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RESEARCH ARTICLE

The Impact of COVID-19 Vaccination on Food Spending Behavior in the United States

Eliana Zeballos*^a, Wilson Sinclair^a, Keenan Marchesi^a

^a USDA Economic Research Service, Food Economic Division, Washington, D.C., USA

***Corresponding author:** eliana.zeballos@usda.gov

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ABSTRACT

The U.S. government's efforts in response to the pandemic included the development, manufacturing, and distribution of safe and effective COVID-19 vaccines. By the end of 2020, the Food and Drug Administration issued Emergency Use Authorizations for the Pfizer-BioNTech COVID-19 and the Moderna COVID-19 vaccine. Following this authorization, on December 14, 2020, each State received allocations of vaccines and devised individual distribution plans. This study investigates the impact of COVID-19 vaccination on U.S. food spending at home and away from home in 2021 employing fixed-effects regression analysis on quarterly State-level data. The results reveal that higher vaccination rates—measured by the share of the population that is fully vaccinated—are associated with a decrease in food-at-home sales and an increase in food-away-from-home sales. Further analysis reveals nuanced shifts between full-service and limited-service restaurants, indicating increased sales at full-service establishments and decreased sales at limited-service ones, suggesting a trade-off effect between the two restaurant types. The results of this study provide valuable insights for policymakers and industry stakeholders seeking to understand the heterogeneous impacts of vaccinations on food spending.

Keywords: COVID-19; State-level Food Expenditure Series, FES, food-at-home, FAH, food-away-from-home, food spending, COVID-19 vaccines.

Introduction

The U.S. government's efforts in response to the pandemic included the development, manufacturing, and distribution of safe and effective COVID-19 vaccines. By the end of 2020, the Food and Drug Administration (FDA) reviewed and evaluated COVID-19 vaccines for quality, safety, and effectiveness and issued an Emergency Use Authorizations (EUAs) for the Pfizer-BioNTech COVID-19 vaccine for individuals aged 16 and older and the Moderna COVID-19 vaccine for individuals aged 18 and older. After this authorization, on December 14, 2020, each State received allocations of vaccines and formulated unique plans for administering and distributing the vaccine within their jurisdiction.¹

Beyond the immediate health implications, the COVID-19 pandemic has triggered profound shifts in consumer behavior, notably impacting the operations of restaurants and food service establishments. Goolsbee and Syverson² found that from March to mid-May 2020 when shelter-in-place orders were in place there was a migration away from nonessential businesses, such as restaurants, toward more essential businesses such as grocery stores which is in line with observed changes in national food spending trends at this time.³⁻⁵ Similarly, Yenerall et al.⁶ found that as of June 2020, COVID-19 related risk impacted consumer food choices, indicating that risk perception led to changes in how people interacted with restaurants (decreased in-person usage, increased take-out and delivery). They suggest that COVID-19 concerns could continue to influence utilization after they relax. These papers highlight early changes in pandemic behavior however they are unable to provide an understanding of how these policies lead to more long-term changes, and like other studies are limited to changes before 2021. Our paper expands upon these previous works by providing evidence of the impact of increase vaccine prevalence on food spending, while controlling for early behavior shifts that were the result of some of these initial policy actions.

Generally, while several studies investigated early pandemic behavioral responses, few studies exist that examine the role of vaccinations in overall food spending. Cotton et al.⁷ investigated the relationship between consumer credit card spending and vaccination rates finding that the introduction of vaccines, as measured by vaccination rates, lead to early increases in spending in social distancing sensitive industries, such as indoor recreation and restaurants, early in the distribution that dissipated by May 2021. Despite evidence that the changes in restaurant

spending were not heterogeneous by restaurant type throughout the pandemic, few studies have further investigated the direct impact of the policy action and health strategies throughout the pandemic impacted these differences. Further, the extent of the impact on food spending and its makeup is expected to be heterogeneous across geographic locations as the effects are likely influenced by vaccination rates, the prevalence of the disease, the degree of local restrictions, and local economic conditions, which can differ significantly among States.

This study investigates the impact of COVID-19 vaccines on food spending in the U.S. throughout 2021, employing a fixed-effects regression analysis on quarterly State-level data. Data on food spending at both food-at-home (FAH) and food-away-from-home (FAFH) establishments are sourced from the USDA Economic Research Service State-level Food Expenditure Series (FES) from 2010 to 2021. Leveraging the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) as a high-frequency indicator, the annual State-level FES is transformed into quarterly data. Furthermore, the study calculates quarterly share of the population that is fully vaccinated at the State level using the COVID-19 Data Repository by the Center for Systems Science and Engineering at Johns Hopkins University.

This research contributes significantly to existing literature by shedding light on the multifaceted impacts of COVID-19 vaccination on food spending. It does so by investigating the implications of the COVID-19 pandemic, including vaccine usage, on consumer food choices measured by State-level food spending. Using a fixed-effect approach to control for State-specific unobservable characteristics and controlling for other observables that may influence both vaccination participation and food spending, this paper finds that higher vaccination rates—measured by the share of the population that is fully vaccinated—are associated with an increase in total food-away-from-home sales, with full-and limited-service restaurants being impacted differently. While it has been well-documented that overall consumer food spending on food-away-from-home first dropped sharply in 2020 and then began to recover in 2021,²¹ it has been less clear how vaccination and other ongoing health policies contributed to these shifts. Such insights are invaluable to policymakers and industry professionals across many fields as shifts in food spending trends have repercussions across economic and health outcomes. Previous studies investigating the impact of economic shocks on consumer spending, such as during the Great Recession, provide a

similar avenue to understand how these shifts could lead to changes in consumer health. For instance, Todd & Morrison²² found that decreased eating out was one of the contributing factors associated with the more long-term improvements in dietary quality that followed the recession. However, here we observe that in aggregate, consumers were quick to reintroducing food-away-from-home spending back into their budgets. In addition, early work investigating the changes in obesity rates during the pandemic has found that overall obesity rates increased significantly between March 2020 and March 2021.²³ This paper addresses how food spending behavior changed in response to the various COVID-19 policies, a necessary precursor to understanding the role of food spending behavior plays in dietary health outcomes, which were also impacted by these policies.

Materials and Methods

Data

This study integrates several datasets:

1. The USDA-ERS Food Expenditure Series (FES) at the State level provides information on Food at Home (FAH) and Food Away from Home (FAFH) spending.
2. The BLS Quarterly Census of Employment and Wages (QCEW) is used to convert the annual State-level Food Expenditure Series data into quarterly data.
3. Johns Hopkins' daily COVID-19 vaccination at the State level used to determine quarterly fully vaccinated individuals at the State level.

To control for varying characteristics over time at the State level that is not controlled by the fixed-effect model, we use:

4. Johns Hopkins' daily COVID-19 deaths at the State level used to determine quarterly deaths per 100,000 individuals at the State level.
5. Data from the COVID-19 U.S. State Policy (CUSP) database are used to construct various measures of pandemic-related restrictions, such as stay-at-home orders/lockdowns, masking mandates, and mandated restaurant closures.
6. Bureau of Economic Analysis' quarterly personal current transfer receipts tables are used to construct quarterly transfers to households and income at the State level.
7. The BLS monthly unemployment data at the State level is used to calculate the quarterly unemployment rate at the State level.

State-Level Food Expenditure Series

The USDA-ERS's State-Level Food Expenditure Series (State-Level FES) measures the total value of

food acquired in each State in the U.S. as well as the District of Columbia. The State-Level FES provides information about consumer food acquisitions and spending behavior across States and time and follows a similar methodology to that used in the national-level FES but with a different underlying dataset.⁸ The national-level estimates are based on retail food sales reported in the U.S. Department of Commerce, Bureau of the Census's Economic Census, which is published every 5 years.⁹ Three annual surveys are used to interpolate between years and also extrapolate lagged data forward. The State-level FES estimates are based on employment counts reported in the Quarterly Census of Employment and Wages (QCEW). Industries are selected under the same North American Industry Classification System (NAICS) codes as the national-level FES. Foods sales are calculated following the methodology developed by Zeballos and Marchesi,¹⁰ who developed a two-step process to calculate sales information based on employment headcounts. Further adjustments are made to the sales data within each industry to exclude nonfood sales and avoid double counting. Finally, to make the national- and State-level estimates comparable, the State-level estimates are benchmarked to the FES at the national level each year. To make sensible comparisons across time periods, each nominal value is deflated by the BLS' Regional Consumer Price Index (CPI).¹¹ Using 1988 as the base year, FAH expenditures are deflated with the CPI for FAH and FAFH expenditures are deflated with the CPI for FAFH.¹²

The State-level FES estimates present information only on food sales and excludes non-food sales: for FAH, home production, and donations are excluded; for FAFH, food revenues at schools and colleges, the value of FAFH furnished to employees or part of a secondary activity, and donations and government assistance are excluded.^{8,12}

Quarterly Census of Employment and Wages

The BLS's Quarterly Census of Employment and Wages (QCEW) provides a quarterly count of employment and wages reported by employers covering more than 95 percent of U.S. jobs, available at the county, MSA, State, and national levels by industry.¹³ To convert the annual State-level FES to quarterly data, we use a deflator constructed using the number of employees at the State level by quarter for the main industries that comprise FAH and FAFH sales in the FES. We use the following North American Industry Classification System (NAICS) codes:

- 445110: Supermarkets and other grocery (except convenience) stores
- 445120: Convenience Stores

- 452311: Warehouse clubs and supercenters
- 4452: Specialty Food Stores
- 722511: Full-service restaurants
- 722513: Limited-service restaurants
- 722514: Cafeterias, grill buffets, and buffets
- 722515: Snack and nonalcoholic beverage bars
- 722410: Drinking places
- 7211: Hotels and casinos

COVID-19 data

The Johns Hopkins University (JHU) Center for Civic Impact COVID-19 United States Cases by County Dashboard provides the cumulative number of fully vaccinated individuals and confirmed deaths. These data are at the county level and subsequently aggregated to the State level.¹⁴ We use the daily cumulative counts to generate new daily measures of fully vaccinated and deaths for each State. We generate quarterly measures of fully vaccinated individuals and new deaths throughout 2021 by State. Furthermore, we control for the size of each State by calculating the share of the population in each State that is fully vaccinated and COVID-19 related deaths per 100,000 individuals.

Transfers:

The Bureau of Economic Analysis (BEA) publishes several regional data by quarter. This study uses two tables: State quarterly personal income summary and personal current transfer receipts. The first one provides information on quarterly population and personal income at the State level. The second provides information on quarterly transfers at the State level. Population numbers are used to calculate per capita information on all the variables used in the regression analysis.

Personal income for a State is the income received by, or on behalf of, all resident in a State, regardless of the duration of residence, except for foreign nationals employed by their home governments in the U.S. Personal income includes income received from all sources: from participation as laborers in production, from owning a home or business, from the ownership of financial assets, and from government and business in the form of transfers. It includes income from domestic sources as well as from the rest of the world. Persons include individuals, nonprofit institutions that primarily serve individuals, private noninsured welfare funds, and

private trust funds. In this study, personal income is separated from transfers to analyze them separately.¹⁵

Personal current transfer receipts, which is part of personal income, are benefits received by persons for which no current services are performed. They are payments by governments and businesses to individuals and nonprofit institutions serving individuals. Estimates are prepared for approximately 50 subcomponents of transfer receipts, classified by source and in some cases, recipient as well.¹⁵

Unemployment data

The Bureau of Labor Statistics (BLS) constructs monthly State employment and unemployment estimates from State-level data from its current population survey. With this data, we construct quarterly unemployment rates equal to the unemployment count divided by the labor force at the State level.^{16,17}

Restrictions

The COVID-19 U.S. State Policy (CUSP) database collects and documents the start and end periods for the health and social policies enacted across all 50 states and the District of Columbia in response to the COVID-19 pandemic.¹⁸ Information was collected searching government websites, media coverage, and complementary tracking efforts and includes stay-at-home orders, masking mandates, and industry specific closures, such as restaurants. The database is maintained by researchers at Boston University School of Public Health and Johns Hopkins Bloomberg School of Public Health. With this information, we construct quarterly lockdown restrictions, restaurant closure mandates, and mask mandates, which are evaluated on a trinary scale, with a value of 1 indicating that the restriction was enforced during the specified quarter, a value of 0 indicating no restriction before the pandemic started, and 2 indicating no restriction after a restriction was in placed. We provide a summary of these measures and dates associated with these restrictions.

Regression analysis

We perform a fixed-effects regression analysis on quarterly State-level data to examine the relationship between FAH and FAFH sales and COVID-19 vaccines. To econometrically estimate the relationship between FAH and FAFH expenditures and vaccines, we use the following specification.

$$\begin{aligned} \ln(\text{Sales}_{sq}) - \ln(\text{Sales}_{sq-4}) &= \beta_0 + \beta_1 \text{Vaccines}_{sq} + \beta_2 \text{Deaths}_{sq} + \beta_3 \text{Mask}_{sq} + \beta_4 \text{Lockdown}_{sq} \\ &+ \beta_5 \text{RestClosure}_{sq} + \beta_6 [\ln(\text{trans}_{sq}) - \ln(\text{trans}_{sq-4})] + \beta_7 [\ln(\text{unemp}_{sq}) \\ &- \ln(\text{unemp}_{sq-4})] + \beta_8 [\ln(\text{income}_{sq}) - \ln(\text{income}_{sq-4})] + \beta_9 [\ln(\text{TFood}_{sq}) \\ &- \ln(\text{TFood}_{sq-4})] + \text{StateFixedEffects}_s + \epsilon_{sq} \end{aligned}$$

We analyze the growth rate of food sales (FAH or FAFH) where s indexes State and q indexes quarter/year. To estimate the growth rate, we calculate the difference between the log of food sales in a given quarter of one year and the log of food sales in the same quarter of the previous year. By doing this, we control for potential seasonality and non-stationarity in the data. We regress on Vaccines_{sq} , which is the share of the population that is fully vaccinated in State s at the end of quarter q . Deaths_{sq} , which is the number of COVID-19 related deaths per 100,000 individuals in State s and quarter q . We further regress on Mask_{sq} , Lockdown_{sq} , and RestClosure_{sq} which are vectors which contain a series of binary indicators to indicate whether there was a policy in place in States in quarter q , and whether we are looking at post-policy in State's quarter q , to control for any other potential differences that may result from post-policy. Similar to sales, we approximate the growth rate of transfers, unemployment rate, and income, by differencing the log of the variable in a given quarter of one year and the log of the variable in the same quarter of the previous year. Finally, we control for the growth of total food spending and local time-invariant characteristics with State fixed effects.

Results

The main findings of the regression analysis are summarized in Table 1. Note that when regressing a linear or binary independent variable, or X term, on a logarithmically transformed Y variable, the coefficient interpretation is as follows: a one-unit change in the X is associated with a $(e^{\beta} - 1)$ percent change in the Y variable.¹⁹

Column 1 focuses on food-at-home (FAH) spending and reveals that a higher vaccination rate, as measured by the share of the population that is fully vaccinated, is significantly related to a decrease in the growth of FAH sales— for every percentage point increase in the share of the population that is

fully vaccinated, FAH sales decreases by 0.26 percent. Moving on to Column 2, which examine food away from home (FAFH) spending, the analysis indicates that a higher vaccination rate is significantly related to an increase in FAFH sales— for every percentage point increase in the share of the population that is fully vaccinated, FAFH sales increases by 0.65 percent or about 8 billion U.S. dollars.

Given previous research which highlighted the disparity in consumer spending by restaurant type,^{3,20} we expand our analysis to investigate differences between full-service and limited-service restaurants separately (Columns 3 and 4, respectively). Results show that a higher vaccination rate is associated with heterogeneous shifts in spending between restaurant types, with an increase in food sales at full-service establishments and a decrease in food sales at limited-service restaurants—for every percentage point increase in the share of the population that is fully vaccinated, food sales at full-service restaurants increases by 0.51 percent while food sales at limited-service restaurants decrease by 0.15 percent. The decrease in limited-service restaurant spending and increase in full-service restaurant spending is likely explained by the trade-off consumers face between the two types of establishments. Full-service restaurants were likely disproportionately impacted by restaurant specific restrictions, often operating primarily out of their dining room, which frequently were either closed or were subjected to large capacity restrictions, which limited-service restaurants were able to work around via other service modes like drive-thru's. Despite many of these lifting by July 2020, consumers spending trends show that spending at full-service restaurants did not immediately recover.³ However, evidence here highlights the importance of vaccinations in the increased spending at full-service restaurants, potentially indicating an additional level of safety provided by vaccinations to return to on premises, which saw a resurgence in terms of utilization at this restaurant type during this time frame.⁴

Table 1: Coefficients and SE from first difference regressions of COVID-19 vaccination on food at home, food away spending, and by outlet type.

	(1)	(2)	(3)	(4)
	Food at home	Food away from home		
		All	Full-service	Limited service
Fully vaccinated individuals per capita	-0.23*** (0.034)	0.50*** (0.026)	0.41*** (0.022)	-0.14*** (0.020)
Deaths per 100,000 individuals	0.00 (0.008)	-0.01 (0.006)	-0.02*** (0.005)	0.02*** (0.005)
Mask mandate	0.02* (0.009)	-0.02*** (0.007)	-0.01* (0.006)	0 (0.005)
Lockdown mandate	-0.01 (0.014)	-0.02 (0.011)	0.02** (0.009)	-0.02** (0.008)
Restaurant closure mandate	0.07*** (0.015)	-0.03** (0.011)	-0.05*** (0.009)	0.05*** (0.008)
Personal current transfer receipts growth	0.11*** (0.013)	-0.26*** (0.010)	0.20*** (0.009)	-0.18*** (0.008)
Unemployment rate growth	0.11*** (0.007)	-0.13*** (0.006)	-0.09*** (0.005)	0.08*** (0.004)
Personal income growth	-0.17*** (0.045)	-0.05 (0.035)	0.12*** (0.027)	0.03 (0.024)
Total food spending	1.17*** (0.021)	0.51*** (0.016)		
Total food away from home spending			1.09*** (0.014)	0.86*** (0.013)
Constant	0.02*** (0.002)	0.02*** (0.001)	-0.03*** (0.001)	0.01*** (0.001)
Observations	2,244	2,244	2,244	2,244
R-squared	0.60	0.91	0.97	0.93
Number of States	51	51	51	51

Note: Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Source: authors calculations.

Discussion

This study examines the impact of the COVID-19 vaccination on sales at food-at-home (FAH) and food-away-from-home (FAFH) establishments. For FAH sales, a higher vaccination rate is significantly associated with a 0.26 percent decrease in FAH sales for each additional percentage point increase in the share of the population that is fully vaccinated. Examining food-away-from-home (FAFH) spending, reveals a contrasting trend, with a higher vaccination rate correlating with a substantial 0.65 percent increase in FAFH sales. Expanding the analysis to distinguish between full-service and limited-service restaurants, the results highlight heterogeneous shifts. A higher vaccination rate is

linked to increased food sales at full-service establishments and decreased sales at limited-service restaurants. This divergence suggests a trade-off effect between the two restaurant types.

The discrepancy in findings between full- and limited-service restaurants may be attributed to the inherent differences between these two types of establishments. Full-service restaurants typically offer food and alcohol to seated customers who pay after eating and receive amenities such large dining areas, table service and non-disposable dishware. In contrast, limited-service or fast-food restaurants prioritize convenience and have limited menus, sparse dining amenities, and no table service.

When restaurants were required to put in a variety of safety measures that primarily impacted their dining rooms, or shut them down completely, it is unsurprising to see this disproportionately impact on full-service restaurants. The limited physical interaction with customers at limited-service restaurants, such as customers being able to obtain food via delivery and takeout services, made it easier for these establishments to quickly adapt to restrictions while full-service restaurants had to reinvent themselves to expand these services. This may explain why we have seen similar pre-pandemic spending levels at limited-service restaurants by the second half of 2020, while full-service restaurants took slightly longer to bounce back, and returned to pre-pandemic spending in March 2021.²¹ It has been documented that while limited-service restaurants tended to see an increase in spending outside of on-premises, such as drive-thru or delivery, full-service restaurants also saw a shift towards carry-out and delivery. The evidence provided here about increased spending at full-service restaurants as vaccination prevalence increased, likely is associated with the increased spending on-premises at full-service restaurants found in other studies taking place throughout 2021.⁴

There are limitations of this study. First, to estimate the effects of COVID-19 vaccination on FAH and FAFH spending, we use a fixed-effects model, which is essentially a first difference model, with 44 observations for each State (36 quarters from 2011 to 2019 and 8 quarters in 2020 and 2021). We calculated the difference between variables over these periods which removes all unobservable State characteristics that do not change during this time (e.g., demographic variables, political affiliation, etc.). What remains are variables that vary during this time and the model controls for as many of these potential variables. A potential limitation of this work is that, although we are able to tease out unobservable time-invariant State unobserved characteristics or within-state variation, some varying, unobservable disturbances may still be correlated with the explanatory variable of interest (vaccination rates). For example, both Goolsbee and Syverson² and Yenerall et al.⁶ highlight the heterogeneity that can be found at the county-level in relation to behavioral shifts. While our paper is unable to identify more granular geographic shifts in policy, we still identify changes in food behavior, suggesting that work featuring spending trends at a more focused geographic levels over long-time trends could better investigate the potential heterogeneity in spending that many of these policies or health measures, like vaccinations, had

on food choice and expenditure behavior. Second, while it is well-known that FAFH spending is associated with lower diet quality,²² the specifics of this association are ever-changing and complex. Though FAH was the predominant outlet for food spending during the early pandemic, adult obesity in the U.S. saw a significant increase²³ potentially due to a pandemic-caused sedentary lifestyle among portions of the population, indicating that the extent of changes in health-related outcomes is likely to be an important focus for future work. This paper lays the groundwork for further research into the post-pandemic relationship between how consumers purchase food and the subsequent health outcomes. Third, while we are able to aggregate these restrictions up to the quarterly level, many changes were occurring at a more rapid, daily pace, which could lead to additional unobservable shifts within a State over time. Finally, since we are looking at State-level averages, we cannot talk about the distribution of expenditures or how the key variables that we look at vary across population subgroups.

Conclusion

The influence of the COVID-19 vaccination on food spending in 2021 was complex and varied. The results show that a higher vaccination rate is significantly associated with a decrease in FAH sales. While results reveal a contrasting trend for FAFH spending, with a higher vaccination rate correlating with an increase in sales. Moreover, a higher vaccination rate is linked to increased food sales at full-service establishments and decreased sales at limited-service restaurants, suggesting a trade-off effect between the two restaurant types. The results of this study provide valuable insights for policymakers and industry stakeholders seeking to understand the heterogenous impacts of vaccinations on FAH and FAFH spending.

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References

1. U.S. Department of Health and Human Services. COVID-19 Vaccines. 2023.
2. Goolsbee, A.; Syverson, C. Fear, lockdown, and diversion: Comparing drivers of pandemic economic decline 2020. *Journal of public economics*. 2021, 193, 104311, doi: [10.1016/j.jpubeco.2020.104311](https://doi.org/10.1016/j.jpubeco.2020.104311).
3. Marchesi, K.; McLaughlin, P. W. COVID-19 Working Paper: The Impact of COVID-19 Pandemic on Food-Away-From-Home Spending. *USDA Administrative Publications*. 2022, doi: [10.22004/ag.econ.327337](https://doi.org/10.22004/ag.econ.327337).
4. Marchesi, K.; McLaughlin, P.W. COVID-19 Working Paper: Food-Away-From-Home Acquisition Trends Throughout the COVID-19 Pandemic. *USDA Administrative Publications*. 2022.
5. Zeballos, E.; Sinclair, W.; Park, T. Understanding the Components of US Food Expenditures During Recessionary and Non-Recessionary Periods. *USDA, ERS Economic Research Report*. 2021, doi: [10.22004/ag.econ.316348](https://doi.org/10.22004/ag.econ.316348).
6. Yenerall, J.; Jensen, K.; Chen, X.; Yu, T.E. COVID-19 risk perception and restaurant utilization after easing in-person restrictions. *Food Policy*. 2022, 107, 102206, doi: [10.1016/j.foodpol.2021.102206](https://doi.org/10.1016/j.foodpol.2021.102206)
7. Cotton, C.D., Garga, V.; Rohan, J. Consumption spending and inequality during the covid-19 pandemic. *Covid Economics*, 2021, 83(2), 116-154.
8. U.S. Department of Agriculture, Economic Research Service. Food Expenditure Series.
9. U.S. Department of Commerce, Census Bureau. Economic Census.
10. Zeballos, E.; K. Marchesi. Comparing Food Sector Employment Headcount and Sales Data in the National Establishment Time Series Database to Federal Data. *USDA, ERS Technical Bulletin 1958*. 2022, doi: [10.22004/ag.econ.329070](https://doi.org/10.22004/ag.econ.329070).
11. U.S. Department of Labor, (BLS). Regional Resources: Consumer Price Index.
12. Zeballos, E.; Sinclair, W. Estimating the State-Level Food Expenditure Series. *USDA, ERS Technical Bulletin 1962*. 2023.
13. U.S. Department of Labor, (BLS). Quarterly Census of Employment and Wages.
14. Johns Hopkins. Coronavirus Resource Center. *Johns Hopkins University and Medicine*. 2023.
15. U.S. Department of Commerce, BEA. State Personal Income and Employment: Concepts, Data Sources, and Statistical Methods.
16. U.S. Department of Labor, BLS. Local Area Unemployment Statistics. 2023.
17. U.S. Department of Labor, BLS. State Employment and Unemployment (Monthly). 2023.
18. Raifman, J.; Nocka, K.; Jones, D.; Bor, J.; Lipson, S.; Jay, J., Chan, P. COVID-19 US state policy database (CUSP). *Published Online*. 2020.
19. Wooldridge, J.M. Introductory econometrics: A modern approach.
20. Adrian Ml: South-Western Cengage Learning. *South-Western Cengage Learning. Michigan State University*. 2006.
21. Zeballos, E.; Sinclair, W. Food-away-from-home spending varied among outlets during first year of pandemic. *U.S. Department of Agriculture, Economic Research Service*. 2023.
22. Todd, J.;Morrison, R.M. Less eating out, improved diets, and more family meals in the wake of the great recession. *Amber Waves. U.S. Department of Agriculture, Economic Research Service*. 2014.
23. Ehmke, M; Restrepo, B.J. COVID-19 Working Paper: Obesity Prevalence Among US Adult Subpopulations During the First Year of the COVID-19 Pandemic. *USDA Administrative Publications*. 2023.