*	272.20***	373.62***	250.71***	220.96***	162.12***	202.32***
	(60.629)	(118.958)	(79.603)	(92.938)	(30.197)	(63.905)	(50.496)	(45.536)
Single with children	-362.15***	-140.75	-287.11***	-60.47[c]	-16.63	-14.98	-39.94	97.37
	(61.422)	(185.964)	(102.282)	(138.250)	(25.338)	(103.280)	(64.819)	(103.382)
Other household types	-332.84***	-209.14*	-174.32**	-152.11**[c]	6.30	-18.86	19.30	14.88
	(46.422)	(107.233)	(72.881)	(68.459)	(21.110)	(60.011)	(43.207)	(46.187)
Urban	384.60***	389.60***	375.95***	393.96***	128.23***	155.47**	137.18**	191.68***
	(91.563)	(111.245)	(92.106)	(113.125)	(28.160)	(76.599)	(55.156)	(44.722)

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	Food away from home				Limited-service FAFH			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Midwest	-53.11	32.66	20.55	-126.25	11.59	46.63	75.77*	-6.65
	(56.481)	(105.045)	(88.706)	(99.691)	(24.254)	(62.299)	(39.438)	(59.593)
South	-38.12	4.80	10.38	-36.69	20.25	-23.74	63.15	2.40
	(42.737)	(111.338)	(93.603)	(112.947)	(21.855)	(61.834)	(45.212)	(64.861)
West	227.67***	141.04	67.10	163.59	133.39***	142.44*	140.50***	123.99**
	(61.998)	(132.368)	(90.920)	(104.788)	(22.998)	(76.262)	(39.741)	(61.151)
Age	-7.58***	-9.41***	-10.46***	-3.50**ef	-8.88***	-7.46***	-7.28***	-6.28***
	-7.58***	(1.951)	(1.848)	(1.598)	-8.88***	(0.971)	(1.082)	(0.931)
Family size	-324.31***	-215.76***	-251.09***	-175.67***ac	-122.74***	-95.64***	-114.49***	-71.86***
	(21.861)	(37.595)	(33.088)	(46.325)	(8.260)	(19.891)	(19.423)	(26.262)
Unemployed	-299.54**	-295.06	59.79	-613.60**f	-127.72*	-26.41	-59.65	-379.98***f
	-299.54**	(299.129)	(228.758)	(241.613)	-127.72*	(238.740)	(116.420)	(103.408)
White collar job	220.85***	198.05***	165.07**	251.58***	102.28***	94.34**	115.92***	111.30***
	220.85***	(58.061)	(67.294)	(55.831)	102.28***	(38.532)	(33.167)	(31.528)
Second quarter	59.34	-675.66***	127.85**	132.65*ade	42.25**	-183.95***	-12.58	36.59ade
	(37.490)	(75.160)	(55.542)	(78.448)	(16.482)	(56.591)	(37.904)	(38.044)
Third quarter	-5.92	-326.32***	169.58**	189.38*abde	25.54	-127.89***	27.59	160.23***acdef
	(40.762)	(76.459)	(77.931)	(95.571)	(18.090)	(44.121)	(43.937)	(46.630)
Fourth quarter	13.27	-272.85***	98.03	71.02ade	15.96	-51.92	-19.59	81.19*e
	(49.775)	(73.726)	(87.548)	(97.481)	(20.924)	(42.971)	(42.628)	(45.230)
Observations		77,676				77,676		

	Full-service FAFH				Other FAFH			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Did not receive SNAP and first income quartile	125.58**	106.43	64.27	3.94	12.40*	-1.21	5.11	-5.81
	(48.286)	(71.310)	(70.263)	(79.587)	(6.643)	(21.793)	(6.934)	(9.507)
Did not receive SNAP and second income quartile	323.79***	166.56***	194.78***	162.99**a	15.96***	5.16	12.02	8.51
	(47.063)	(59.218)	(55.899)	(76.087)	(4.870)	(18.923)	(7.797)	(10.821)
Did not receive SNAP and third income quartile	583.51***	313.59***	362.28***	343.77***abc	35.00***	1.04	16.10**	7.90bc
	(58.990)	(60.612)	(68.374)	(87.161)	(5.717)	(22.200)	(5.311)	(9.055)
Did not receive SNAP and fourth income quartile	1,218.07***	690.89***	909.04***	813.52*** abc	75.41***	12.07	24.61***	21.63**abc
	(70.648)	(97.143)	(97.996)	(100.835)	(6.832)	(24.714)	(7.310)	(8.762)
Non-Hispanic White	39.50	123.42**	109.71*	8.62	12.47**	-13.47*	2.32	-22.33*ac
	(46.389)	(60.688)	(56.930)	(62.566)	(5.519)	(7.207)	(7.772)	(11.107)
Non-Hispanic Black	-235.25***	-81.52	-142.47**	-302.62***e	-0.82	-5.38	18.06	-25.53
	(66.883)	(62.797)	(61.561)	(69.448)	(5.769)	(13.641)	(18.374)	(14.456)

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	Full-service FAFH				Other FAFH			
Variables	**2016–19**	**2020**	**2021**	**2022**	**2016–19**	**2020**	**2021**	**2022**
Non-Hispanic Asian	109.48	80.45	9.53	-60.69	13.11	-8.81	-6.71	-31.57**[c]
	(65.210)	(81.597)	(117.239)	(77.426)	(10.362)	(13.629)	(6.012)	(11.402)
Non-Hispanic Native American/ Pacific Islander/ Multiracial	-9.74	9.68	126.22	104.40	17.54	0.40	-2.38	-2.53
	(66.395)	(110.123)	(116.320)	(131.542)	(10.249)	(22.417)	(8.067)	(20.101)
Married with children	-286.48***	-124.14*	-162.40***	-145.23**[ac]	12.56**	5.46	7.00	-3.87[c]
	(34.517)	(64.312)	(58.787)	(62.089)	(4.539)	(6.485)	(7.546)	(5.250)
Single without children	70.92*	-2.05	137.60**	142.04**	57.42***	2.09	3.01	34.98*[ab]
	(41.358)	(79.214)	(62.580)	(67.444)	(6.749)	(5.633)	(5.567)	(18.191)
Single with children	-379.13***	-126.17	-273.48***	-138.79*[ac]	38.05***	11.13	25.49	4.51[c]
	(51.739)	(92.126)	(80.939)	(70.864)	(7.388)	(22.127)	(27.801)	(12.027)
Other household types	-313.50***	-173.25***	-192.46***	-153.80***[abc]	9.28*	2.94	5.79	-1.21
	(36.816)	(57.118)	(41.058)	(40.954)	(4.782)	(9.847)	(7.843)	(4.726)
Urban	247.10***	223.44***	222.27***	219.13**	2.25	-5.82	7.46	4.80
	(67.259)	(62.808)	(54.228)	(93.338)	(5.090)	(9.936)	(8.138)	(13.325)
Midwest	-76.28*	-25.63	-63.67	-118.98***	15.79***	4.24	12.17	22.47*
	(45.063)	(71.662)	(60.588)	(43.182)	(5.083)	(7.771)	(8.556)	(11.434)
South	-46.21	32.26	-68.97	-11.37	-3.39	1.05	4.82	9.97*
	(32.891)	(74.521)	(61.190)	(50.494)	(4.511)	(8.470)	(5.347)	(5.304)
West	95.77*	6.12	-92.16	56.25[b]	1.74	-1.99	9.07	5.06
	(48.310)	(82.886)	(61.905)	(53.009)	(5.358)	(8.373)	(7.059)	(2.842)
Age	2.91***	-0.96	-1.86	3.50***[ef]	-1.17***	-0.90**	-0.51*	-0.48**
	2.91***	(1.309)	(1.246)	(1.108)	-1.17***	(0.315)	(0.265)	(0.161)
Family size	-199.49***	-130.65***	-129.49***	-122.28***[abc]	-9.55***	-8.86**	-7.03**	-0.86[c]
	(19.122)	(28.505)	(22.761)	(28.626)	(1.530)	(3.445)	(2.651)	(3.435)
Unemployed	-145.04	-230.65*	109.18	-176.36	-24.75	9.67	-13.08	0.64
	-145.04	(119.701)	(150.768)	(179.074)	-24.75	(19.652)	(7.339)	(37.906)
White collar job	101.47***	106.28**	74.72	139.67***	22.04***	2.89	-6.05	5.36
	101.47***	(41.046)	(49.353)	(45.877)	22.04***	(4.802)	(5.467)	(6.394)
Second quarter	26.51	-454.87***	139.33***	83.01[ade]	-12.56**	-46.97***	4.90	9.57**[acde]
	(31.480)	(41.381)	(49.454)	(53.692)	(4.657)	(13.504)	(8.593)	(3.975)
Third quarter	-29.65	-154.06***	136.67**	-2.23[abd]	-5.66	-52.32***	2.84	25.33***[acdef]
	(30.337)	(53.861)	(51.599)	(63.908)	(4.111)	(14.161)	(5.824)	(4.910)
Fourth quarter	-1.23	-176.99***	113.79*	-47.72[ad]	-4.07	-46.26**	1.28	21.03***[acdef]
	(39.225)	(44.364)	(61.109)	(67.246)	(7.337)	(15.205)	(6.512)	(5.820)
Observations	77,676				77,676			

FAH = food at home. SNAP = Supplemental Nutrition Assistance Program.

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Note: Survey weights were used to compute nationally representative coefficient estimates and appropriate standard errors presented in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Nominal expenditures are deflated with regional Consumer Price Indexes for the different food categories using 2022 as the base year. Base categories for socioeconomic covariates are omitted and include: the 2016–19 time period, received SNAP, Hispanic, married without children, rural, northeast, employed, blue collar job, and first quarter, [a] if the difference between 2016–19 and 2020 is statistically different from 0, [b] if the difference between 2016–19 and 2021 is statistically different from 0, [c] if the difference between 2016–19 and 2022 is statistically different from 0, [d] if the difference between 2020 and 2021 is statistically different from 0, [e] if the difference between 2020 and 2022 is statistically different from 0, and [f] if the difference between 2021 and 2022 is statistically different from 0. These are only the marginal effects on the interaction terms in the two-part models.

Source: USDA, Economic Research Service calculations based on the two-part model using U.S. Department of Labor, Bureau of Labor Statistics, Consumer Expenditure Diary Survey public-use microdata and Consumer Price Indexes.