

Food Insecurity During the First Year of COVID-19: Employment and Sociodemographic Factors Among Participants in the CHASING COVID Cohort Study

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Abstract

Objective: While much has been reported about the impact of the COVID-19 pandemic on food insecurity, longitudinal data and the variability experienced by people working in various industries are limited. This study aims to further characterize people experiencing food insecurity during the pandemic in terms of employment, sociodemographic characteristics, and degree of food insecurity.

Methods: The study sample consisted of people enrolled in the Communities, Households and SARS-CoV-2 Epidemiology (CHASING) COVID Cohort Study from visit 1 (April–July 2020) through visit 7 (May–June 2021). We created weights to account for participants with incomplete or missing data. We used descriptive statistics and logistic regression models to determine employment and sociodemographic correlates of food insecurity. We also examined patterns of food insecurity and use of food support programs.

Results: Of 6740 participants, 39.6% (n=2670) were food insecure. Non-Hispanic Black and Hispanic (vs non-Hispanic White) participants, participants in households with children (vs no children), and participants with lower (vs higher) income and education levels had higher odds of food insecurity. By industry, people employed in construction, leisure and hospitality, and trade, transportation, and utilities industries had the highest prevalence of both food insecurity and income loss. Among participants reporting food insecurity, 42.0% (1122 of 2670) were persistently food insecure (≥ 4 consecutive visits) and 43.9% (1172 of 2670) did not use any food support programs.

Conclusions: The pandemic resulted in widespread food insecurity in our cohort, much of which was persistent. In addition to addressing sociodemographic disparities, future policies should focus on the needs of those working in industries vulnerable to economic disruption and ensure those experiencing food insecurity can access food support programs for which they are eligible.

Keywords

COVID-19, food security, racial disparities, ethnic disparities, employment

Food insecurity, defined as limited or uncertain access to adequate food due to money and other resources, affected approximately 1 in 10 US households before the COVID-19 pandemic, although the prevalence varied according to race and ethnicity, income level, and US region, among other factors.¹ Much research has been published on increases in food insecurity in the United States caused by the widespread economic disruption during the COVID-19 pandemic²⁻⁸; however, the percentage of US households experiencing food insecurity in 2020, as defined by data from the US Department of Agriculture's Household Food Security Survey, did not change from 2019.⁹ The consistent prevalence from 2019 to 2020 was attributed to different trends observed by race and ethnicity, widening well-documented racial and ethnic disparities.¹⁰⁻¹⁴

Data on food insecurity during COVID-19 primarily consist of data from cross-sectional studies²; therefore, we lack a clear understanding of whether people who experienced food insecurity did so temporarily or persistently. Longitudinal data can distinguish between experiences of temporary food insecurity due to rapidly changing circumstances during the pandemic and experiences of persistent food insecurity due to sustained economic challenges. Understanding these differences can help guide policies and interventions.

Public health measures enacted to prevent the spread of COVID-19 had a negative impact on many businesses and employment, resulting in job losses or decreased income.¹⁵⁻¹⁹ Research conducted during the pandemic found positive associations between job disruption and food insecurity. For example, a cross-sectional study that surveyed participants in March and April 2020 showed that those experiencing job loss had 3 times the odds of experiencing food insecurity as those without job loss.¹⁹ The leisure and hospitality sector had the highest unemployment rate of all sectors in April 2020 due to business closures required by COVID-19 mitigation policies.¹⁷ Jobs in this sector seldom include benefits such as health care or paid sick leave and often pay low wages, making it difficult to establish emergency savings in the event of unexpected expenses or income loss. People who were employed in sectors that were not deemed essential or in occupations unable to transition to an online environment also likely had COVID-19-related loss of income. However, information on the prevalence of food insecurity by employment sectors during the COVID-19

pandemic is limited. The variability of income loss and food insecurity experienced by people working in various occupations may help identify sectors that need more targeted interventions in future pandemics.

The objective of this study was to characterize food insecurity within a large sociodemographically and geographically diverse cohort of US adults who have been followed since the start of the COVID-19 pandemic in the United States. We examined the relationships among occupation, job loss, and food insecurity during the first 12 months of the COVID-19 pandemic.

Methods

This study used data from the Communities, Households and SARS-CoV-2 Epidemiology (CHASING) COVID Cohort Study, a prospective national study of 6740 US adults (aged ≥ 18 y). Online recruitment and screening began in March 2020. Once enrolled, study participants completed online questionnaires at designated points every 1 to 3 months (hereinafter referred to as a "visit") on various topics relating to COVID-19 and its economic and social impacts. Additional details on eligibility and enrollment are described elsewhere.²⁰ The analytic population was restricted to the 4019 participants who completed all food security questions through the first year of the pandemic, from visit 1 (April–July 2020) through visit 7 (May–June 2021).

Study Variables

Food insecurity during April 2020–June 2021. The Household Food Security Survey asked participants to respond to the following statement at each visit, beginning with visit 1: "The food that we bought just didn't last, and we didn't have money to get more." The question used a 30-day reference period and had the following response options: "often true," "sometimes true," and "never true." An affirmative answer ("often true" or "sometimes true") is an appropriate screen for food insecurity, as detailed previously.^{21,22} We dichotomized participants as food insecure (a response of "often true" or "sometimes true" at any of the 7 visits) or food secure (a response of "never true" at every visit).

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Newly, temporarily, or persistently food insecure among those with any food insecurity. Among participants with any food insecurity, we examined (1) the number of assessments (of 7 total) in which a participant reported being food insecure, (2) new food insecurity (participants reported food insecurity for the first time during the study), and (3) persistent or temporary food insecurity. We considered a participant to be temporarily food insecure if the participant reported food insecurity in ≤ 3 consecutive visits and persistently food insecure if the participant reported food insecurity in ≥ 4 consecutive visits. The cutoff of ≥ 4 was based on the median number of times participants reported food insecurity.

Food support programs. To understand the extent to which participants were using various food support programs, the following question was included at visit 6: “Since the pandemic began, have you used any of the following?” Response options were food pantry, soup kitchen, SNAP (Supplemental Nutrition Assistance Program), Pandemic EBT (electronic bank transfer), emergency food support, other food support not listed above, and none. Multiple responses were permitted. Pandemic EBT is the federal program implemented in response to the pandemic that provided funds to children who would normally receive free or reduced-price meals in schools.

Predictor of interest: income loss. Participants were asked the following question at each visit, beginning with visit 1: “In the past month, have you experienced a significant personal loss of income as a result of the new coronavirus?” Response options were yes, no, and NA (not applicable). Participants were considered to have ever experienced COVID-19–related income loss if they responded yes to this question at any visit.

Predictor of interest: occupation/industry. Occupational data were collected at visit 6. Participants were asked to select 1 occupation from a list of ≥ 30 choices that best described their job. These choices were largely based on the North American Industry Classification System (NAICS) used in the US Census. These occupations were then categorized into 1 of the 11 NAICS Supersectors, hereinafter referred to as the industry variable.²³ The “other” category includes participants who reported they were students, homemakers, disabled, employed in a religious setting, self-employed, or belonged to an “other” employment category.

Additional model covariates. We collected data on the following sociodemographic variables: age, sex/gender, race and ethnicity, whether children were in the household, education level, employment status, annual household income, and zip code of residence. We used zip codes to define the geographic region of residence (grouped into 4 regions as defined by the US Census Bureau,²⁴ with US territories grouped into Northeast for simplicity) and geographic designation (rural, urban, or suburban).

Statistical Analysis

To address the potential differences between the analytic population ($n=4019$) and the full cohort ($N=6740$), we created inverse probability weights to account for participants with incomplete or missing visits.^{25,26} We identified a priori variables associated with missingness, and the final model included covariates that were associated with food insecurity ($P < .05$ considered significant) in univariable models. The final missingness model included the following covariates: age, race and ethnicity, whether children were in the household, education level, employment status, annual household income, geographic region, geographic designation, and income loss.

To identify correlates of food insecurity, we ran a logistic regression model with the following independent variables: age, sex/gender, race and ethnicity, whether children were in the household, education level, employment status, annual household income, geographic region, geographic designation, and income loss. Given these models were predictive and not explanatory, we included variables found to be significant in these individual models in the final adjusted model. The prevalence of food insecurity in the study cohort was further characterized by calculating the per-visit percentage reporting food insecurity, the percentage reporting new food insecurity, the percentage reporting temporary food insecurity, and the percentage reporting persistent food insecurity. We created a scatter plot to display the percentage of participants with food insecurity and the percentage with any income loss by industry type. We used SAS version 9.4 (SAS Institute, Inc) for all analyses.

Results

Cohort Characteristics

Participants ($N=6740$) were enrolled from all 50 states; 61.5% identified as non-Hispanic White, 17.4% as Hispanic, 10.5% as non-Hispanic Black, 7.3% as Asian/Pacific Islander, and 3.0% as Other (Table 1). Most participants did not have children in the household (65.0%), had a college degree (60.8%), and were employed (62.3%).

Characteristics of People Experiencing Food Insecurity

Of the 6740 participants, 39.6% ($n=2670$) were categorized as being food insecure at any time during the first year of the pandemic. In the adjusted logistic regression model, non-Hispanic Black (adjusted odds ratio [aOR]=2.52; 95% CI, 2.05-3.10) and Hispanic (aOR=1.93; 95% CI, 1.63-2.28) participants had approximately 2-fold increased odds of being food insecure compared with non-Hispanic White participants (Table 1). Participants living

Table 1. Characteristics of participants in the CHASING COVID Cohort Study and logistic regression analysis for food insecurity during the first year of the COVID-19 pandemic, United States, April 2020–June 2021^a

Characteristic	Unweighted, no. (%)	Weighted, no. (%) ^b		OR (95% CI)	
		Total	Food insecure ^c	Univariable analysis	Multivariable analysis ^d
Total	4019 (100.0)	6740 (100.0)	2670 (39.6)	—	—
Age group, y					
18-29	817 (20.3)	1465 (21.7)	700 (47.8)	[Reference]	[Reference]
30-39	1164 (29.0)	2101 (31.2)	960 (45.7)	0.92 (0.80-1.05)	1.00 (0.83-1.20)
40-49	746 (18.6)	1348 (20.0)	591 (43.8)	0.85 (0.74-0.99)	0.88 (0.72-1.09)
50-59	563 (14.0)	798 (11.8)	239 (30.0)	0.47 (0.39-0.56)	0.53 (0.42-0.68)
≥60	729 (18.1)	1028 (15.3)	180 (17.5)	0.23 (0.19-0.28)	0.34 (0.26-0.46)
Sex/gender					
Male	1795 (44.7)	2926 (43.4)	1101 (37.6)	[Reference]	[Reference]
Female	2113 (52.6)	3630 (53.9)	1504 (41.4)	1.17 (1.06-1.30)	0.94 (0.82-1.08)
Nonbinary	111 (2.8)	184 (2.7)	65 (35.3)	0.91 (0.66-1.24)	0.45 (0.31-0.66)
Race and ethnicity					
Hispanic	613 (15.3)	1175 (17.4)	691 (58.8)	3.41 (2.99-3.90)	1.93 (1.63-2.28)
Non-Hispanic Asian/Pacific Islander	301 (7.5)	490 (7.3)	160 (32.6)	1.17 (0.96-1.43)	1.10 (0.86-1.41)
Non-Hispanic Black	377 (9.4)	710 (10.5)	462 (65.1)	4.47 (3.77-5.28)	2.52 (2.05-3.10)
Non-Hispanic White	2606 (64.8)	4147 (61.5)	1223 (29.5)	[Reference]	[Reference]
Non-Hispanic Other ^e	122 (3.0)	218 (3.2)	134 (61.5)	3.77 (2.85-4.99)	2.54 (1.79-3.61)
Children in household					
No	2859 (71.1)	4383 (65.0)	1356 (30.9)	[Reference]	[Reference]
Yes	1160 (28.9)	2357 (35.0)	1314 (55.7)	2.81 (2.53-3.12)	2.43 (2.11-2.80)
Education level					
<High school diploma	55 (1.4)	122 (1.8)	107 (87.7)	[Reference]	[Reference]
High school diploma	337 (8.4)	885 (13.1)	620 (70.1)	0.34 (0.19-0.59)	0.27 (0.14-0.51)
Some college	977 (24.3)	1635 (24.3)	858 (52.5)	0.16 (0.09-0.28)	0.21 (0.11-0.39)
College degree	2650 (65.9)	4098 (60.8)	1085 (26.5)	0.05 (0.03-0.09)	0.12 (0.07-0.23)
Employment status					
Employed	2506 (62.4)	4197 (62.3)	1557 (37.1)	[Reference]	[Reference]
Out of work	493 (12.3)	891 (13.2)	515 (57.8)	2.32 (2.01-2.69)	1.05 (0.87-1.27)
Homemaker	221 (5.5)	438 (6.5)	267 (61.0)	2.65 (2.17-3.24)	1.24 (0.93-1.65)
Student	310 (7.7)	518 (7.7)	201 (38.8)	1.08 (0.89-1.30)	0.57 (0.44-0.74)
Retired	489 (12.2)	696 (10.3)	130 (18.7)	0.39 (0.32-0.48)	1.03 (0.76-1.40)
Annual household income, \$					
<35 000	1044 (26.0)	1993 (29.6)	1292 (64.8)	[Reference]	[Reference]
35 000-49 999	456 (11.3)	827 (12.3)	437 (52.8)	0.61 (0.52-0.72)	0.69 (0.57-0.84)
50 000-69 999	599 (14.9)	959 (14.2)	334 (34.8)	0.29 (0.25-0.34)	0.33 (0.27-0.40)
70 000-99 999	710 (17.7)	1098 (16.3)	286 (26.0)	0.19 (0.16-0.23)	0.26 (0.21-0.31)
≥100 000	1210 (30.1)	1863 (27.6)	321 (17.2)	0.11 (0.10-0.13)	0.16 (0.13-0.19)
Region ^f					
Northeast	1194 (29.7)	1900 (28.2)	569 (30.0)	[Reference]	[Reference]
Midwest	724 (18.0)	1145 (17.0)	462 (40.4)	1.58 (1.36-1.85)	1.01 (0.83-1.23)
South	1123 (27.9)	2067 (30.7)	1025 (49.6)	2.30 (2.02-2.62)	1.18 (1.00-1.40)
West	978 (24.3)	1628 (24.2)	614 (37.7)	1.42 (1.23-1.63)	0.94 (0.79-1.12)
Geographic designation					
Urban	1779 (44.3)	2902 (43.1)	1052 (36.2)	[Reference]	[Reference]
Suburban	1048 (26.1)	1780 (26.4)	675 (37.9)	1.07 (0.95-1.21)	1.10 (0.94-1.28)
Rural	1192 (29.7)	2058 (30.5)	943 (45.8)	1.49 (1.33-1.67)	1.24 (1.06-1.44)
Income loss ^g					
No	2252 (56.0)	3616 (53.6)	822 (22.7)	[Reference]	[Reference]
Yes	1767 (44.0)	3124 (46.4)	1848 (59.2)	4.93 (4.43-5.48)	3.85 (3.38-4.38)

(Continued)

Table 1. (Continued)

Characteristic	Unweighted, no. (%)	Weighted, no. (%) ^b		OR (95% CI)	
		Total	Food insecure ^c	Univariable analysis	Multivariable analysis ^d
Industry sector					
Government	208 (5.2)	314 (4.7)	59 (18.8)	1 [Reference]	[Reference]
Education and health service	1012 (25.2)	1605 (23.8)	462 (28.8)	1.75 (1.29-2.37)	0.98 (0.69-1.39)
Professional and business	360 (9.0)	574 (8.5)	169 (29.4)	1.81 (1.30-2.54)	1.27 (0.86-1.86)
Financial activities	215 (5.3)	340 (5.0)	100 (29.4)	1.79 (1.24-2.59)	1.31 (0.86-2.00)
Information	309 (7.7)	494 (7.3)	153 (31.0)	1.95 (1.39-2.75)	1.39 (0.94-2.06)
Manufacturing	96 (2.4)	168 (2.5)	76 (45.2)	3.59 (2.37-5.44)	1.72 (1.05-2.82)
Other ^h	1065 (26.5)	1881 (27.9)	906 (48.2)	4.03 (2.99-5.42)	1.24 (0.87-1.75)
Trade, transportation, and utilities	297 (7.4)	538 (8.0)	288 (53.5)	5.01 (3.60-6.97)	1.39 (0.94-2.04)
Natural resources and mining	32 (0.8)	55 (0.8)	28 (50.9)	4.56 (2.50-8.32)	2.74 (1.33-5.63)
Leisure and hospitality	334 (8.3)	592 (8.8)	316 (53.4)	4.96 (3.59-6.89)	1.13 (0.77-1.66)
Construction	91 (2.3)	179 (2.7)	113 (63.1)	7.38 (4.87-11.18)	2.66 (1.63-4.35)

Abbreviations: —, not applicable; CHASING, Communities, Households and SARS-CoV-2 Epidemiology.

^a Data source: CHASING COVID Cohort Study.²⁰ Participants completed online questionnaires at designated points every 1 to 3 months (called a “visit”) during the first year of the pandemic, from visit 1 (April–July 2020) through visit 7 (May–June 2021).

^b Inverse probability weights were created to account for participants with incomplete or missing visits.

^c Percentage = no./weighted total.

^d All variables in table were adjusted for in the multivariable analysis.

^e “Other” was the term used by the survey.

^f Based on US Census designations.²⁴ Due to small numbers (n=4), participants from US territories were included in the Northeast region.

^g The question was, “In the past month, have you experienced a significant personal loss of income as a result of the new coronavirus?” Participants were considered to have ever experienced COVID-19–related income loss if they responded yes to this question at any visit.

^h Includes students, homemakers, disabled, employed in a religious setting, self-employed, and other.

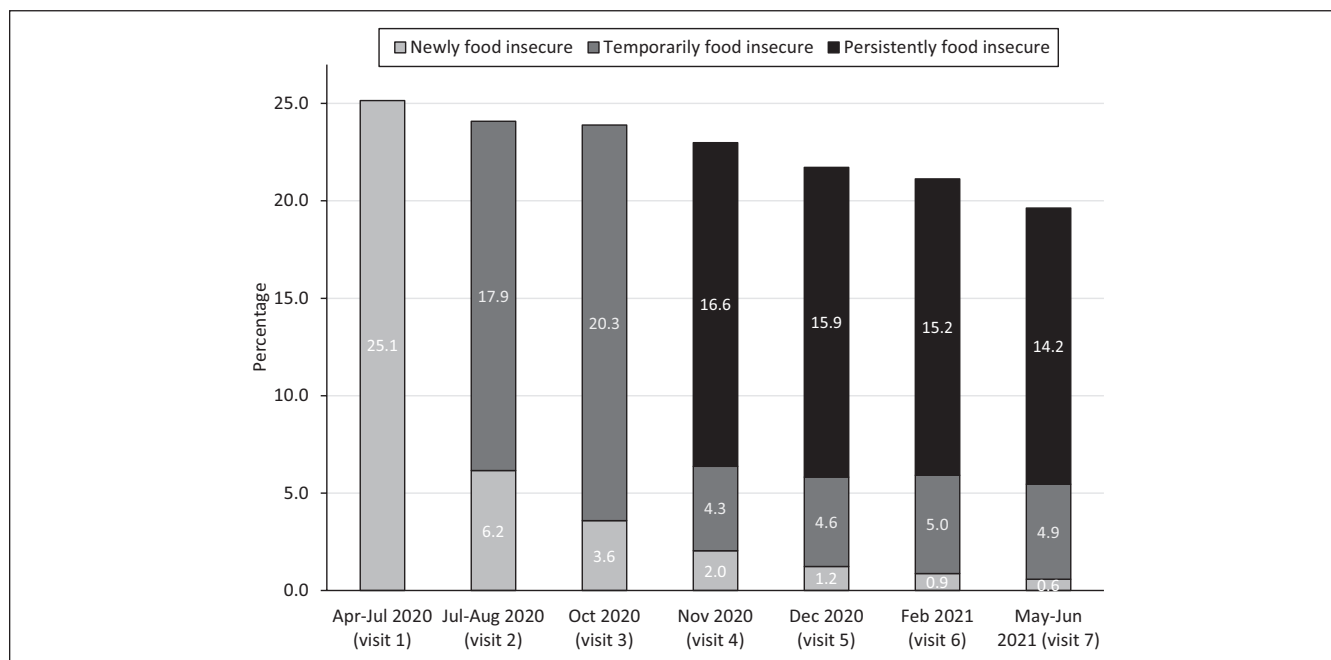


Figure 1. Percentage of CHASING COVID Cohort Study participants reporting food insecurity (n=2670), by visit, during the first year of the COVID-19 pandemic, United States, April 2020–June 2021. Newly food insecure=participants who reported food insecurity for the initial time in the study, temporarily food insecure=participants who reported food insecurity in ≤3 consecutive visits, and persistently food insecure=participants who reported food insecurity in ≥4 consecutive visits. Abbreviation: CHASING, Communities, Households and SARS-CoV-2 Epidemiology.

Table 2. Percentage of participants in the CHASING COVID Cohort Study who reported income loss and food insecurity during the first year of the COVID-19 pandemic, by industry, United States, April 2020–June 2021^a

Industry sector	Total no. in cohort (N = 6740)	Food insecurity, no. (%)			Income loss, ^d no. (%)
		Total (n = 2670)	Temporary ^b (n = 1548)	Persistent ^c (n = 1122)	
Construction	179	113 (63.1)	52 (29.0)	61 (34.1)	100 (55.9)
Leisure and hospitality	592	316 (53.4)	166 (28.0)	150 (25.3)	456 (77.0)
Natural resources and mining	55	28 (50.9)	12 (21.8)	16 (29.1)	24 (43.6)
Trade, transportation, and utilities	538	288 (53.5)	156 (29.0)	132 (24.5)	301 (55.9)
Other ^e	1881	906 (48.2)	508 (27.0)	398 (21.2)	884 (47.0)
Manufacturing	168	76 (45.2)	45 (26.8)	31 (18.5)	76 (45.2)
Information	494	153 (31.0)	94 (19.0)	59 (11.9)	203 (41.1)
Financial activities	340	100 (29.4)	58 (17.1)	42 (12.3)	153 (45.0)
Professional and business	574	169 (29.4)	115 (20.0)	54 (9.4)	184 (32.1)
Education and health service	1605	462 (28.8)	289 (18.0)	173 (10.8)	674 (42.0)
Government	314	59 (18.8)	53 (16.9)	6 (1.9)	75 (23.9)

Abbreviation: CHASING, Communities, Households and SARS-CoV-2 Epidemiology.

^a Data source: CHASING COVID Cohort Study.²⁰ Participants completed online questionnaires at designated points every 1 to 3 months (called a “visit”) during the first year of the pandemic, from visit 1 (April–July 2020) through visit 7 (May–June 2021).

^b Reported food insecurity in ≤3 consecutive visits.

^c Reported food insecurity in ≥4 consecutive visits.

^d The question was, “In the past month, have you experienced a significant personal loss of income as a result of the new coronavirus?” Participants were considered to have ever experienced COVID-19–related income loss if they responded yes to this question at any visit.

^e Includes students, homemakers, disabled, employed in a religious setting, self-employed, and other.

in households with children had 2.43 times (95% CI, 2.11–2.80) the odds of being food insecure compared with those living in households without children. Those reporting significant personal income loss had 3.85 times (95% CI, 3.38–4.38) the odds of being food insecure compared with those who did not report income loss. The odds of experiencing food insecurity decreased with increasing age and education level.

Patterns of Food Insecurity

Although 39.6% of participants reported being food insecure at any time during the first year of the pandemic, the percentage of participants who reported being food insecure at any given visit ranged from 19.7% (visit 7) to 25.1% (visit 1); percentages declined at each subsequent visit after visit 1 (Figure 1). Participants who reported food insecurity did so at a median (IQR) of 4 (1–6) visits. Of the 2670 participants who experienced food insecurity, 42.0% (n = 1122) were persistently food insecure and 58.0% (n = 1548) were temporarily food insecure.

Food Insecurity and Income Loss by Industry/Occupation

In univariable analysis, participants employed in 5 industry sectors had more than 4 times (range, 4.03–7.38) the odds of being food insecure compared with those employed in the government sector (Table 1), which reported the lowest percentage of both food insecurity and income loss. The construction

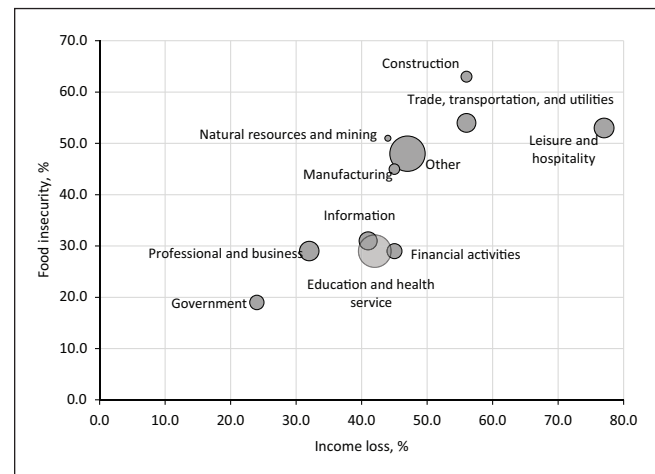


Figure 2. Relationship between income loss and food insecurity, by industry, among participants (n = 6740) in the CHASING COVID Cohort Study during the first year of the COVID-19 pandemic, United States, April 2020–June 2021. “Other” includes students, homemakers, disabled, those employed in a religious setting, self-employed, and other. Size of circles is proportional to the number of study participants in each category. Abbreviation: CHASING, Communities, Households and SARS-CoV-2 Epidemiology.

industry had the highest percentage of food insecurity (63.1%; 113 of 179), whereas government had the lowest (18.8%; 59 of 314). Income loss affected all industries, with the leisure and hospitality industry having the highest percentage (77.0%; 456 of 592), followed by construction (55.9%; 100 of 179) and

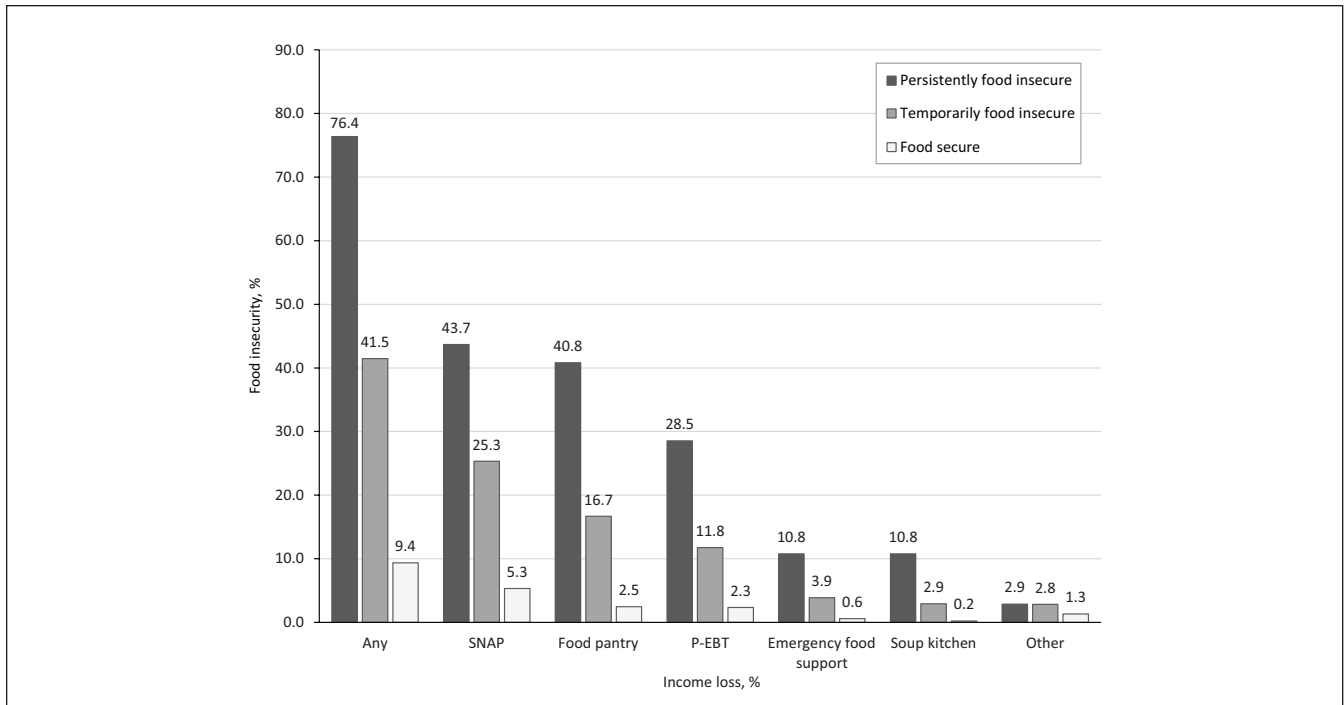


Figure 3. Use of food support programs among participants (n=6740) in the CHASING COVID Cohort Study during the first year of the COVID-19 pandemic, United States, April 2020–June 2021. Information on use of food support programs was collected only at visit 6 (February 2021). Multiple responses were permitted. Temporarily food insecure refers to participants who reported food insecurity in ≤ 3 consecutive visits, and persistently food insecure refers to participants who reported food insecurity in ≥ 4 consecutive visits. Abbreviations: CHASING, Communities, Households and SARS-CoV-2 Epidemiology; P-EBT, pandemic electronic benefits transfer; SNAP, Supplemental Nutrition Assistance Program.

trade, transportation, and utilities (55.9%; 301 of 538) (Table 2). We found a strong correlation between income loss and food insecurity ($r=0.77$) (Figure 2). Depending on the industry, 72.5% to 100.0% of those who reported persistent food insecurity and 45.4% to 82.9% of those who reported temporary food insecurity reported income loss at any visit.

Use of Food Support Programs

To address their food needs, 76.4% (857 of 1122) of participants in the persistently food-insecure group, 41.5% (642 of 1548) in the temporarily food-insecure group, and 9.4% (381 of 4070) in the food-secure group indicated using some form of food support program (Figure 3). The most common programs used were SNAP and food pantries; for each program, rates of use were greater among participants who were persistently food insecure (range, 2.9%–43.7%) than among participants who were temporarily food insecure (range, 2.8%–25.3%). Of the 2670 participants who were food insecure, 43.9% (n=1172) did not report use of any food support program. Use of food support programs across industry sectors was proportional to food insecurity, with participants in the government sector reporting lowest use and those in construction reporting the highest use.

Discussion

This study adds new evidence to the literature on COVID-19's impact on food insecurity by not just reporting the overall prevalence of food insecurity at 1 or 2 time points but illuminating the extent to which people experienced food insecurity at multiple regularly scheduled time points during 1 year. More than one-third of our cohort was food insecure during the first year of the pandemic, consistent with existing reports indicating widespread food insecurity.^{2-8,27} What is notable from our longitudinal data is that 42.0% of those reporting food insecurity were persistently food insecure, indicating many people had prolonged difficulties in obtaining sufficient food and nutrition. In addition, our analysis shows that food insecurity was strongly related to income loss experienced as a result of the pandemic and that food insecurity and income loss varied widely across industries.

Industries in which employees are not able to work remotely and that are not designated essential (construction, leisure and hospitality, and trade, transportation, and utilities) had the highest percentages of food insecurity. Unsurprisingly, sectors in which participants had the highest percentages of food insecurity were sectors in which participants had high percentages of income loss due to the pandemic, as seen in other studies.^{27,28} Many occupations in these industries commonly have

low wages and minimal or no benefits, such as sick leave and health care, which compound the impact of the pandemic. A study based on the US Census Bureau's Household Pulse Survey found an inverse relationship between prepandemic income levels and financial hardship during the pandemic, which disproportionately affected non-Hispanic Black and Hispanic people in the United States.²⁹ The higher level of financial hardship in this population was associated with a greater risk of food insufficiency. Consistent with other research, our study showed that food insecurity during the pandemic disproportionately affected non-Hispanic Black and Hispanic individuals and households, with 65.1% of non-Hispanic Black participants and 58.8% of Hispanic participants reporting food insecurity (compared with 39.6% overall). Our data also indicated that non-Hispanic Black and Hispanic participants working in the most affected industries tended to have lower incomes (as reported in visit 1) than non-Hispanic White participants, which, combined with lost income during the pandemic, may have exacerbated the disparity.

In March 2020, the federal government passed the Families First Coronavirus Response Act,³⁰ which expanded the definition of who could receive paid sick or medical leave, helping people in occupations that do not typically provide these benefits. That same month, the Coronavirus Aid, Relief and Economic Security (CARES) Act was passed,³¹ which increased unemployment benefits, provided direct payments ("stimulus checks") to eligible individuals, and increased support for child nutrition programs and SNAP, targeting the issues of income loss and food insecurity. Among our cohort, almost one-quarter of those who were persistently food insecure and more than half of those who were temporarily food insecure did not use any food support programs to alleviate their food insecurity. Although the federal legislation was passed in early 2020, the timing of state and local implementation of these programs varied and may not have been in effect in all places at the time of our study. This discrepancy in timing could have contributed to the low participation rates observed. In addition, prior research suggested that barriers to food assistance exist for people who are food insecure. A study of Latino college students who became food insecure during the pandemic highlighted that a key barrier to food support programs was that students may not have met eligibility criteria or did not know how to access these resources.³² Studies conducted during the pandemic showed that fewer than half of people who lost employment income applied for unemployment benefits²⁹ and that increases in food insecurity were not accompanied by similar increases in SNAP participation.⁶ Similarly, the level of assistance may not have been adequate to prevent or alleviate food insecurity; many study participants who reported using SNAP were food insecure. Our data showed that participants experienced food insecurity for the first time 1 year into the pandemic (at visit 7), indicating that current methods of addressing food insecurity are not sufficient or that the

effects of the pandemic may not be felt by all people immediately. The reevaluation of the Thrifty Food Plan in August 2021, which increased monthly SNAP benefits by an average of 21%, is a step in the right direction, but it is largely offset by the expiration of other benefit increases implemented during the pandemic.³³

Limitations and Strengths

Our study had several limitations. First, the use of a single question to define food insecurity instead of the fully validated 6- or 18-question version of the Household Food Security Survey could have resulted in an underestimation of food insecurity. Second, we did not collect information on food insecurity or use of food support programs before the start of the COVID-19 pandemic; therefore, we could not assess if or by how much food insecurity and use of food support programs changed as a result of the pandemic. Third, we collected data on selected variables once (eg, occupation at visit 6, employment status at visit 1), but these may have varied during the study period, leading to some misclassification. Fourth, our approach to identifying correlates of food insecurity was based on a predictive model that included all significant variables. The model identified correlates and should not be used to inform causal inference. However, we believe the results of this descriptive study are useful for hypothesis generation. One strength of our study was the composition of our study sample, from a large US cohort that is diverse in several characteristics (eg, race, age, geographic location). In addition, our study followed participants longitudinally for more than 1 year during the pandemic, and we captured data at 7 time points.

Conclusions

Our study showed that a large proportion of people experiencing food insecurity during the first year of the COVID-19 pandemic did so persistently and that certain people, such as those working in industries severely affected by the pandemic and those who experienced income loss, were more likely than others to report food insecurity. Our results illustrate the importance of targeted policies that help workers in industries most affected by pandemic-related income loss. It is also critical to publicize the availability of food support programs and make them easily accessible to people for whom they are intended. Policies and programs should focus on outreach to communities to ensure people are aware of the benefits for which they are eligible and entitled. Government agencies, working with community-based organizations as applicable, should minimize administrative and logistical barriers wherever possible to facilitate program enrollment.

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