



# Food Security, Access, and Challenges in New Mexico during COVID-19

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## ABSTRACT

**Background:** The novel coronavirus disease 2019 (COVID-19) pandemic disrupted food systems and economies across the United States. Public health measures, including stay-at-home orders, led to employment disruptions and food system shocks that increased barriers to food access.

**Objectives:** We aimed to examine food insecurity and food access challenges in New Mexico (NM) during the COVID-19 pandemic.

**Methods:** A cross-sectional study using a validated survey was conducted in NM in May and June 2020. Adults 18 y and older were recruited through convenience sampling via email, websites, and targeted social media ads from major universities, nongovernmental organizations, state agencies, and media outlets. Survey questions assessed food insecurity and food-related challenges and worry. Bivariate and multivariate logistic regression examined relations between food insecurity and demographic characteristics. z Tests were used to compare the proportions of individuals who responded affirmatively to food challenge and worry questions between food-secure and food-insecure respondents.

**Results:** A total of 1487 residents participated in the study. Thirty percent of respondents reported experiencing food insecurity and 16% experienced very low food security since the pandemic started. Food insecurity was associated with each of 7 characteristics examined in bivariate logistic regression analyses. Multivariate logistic regression results showed that Hispanic (adjusted OR: 1.70; 95% CI: 1.18, 2.44) and female (adjusted OR: 1.78; 95% CI: 1.09, 2.90) respondents were more likely to experience food insecurity than non-Hispanic white and male respondents. Larger household sizes were associated with higher odds of food insecurity except for those in the lowest and highest income categories. z Tests showed that a higher proportion of food-insecure respondents experienced food-related challenges and worry than food-secure respondents.

**Conclusions:** Disparities in food insecurity persisted during the COVID-19 pandemic and food-insecure individuals were more likely to report experiencing food-related challenges and worry. Researchers and policy makers in NM may consider continuing efforts to mitigate food access issues as the pandemic continues. *Curr Dev Nutr* 2022;6:nzab139.

**Keywords:** food insecurity, food access, COVID-19, New Mexico, cross-sectional study

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Abbreviations used: COVID-19, novel coronavirus disease 2019; NFACT, National Food Access and COVID Research Team; NM, New Mexico.

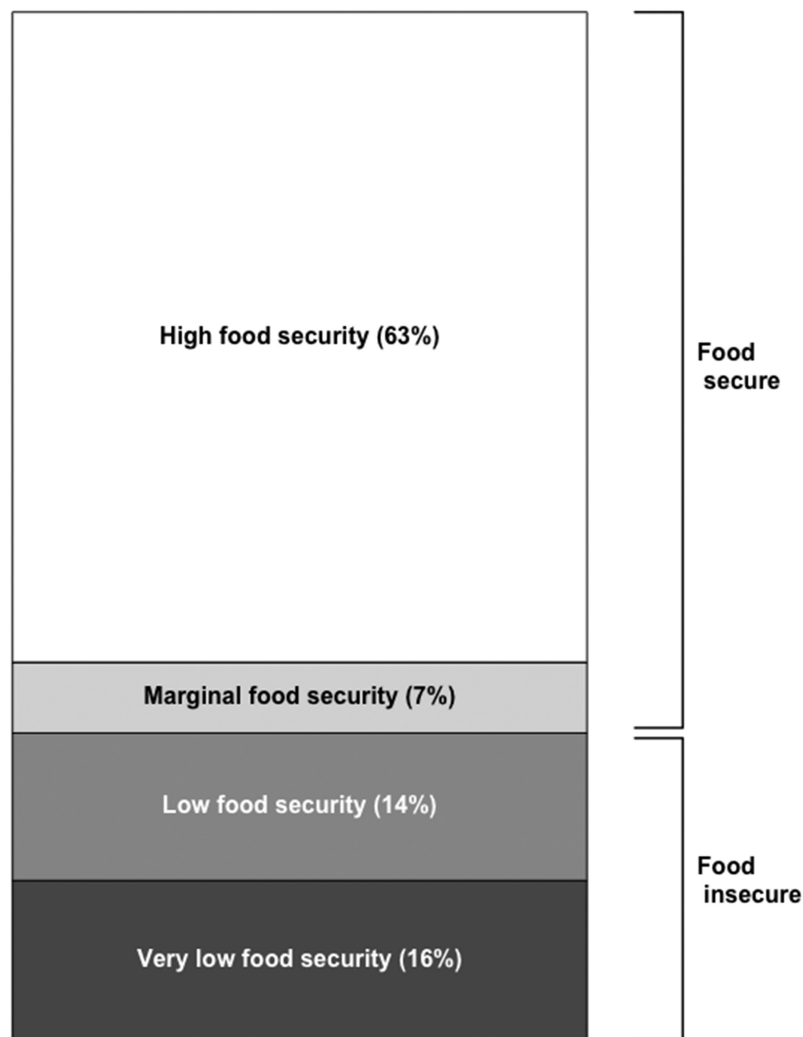
## Introduction

The first case of SARS-CoV-2, the virus that causes the novel coronavirus disease 2019 (COVID-19), reported in the United States was in early 2020. The state of New Mexico (NM) announced its first cases on 11 March followed closely by the implementation of stay-at-home orders and the closing of schools and nonessential businesses (1). As the number of cases grew throughout the state, public health orders remained in place and became increasingly strict through summer 2020. Although necessary to prevent the spread of the virus and overwhelming of the health care system, public health orders significantly affected the economy, communities, and families in NM. More than a year later, long-term impacts of the pandemic continue to emerge.

In 2019, ~10.5% of American households were food insecure at some point during the year; this includes ~4.1% of households

experiencing very low food security (2). In NM, the mean prevalence of food insecurity and very low food security over 2017–2019 was 15.1% and 5.5%, respectively (2). Further, 1 in 4 children (24.1%) <18 y of age in NM were at risk of childhood hunger and food insecurity in 2019 (3). In 2020, the projected prevalence of food insecurity in NM was 20.7% (4).

Food insecurity is a complex problem that rarely exists in isolation. The accumulation of psychosocial, behavioral, and environmental factors such as transportation, food deserts, poverty, and low literacy skills contributes to the development of food insecurity (5, 6). Lack of affordable housing, social isolation, chronic or acute health problems, high medical costs, and low wages are all overlapping issues faced by low-income families (7–9). Food-secure working families across America may also face temporary food insecurity and hunger; layoffs at work, unexpected health complications, and many other unforeseen



**FIGURE 1** Proportion of study respondents in each USDA food security category and the collapsed categories (food secure and food insecure) used in the analysis.

circumstances can force families to choose between buying food and paying bills (10, 11). Many of these situations were experienced by families across the state owing to the COVID-19 pandemic. Food insecurity may, in turn, affect physical and mental health by contributing to the development and progression of malnutrition and obesity (12).

Food availability was disrupted early on in the COVID-19 pandemic. In March and April of 2020, grocery shoppers were faced with empty store shelves as the food supply chain struggled to cope with stockpiling by consumers, changes in demand from restaurants and foodservice establishments, and illness among workers. As COVID-19 cases increased, consumers stocked up on food staples and other supplies, which led many grocery stores around the nation to limit sales to avert hoarding and keep products on the shelf. Low-income households were disadvantaged in these circumstances because many may have struggled to afford immediate needs, let alone large shopping purchases to prepare for a 10- to 14-d quarantine.

The COVID-19 outbreak has also caused a drastic increase in unemployment rates in the United States; unemployment rose from

6.2 million in February 2020 to 20.5 million in May 2020 (13). High unemployment rates among low-income populations make it more difficult for them to meet their basic household food needs. Disruptions in food access and availability and unemployment can negatively affect a household's food security status (12). Neighborhood conditions also have the potential to affect access to food; when a sole source of food closes or faces supply shortages, and transportation to alternative sources is difficult, residents are put at risk of food insecurity (14, 15). The pandemic has made grocery shopping via public transport more challenging, as some cities have reduced the number of bus routes and the number of passengers to allow for social distancing. How one travels to the grocery store may influence purchases; individuals who walk or take the bus are limited to what can be carried or pulled in a cart (14). In the United States, 17% of food-insecure households have reported using someone else's car to grocery shop compared with 4% of food-secure households, whereas 14% have used other modes of transportation like public transport compared with 4% of food-secure households (15).

Racial and ethnic disparities also exist related to food insecurity. In 2019, non-Hispanic black households were nearly 2 times more likely to be food insecure than the national average (19.1% compared with 10.5%) (2). Among Hispanic households, the prevalence of food insecurity was 15.6% compared with the national average of 10.5% (2). One in 4 Native Americans experience food insecurity and 60% of all counties in which Native Americans are the majority have high food-insecurity rates despite making up <1% of all counties in the United States (16). NM's Hispanic and Native American populations are more likely to be poor or low-income than non-Hispanic white residents; 56% of NM Hispanic/Latino working families experience poverty or qualify as low-income compared with 33% of non-Hispanic white working families (17).

With COVID-19-related disruption to world trade, the food supply chain and food availability, public transportation, and other key variables related to obtaining food, it is critical to assess food access and food security in diverse geographic areas to identify needs related to food access and inform policy decisions. The aim of this study was to examine food access and food security among residents of NM during the COVID-19 pandemic and to examine demographic factors associated with food-related challenges, worry, and food insecurity.

## Methods

### Study design and sample

A cross-sectional study was conducted using a validated survey developed by the National Food Access and COVID Research Team (NFACT) (18–21). The survey was developed in Vermont in March 2020 by examining the existing research on food access and security and seeking input from key stakeholders (19). It was piloted in late March with 25 residents of Vermont, and Cronbach's  $\alpha$  and factor analysis were used to test the tool's internal validity ( $\alpha > 0.7$ ) (19). Refinements to the survey were made in May 2020 after key stakeholder and researcher feedback on the wording of questions, and updates to the tool continue as the pandemic evolves (19). The validated March 2020 survey was adapted for use in NM by changing store and food assistance program names to reflect availability in the state. Convenience sampling was used to recruit NM residents to take the online survey that asked participants about their experiences with food access-related concerns and challenges. Recruitment was targeted to the adult population in general. Participants were recruited via email from listservs and through information on websites of nongovernmental organizations, state agencies, major universities, health care organizations, and large employers across the state of NM. Targeted social media ads, press releases, and media outlets were also utilized for recruitment. Nongovernmental organizations and state agencies that administer food assistance programs, work with low-income populations, and provide emergency food relief assisted with survey dissemination to encourage participation among at-risk residents. This study was approved by the New Mexico State University Office of Research Integrity and Ethics.

### Data collection

The survey was available in English and Spanish and included closed- and open-ended questions. It took ~20 min to complete and was

available to participants from 21 May, 2020 through 25 June, 2020. Participants consented to the study by continuing past the first screen of the survey and were able to opt out of the survey at any time. Participants could choose not to answer any question. An option was selected to prevent participants from taking the survey more than once by placing a cookie on their browser.

A total of 2156 individuals consented to the study. Respondents with ZIP codes outside of NM ( $n = 160$ ) and respondents who did not respond to any questions ( $n = 509$ ) were excluded from analysis. The total number of respondents included in the analysis was 1487.

The survey asked a series of questions about participants' shopping behaviors, food-related worry and concern, coping strategies, challenges, impacts on employment, and food insecurity since the COVID-19 outbreak began in NM (11 March, 2020). The USDA's 6-item food insecurity module was included to assess food insecurity. The instrument asks a series of questions related to financial access to food and responses are scored according to the following categories: 1) high food security (0 affirmative responses), 2) marginal food security (1 affirmative response), 3) low food security (2–4 affirmative responses), and 4) very low food security (5–6 affirmative responses) (22). The questions were scored according to the USDA's guidelines and respondents were categorized as food secure (marginal or high food security) or food insecure (low or very low food security) (Figure 1). The focus of this study was on questions related to food challenges, worry, and food insecurity. Table 1 includes a description of the variables used in this study along with their response options (measures).

### Data analysis

The distributions of the demographic characteristics of the study population were calculated and reported both as frequencies and as percentages. "Missing" was included as a separate category in each of the demographic characteristics. An analysis of the pattern of missing data found that most of the missingness was attributable to the same individuals missing values across all of the demographic characteristics. Subsequent analyses were conducted using a complete-case analysis. Bivariate relations between food insecurity (response) and demographic characteristics (predictors) were estimated by fitting a separate logistic regression model for each characteristic. Coefficients from the fitted model were exponentiated to obtain unadjusted ORs and 95% CIs. A multivariate logistic regression model was fit to examine which demographic characteristics were associated with food insecurity during COVID-19, adjusting for all other factors. The model included an interaction term that allowed the effect of household size to vary by income category. Adjusted ORs and 95% CIs were calculated for all predictors (except household size and income) by exponentiating the coefficients from the multivariate model. For household size and income, ORs and CIs were calculated by combining the appropriate model coefficients, computing the SEs of those linear combinations using the model covariance matrix, calculating the 95% CIs of the linear combinations, and exponentiating the results. Because the interaction term in the model allows the effect of income to vary by household size, results comparing income levels were examined at the mean household size of 3. The relations between food insecurity and responses to questions regarding challenges and worries were examined using a  $z$  test for comparing the proportion of

**TABLE 1** Variable names, descriptions, and measures used in the analysis

Variable	Description	Measure
Race/ethnicity	Asked respondents if they were of Hispanic, Latino, or Spanish origin and separately asked to select their race based on 2020 Census categories	Non-Hispanic white = 0; Native American = 1; Hispanic = 2; other, non-Hispanic = 3
Rural/urban	Coded as a rural or urban area by ZIP code based on the Rural-Urban Commuting Area Codes (39, 40)	Urban = 0; large rural = 1; small rural = 2; rural, isolated = 3
Gender	Asked respondents which of the following describes their gender identity	Male = 0; female = 1; other (transgender, nonbinary, or self-describe) = 2
Age	Asked respondents what year they were born	Continuous
Education	Asked respondents what is the highest level of formal education that you have completed	Less than high school = 0; some college = 1; bachelor's degree = 2; postgraduate degree = 3
Income	Asked respondents to select an income category based on their household income in 2019 before taxes	Continuous (1 = <\$12,999/y; 2 = \$13,000–\$24,999/y; 3 = \$25,000–\$49,999/y; 4 = \$50,000–\$74,999/y; 5 = \$75,000–\$99,999/y; 6 = \$100,000–\$124,999/y; 7 = \$125,000–\$149,999/y; 8 = >\$150,000/y)
Household size	Asked respondents to report the number of people living in their household within categories (>65 y old, 18–65 y old, <18 y old)	Continuous (number of individuals per age group summed per respondent)
Challenges	Could not find as much food as I wanted to buy  Could not find the kinds of food my household prefers to eat Had challenges getting food through a school food program Had challenges getting food through a food pantry Had challenges knowing where to find help for getting food Had to go to more places than usual in order to find the food my household wanted Had to stand "too close for safety" to other people when getting food (less than six feet away)	1 = never, 2 = sometimes, 3 = usually, 4 = always, not applicable
Worry	There will not be enough food in the store  Food will become more expensive for my household Food will become unsafe My household will lose access to programs that provide free food or money for food My household will have a decrease in income and won't be able to afford enough food My household won't have enough food if we have to stay at home and can't go out at all	Scale of 1–6: 1 = not worried at all; 6 = extremely worried, not applicable

food-secure individuals who responded "usually" or "always" to food-related challenges and reported 4–6 on a scale of 1–6 for food-related worries with the proportion of food-insecure individuals who responded in the same way for each item. Differences were determined to be statistically significant if the *P* value was <0.05. Analyses were conducted using R version 3.6.3 (The R Foundation).

## Results

Thirty percent of respondents reported experiencing food insecurity since the COVID-19 outbreak began in NM on 11 March, 2020 with more than half of food-insecure respondents experiencing very low food security (data not shown). **Table 2** presents descriptive statistics.

Forty percent of the respondents identified as non-Hispanic white, 23% identified as Hispanic, and 4% identified as Native American. Over 50% of the respondents lived in an urban area. Over 60% of the respondents identified as female and 26% of the respondents were 18–44 y old. Almost 50% of the sample reported earning a bachelor's degree or higher. Over 30% of the respondents reported a household income of <\$50,000 annually, 11.8% reported living alone, and 51.2% reported 2–4 members in their household.

**Table 3** presents unadjusted logistic regression results. At least 1 level of each characteristic had a statistically significant association with higher or lower odds of experiencing food insecurity; differences were found by race and ethnicity, urban and rural designation, gender, age, education level, household income, and household size. **Table 4** presents adjusted logistic regression results. Adjusting for all other

**TABLE 2** Sample descriptive characteristics<sup>1</sup>

Characteristic	n	%	FI, n	FI, %
Race/ethnicity				
Non-Hispanic white	603	40.6	130	21.6
Native American	69	4.6	32	46.4
Hispanic	351	23.6	144	41.0
Other non-Hispanic	84	5.6	22	26.2
Missing	380	25.6	95	25.0
Rural/urban classification				
Urban	789	53.1	219	27.8
Large rural	160	10.8	59	36.9
Small rural	80	5.4	25	31.2
Isolated	81	5.4	28	34.6
Missing	377	25.4	92	24.4
Gender				
Male	176	11.8	32	18.2
Female	920	61.9	290	31.5
Other	15	1.0	8	53.3
Missing	376	25.3	93	24.7
Age, y				
18–30	121	8.1	42	34.7
31–44	269	18.1	99	36.8
45–64	521	35.0	160	30.7
≥65	196	13.2	27	13.8
Missing	380	25.6	95	25.0
Education				
High school or less	87	5.9	49	56.3
Some college	300	20.2	130	43.3
Bachelor degree	364	24.5	95	26.1
Postdegree	357	24.0	53	14.8
Missing	379	25.5	96	25.3
Income, \$				
<13,000	98	6.6	68	69.4
13,000 to <25,000	123	8.3	69	56.1
25,000 to <50,000	242	16.3	94	38.8
50,000 to <75,000	266	17.9	56	21.1
75,000 to <100,000	156	10.5	24	15.4
≥100,000	200	13.4	12	6.0
Missing	402	27.0	100	24.9
Household size, n				
1	176	11.8	48	27.3
2	382	25.7	72	18.8
3–4	379	25.5	123	32.5
>4	171	11.5	86	50.3
Missing	379	25.5	94	24.8

<sup>1</sup>n = 1487. FI, food insecure.

respondent characteristics, Hispanic respondents were 1.70 (95% CI: 1.18, 2.44) times more likely to experience food insecurity than non-Hispanic white respondents. Female respondents and respondents identifying as transgender, nonbinary, or who preferred to self-describe (“other”) were 1.78 (95% CI: 1.09, 2.90) and 8.38 (95% CI: 1.99, 35.21) times more likely, respectively, to experience food insecurity than male respondents. However, the result for “other” should be interpreted cautiously because there were only 15 respondents in that category. The household income and size interaction term in the logistic regression model was statistically significant, indicating that the ORs for household size varied by income category. Holding household size constant at 3 (the mean value), the ORs comparing each income category to the reference level decreased as income increased. In all but the lowest and

highest income categories, each additional person in the household increased the odds of experiencing food insecurity.

**Figures 2** and **3** show the results of the z tests comparing the proportions of food-secure and food-insecure respondents who reported experiencing challenges with food access or food-related worry. A larger proportion of food-insecure respondents reported experiencing each challenge and worry during COVID-19 than food-secure respondents ( $P < 0.001$  for all questionnaire items reported). Over 50% of food-insecure individuals reported that they could not find as much food as they wanted to buy and that they had to go to more places than usual to find food for their household. At least 65% of food-insecure respondents reported experiencing any food-related worry, with >80% reporting worry that food will become more expensive and that their



**TABLE 3** Unadjusted ORs (95% CIs) of the relations between individual participant characteristics and reported food insecurity

Characteristic	Unadjusted OR (95% CI)
Race/ethnicity (n = 1105)	
Non-Hispanic white	Reference
Native American	3.15 (1.88, 5.25)
Hispanic	2.56 (1.92, 3.41)
Other non-Hispanic	1.29 (0.75, 2.15)
Rural/urban classification (n = 1108)	
Urban	Reference
Large rural	1.53 (1.07, 2.19)
Small rural	1.18 (0.71, 1.92)
Isolated	1.37 (0.84, 2.21)
Gender (n = 1109)	
Male	Reference
Female	2.06 (1.39, 3.14)
Other	5.11 (1.72, 15.57)
Age (n = 1105)	0.98 (0.97, 0.98)
Education (n = 1106)	
High school or less	Reference
Some college	0.60 (0.37, 0.96)
Bachelor degree	0.27 (0.17, 0.44)
Postgraduate degree	0.14 (0.08, 0.23)
Income (n = 1083), \$	
<13,000	Reference
13,000 to <25,000	0.54 (0.31, 0.95)
25,000 to <50,000	0.27 (0.16, 0.45)
50,000 to <75,000	0.11 (0.07, 0.19)
75,000 to <100,000	0.08 (0.04, 0.14)
≥100,000	0.03 (0.01, 0.05)
Household size (n = 1106)	1.35 (1.25, 1.47)

household's income will decrease and they will not be able to afford enough food.

## Discussion

Thirty percent of survey participants reported experiencing food insecurity since the start of the coronavirus outbreak in NM. More than half of food-insecure participants had very low food security, which includes disruptions in food intake like skipping or cutting meals. Certain population groups were disproportionately affected by food insecurity and experienced high degrees of worry, concern, and disruptions related to food. Hispanic respondents had higher odds of food insecurity than non-Hispanic white respondents. Native Americans had the highest prevalence of food insecurity across races/ethnicities, but were not statistically different from non-Hispanic white respondents after adjusting for other demographic and socioeconomic characteristics. Finally, there was a significant relation between household income and size. At a household size of 3, the odds of experiencing food insecurity decreased as income increased. Each additional person in a household increased the odds of experiencing food insecurity in all but the lowest and highest income groups.

A United Way study reported that NM ranked number 6 of the top 10 states with the highest rates of food insecurity post COVID-19

(23). In addition, 33% of NM residents live in a food desert (24). Based on these reports, NM residents were at an increased risk of food insecurity before the impact of COVID-19. Results of this study indeed reveal a high prevalence of food insecurity during COVID-19 and associations between food insecurity and sociodemographic characteristics.

Other studies conducted during the COVID-19 pandemic report higher prevalence estimates of food insecurity among adults in the United States than findings in this study, ranging from 43% in a nationally representative survey of US adults in April 2020 (25) to 24.8% during the early phases of the pandemic in Vermont (21). Similarly, in a convenience sample of American adults, 41% were identified as at-risk of food insecurity. Consistent with our results, groups most at-risk of being newly food insecure due to the COVID-19 pandemic included blacks, Asians, and Hispanics/Latinos; those with annual incomes <\$100,000; and those living with children or others (26). Individuals who lost work during the pandemic and lived in households earning <\$75,000 annually were also at-risk of food insecurity (27). Differences in food insecurity estimates are expected across geographic locations and population groups and may also be due to differences in measuring food insecurity; however, it appears that those groups which are vulnerable [low-income; Black, Indigenous, and People of Color (BIPOC); and other underrepresented groups] are consistent across studies.

In unadjusted analyses in this study, Native American and Hispanic survey respondents had higher odds of food insecurity than non-Hispanic white respondents. Adjusting for other demographic characteristics (rural/urban, gender, age, education level, income, and household size), only Hispanic respondents had increased odds of food insecurity. In descriptive analyses, however, >46% of Native American respondents were classified as food insecure. Native Americans also consistently reported higher degrees of food-related worries and concern due to the coronavirus outbreak. Thus, household characteristics significantly associated with food insecurity in adjusted analyses like income and household size may contribute to the higher odds of food insecurity in Native Americans; this group may not experience food insecurity disproportionately because of race/ethnicity, but because of the higher likelihood of having a lower income, larger household size, and living in a food desert (26).

In adjusted analyses, rural/urban classification, age, and education level were not associated with odds of food insecurity. Income and household size were associated with food insecurity, adjusting for all other demographic characteristics. In NM, lower-income individuals and people residing in larger households may be most likely to experience food insecurity, regardless of race/ethnicity, geographic location, gender, age, or education level. In the lowest and highest income groups, however, each additional household member did not increase the odds of experiencing food insecurity. Household income in the lowest income group may be so low that respondents were likely to be food insecure regardless of the number of household members. Similarly, household income in the highest income group may be so high that respondents were unlikely to be food insecure regardless of household size. The impact of income and household size on food insecurity has been widely reported (2, 28).

Food insecurity affects physical health, mental health, and the community at large. Food insecurity is associated with the development of chronic conditions including obesity, type 2 diabetes

**TABLE 4** Logistic regression coefficients, SEs, and adjusted ORs of the relations between participant characteristics and reported food insecurity<sup>1</sup>

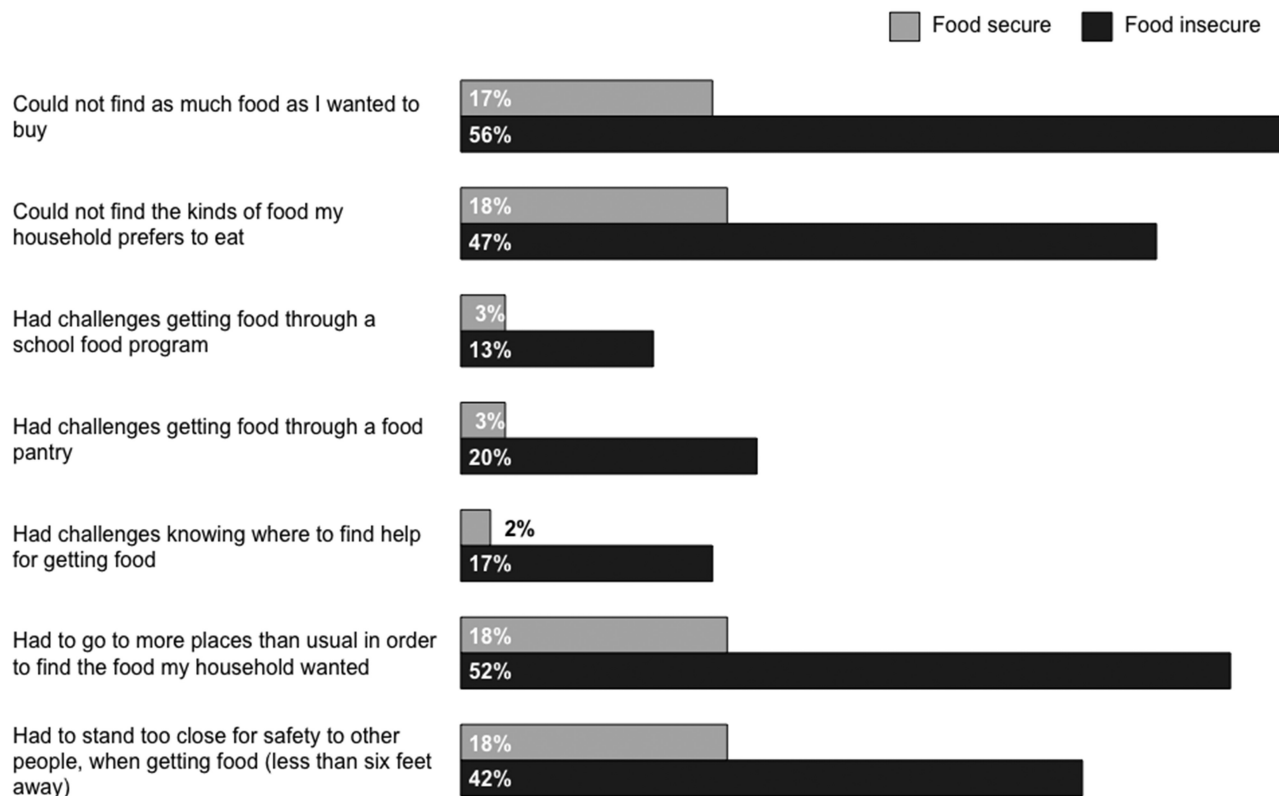
Characteristics	Coefficient	SE	P value	Adjusted OR (95% CI)
(Intercept)	0.531	0.638	0.406	
Race/ethnicity				
Non-Hispanic white	Reference			
Native American	0.185	0.323	0.567	1.20 (0.64, 2.26)
Hispanic	0.529	0.185	0.004	1.70 (1.18, 2.44)
Other non-Hispanic	0.241	0.317	0.447	1.27 (0.68, 2.37)
Rural/urban classification				
Urban	Reference			
Large rural	0.185	0.230	0.421	1.20 (0.77, 1.89)
Small rural	−0.364	0.306	0.233	0.69 (0.38, 1.26)
Isolated	−0.101	0.298	0.735	0.90 (0.50, 1.62)
Gender				
Male	Reference			
Female	0.574	0.250	0.021	1.78 (1.09, 2.90)
Other	2.126	0.732	0.004	8.38 (1.99, 35.21)
Age	−0.005	0.006	0.431	1.00 (0.98, 1.01)
Education				
High school or less	Reference			
Some college	0.160	0.289	0.580	1.17 (0.67, 2.07)
Bachelor degree	−0.298	0.297	0.316	0.74 (0.41, 1.33)
Postgraduate degree	−0.400	0.323	0.216	0.67 (0.36, 1.26)
Income (at mean household size of 3), \$				
<13,000	Reference			
13,000 to <25,000	−1.515	0.573	0.008	0.51 (0.28, 0.93)
25,000 to <50,000	−2.615	0.523	0.000	0.29 (0.17, 0.50)
50,000 to <75,000	−3.308	0.543	0.000	0.13 (0.07, 0.22)
75,000 to <100,000	−3.746	0.742	0.000	0.08 (0.04, 0.17)
≥100,000	−3.811	0.889	0.000	0.03 (0.02, 0.08)
Household size, \$				
<13,000	−0.038	0.123	0.759	0.96 (0.76, 1.23)
13,000 to <25,000	0.281	0.165	0.090	1.28 (1.01, 1.60)
25,000 to <50,000	0.460	0.151	0.002	1.52 (1.26, 1.84)
50,000 to <75,000	0.411	0.153	0.007	1.45 (1.20, 1.75)
75,000 to <100,000	0.423	0.203	0.037	1.47 (1.06, 2.03)
≥100,000	0.151	0.247	0.542	1.12 (0.73, 1.71)

<sup>1</sup> *n* = 1072. All ORs are adjusted for all other characteristics presented in the table.

and gestational diabetes, and metabolic syndrome (28). In adults with chronic conditions, food insecurity also exacerbates difficulties following disease-specific diets or purchasing prescribed medication. For example, food-insecure individuals with diabetes experience poor disease management (29). Food insecurity is also strongly linked to mental health, associated with increased levels of depression, substance use, suicidal ideation, anxiety, and even sleep disorders (30, 31). The relation between mental health and food insecurity is likely bidirectional because declines in mental health may also increase the risk of developing food insecurity (32). This is particularly important in NM, which currently suffers from among the highest rates of suicide, alcohol-related deaths, opioid overdose and deaths, and poverty in the nation (33). NM also experiences one of the most severe shortages of behavioral health services in the country (34). Unfortunately, there are well-documented increases in stress, anxiety, and depression throughout the world owing to the pandemic (35). As households experienced pandemic-related stress, anxiety, and worry, food insecurity may

have also increased in severity, further exacerbating mental health concerns.

This study has several limitations that were mostly due to the necessity to conduct the survey quickly and to social distancing and stay-at-home orders that were in place during survey administration. A convenience sampling method was used in this study, which means the results cannot be generalized to the population of NM. Participant recruitment and the survey were conducted online, so residents without Internet access were systematically excluded from participation. Therefore, both the sampling method and online survey delivery may have precluded those most at-risk of experiencing food insecurity, such as low-income and older residents without Internet access, from completing the survey. However, in NM, 74% of individuals live in households with Internet use (36). The cross-sectional nature of this research means that conclusions cannot be drawn about causality. This study was not longitudinal, so it could not capture changes in food insecurity due to the pandemic. Likert scale terms such as “sometimes” and “usually” are vague and may be interpreted differently across study participants,



**FIGURE 2** z Test comparing the proportions of food-secure and food-insecure individuals who selected “usually” or “always” in response to the questions examining challenges with access to food during the novel coronavirus disease 2019 pandemic. Proportions were significantly different ( $P < 0.001$ ) for each question.

including variation in interpretation based on cultural experiences. However, questions such as these are commonly used in survey research, including studies similar to this one (21). Finally, participants could have completed the survey more than once by clearing their browser cookies or using a different browser or device, or could have provided inaccurate or dishonest responses (37). These are difficult variables to control in online survey-based studies; however, they must be considered in interpreting results. Moreover, response bias may have been present, where those that responded to the survey had a particular interest in the pandemic and/or food security in NM, and may have been more or less likely to be food insecure, skewing results. Despite limitations, strengths of the study include its early administration and validated survey instrument that included multiple components of food insecurity that are particularly important during a disaster (i.e., physical access to food, access to appropriate foods, and disaster-related uncertainty and fear).

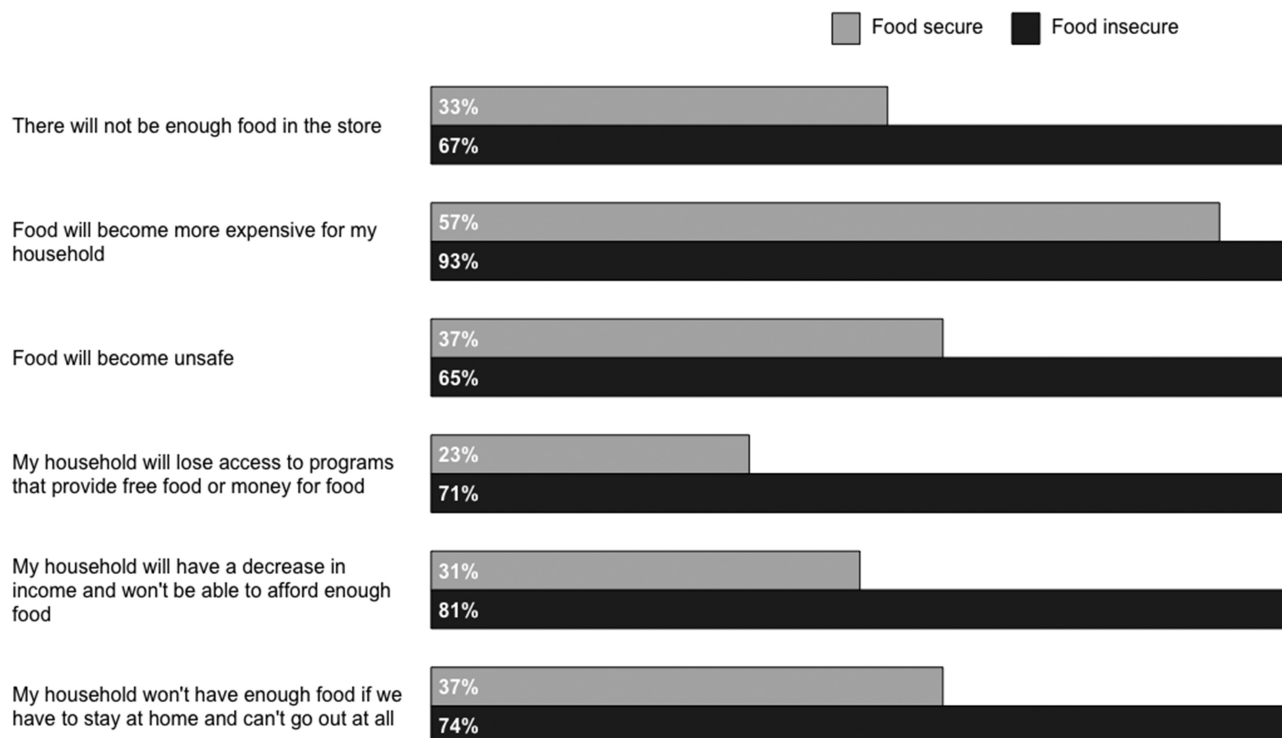
The COVID-19 pandemic disrupted the economy and food systems across the United States. The prevalence of food insecurity among respondents in this study during COVID-19 was lower than in some studies conducted early in the pandemic but similar to studies conducted in other parts of the United States that used the same survey and sampling method (38). Food insecurity was also more likely among respondents

who were Hispanic, female, low-income, and in larger households than among non-Hispanic white, male, high-income respondents, and those in smaller households. Finally, food-insecure respondents in this study experienced more food-related challenges and worry than food-secure respondents. Future research should continue to examine the effects of COVID-19 on food access and food insecurity in order to inform ongoing policy efforts to address food access challenges during the pandemic and response to future public health emergencies. Lessons learned about food access during COVID-19 can facilitate a rapid response to similar future events.

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**FIGURE 3** z Test comparing the proportions of food-secure and food-insecure individuals who rated their food-related worry during the novel coronavirus disease 2019 pandemic as 4–6 on a scale of 1 (not worried at all) to 6 (extremely worried). Proportions were significantly different ( $P < 0.001$ ) for each question.

content; and all authors: wrote the paper and read and approved the final manuscript.

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