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Featured Article

Labor Issues in the Food Supply Chain Amid the COVID-19 Pandemic

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Abstract *The impacts of COVID-19 on labor in the food supply chain and on workers' decisions to accept essential jobs are discussed. We then analyze surveys administered to low-skilled domestic workers before and during the pandemic to assess respondents' attitudes toward food production, guest workers, immigration policy, and the government's response to COVID-19. Results suggest the outbreak resulted in respondents, on average, shifting their view toward food being a national security issue and a higher degree of empathy for H-2A workers. Regression analysis shows that gender, current agricultural workers, and information on COVID-19 and agricultural field workers influenced respondents' answers.*

Key words: Agricultural labor, Coronavirus, COVID-19, Food supply chain.

JEL codes: Q10, J43.

Introduction

The novel coronavirus rapidly spread throughout the United States following the first confirmed case on January 20, 2020. By the start of April 2020, extensive stay-at-home and social distancing measures were issued, which dramatically slowed the economy and caused unprecedented layoffs (Mervosh, Lu, and Swales 2020; Morath and Chaney 2020; Rainey and Forgey 2020). The COVID-19-induced economic uncertainty caused significant shifts in consumer food spending. Food sales from restaurants and bars struggled, while food sales from grocery stores and online food retailers significantly increased. These sudden shifts in consumer demand stressed the food supply chain, leading to many labor-market disruptions. In response, the US government deemed workers in the primary agricultural and food

manufacturing, distribution, and retail industries as critical to food security and issued exemptions from stay-at-home orders for these workers.

This paper discusses the impacts of the COVID-19 pandemic on labor throughout the food supply chain and on the attitude of a sample of past, current, and potential low-skilled food-supply-chain workers toward food production, guest workers, and immigration policy by comparing surveys administered before and during the outbreak. Specifically, the next section discusses COVID-19-induced labor issues in the food supply chain by focusing on downstream (retail, distribution, and processing) and upstream (agricultural field jobs) segments. It also provides a framework to analyze how the pandemic can impact workers' decision to accept jobs. The third section presents the survey results by comparing mean responses before and during the pandemic and what factors impacted respondents' answers. The fourth section offers concluding remarks.

Labor Issues in the Food Supply Chain

Downstream Segments: Retail, Distribution, and Processing

As the pandemic worsened, state governments ordered nonessential businesses to shut down, but included exemptions for "essential critical infrastructure workers" that protect communities, ensure public health, and maintain vital economic sectors. Food and agriculture are key sectors, and workers in every aspect of the food supply chain—from primary production to processing to distribution to delivery—were deemed essential. However, the food-service industry (restaurants and bars, stadiums, schools, concert venues, *etc.*) was largely deemed unessential and experienced a 28% decline in expenditures on food away from home during the peak of the first wave in March 2020 (USDA 2020). These sudden and drastic changes have far-reaching consequences for workers in upstream segments of the food supply chain because, over the last two decades, the portion of consumers' food expenditures spent on the food-service industry expanded from 47.1% in 1997 to 54.4% in 2018 (Newman and Bunge 2020). The closing of the food service industry caused increases in unemployment and income losses which led to increases in food insecurity (see Ahn and Norwood 2021; Gundersen et al. 2021 and Ziliak 2021). It also caused consumers to drastically alter their food consumption habits toward cooking at home. As consumers shifted from spending over half of their food budget on eating out to eating in, the food-service industry struggled while food retailers (grocery stores, food banks, online retailers), deemed essential, experienced shortages.

The sudden closures and shifts in spending habits caused substantial disruptions in the food supply chain because of two primary reasons: (i) food growers, processors, and distributors had to simultaneously adjust to a plummet in demand by the food service industry and a spike in demand by food retailers[1]; and (ii) food products destined for the food service industry are

[1]*Early in the outbreak, problems arose with food retailers as restocking efforts were unable to match demand (Kang and Gasparro 2020). After the initial surge of consumers filling their pantries, grocery stores experienced a drop in demand, which eased the initial pressure on the food system, and food processors and food retailers cut back on product varieties to improve efficiency and reduce the time required to make products available to consumers (Gasparro and Maidenberg 2020; Kang and Gasparro 2020).*

different in terms of size, packaging, and labeling requirements from those destined for food retail outlets (Cagle 2020; Newman and Bunge 2020).[2] Overcoming these logistical difficulties required time and financial resources. This, coupled with the drop in demand, resulted in substantial quantities of food waste as the pandemic took hold because growers of perishable products in the middle of winter harvest dumped, abandoned, or plowed crops into the ground, causing disruptions in the labor market and income loss to farmers (Cagle 2020; Frias and Hall 2020; Lush 2020; Newman and Bunge 2020).[3] One bi-product has been a dramatic uptick in the hiring of drivers, warehouse employees, and in-store workers.

Slaughterhouses and food processors, crucial to the food supply chain, were deemed essential. These facilities put workers at higher risk of contracting coronavirus due to shoulder-to-shoulder, indoor working conditions. Plant managers attempted to mitigate the added risk to workers by implementing social distancing where possible, assigning workers to groups, quarantining work groups infected with the coronavirus, and temporarily closing plants if an outbreak occurred. Though deemed essential, many facilities were forced to shut down because the preventative measures failed and outbreaks among workers became widespread. By late April, over thirty meat processing facilities throughout the country closed due to outbreaks among workers and management alike (Birch and Jett 2020; Jackson 2020; Wiener-Bronner 2020a; Wiener-Bronner 2020b). Quarantining large portions of the labor force had sizable implications and revealed vulnerabilities in the food supply chain. In addition to sudden shift in demand from food service to retail, the closures of slaughterhouses and processing facilities created further bottlenecks for livestock farmers, leading to culling of hogs and chickens (Kevany 2020; Mansoor 2020). As a result, meat shortages became a reality (Gross 2020).[4]

To help boost the US meat supply as demand spiked and processing plants closed due to the outbreaks, the US Department of Agriculture's Food Safety Inspection Service temporarily allowed poultry, beef, and pork processing plants to increase processing speeds (van der Zee, Levitt, and Wasley 2020). The potential drawbacks to boosting supply through faster slaughter rates include increasing risk to workers and hindering quality control and federal food safety inspectors' efforts.

Upstream Segment: Agricultural Field Jobs

While the downstream segment of the food supply chain struggled with drastic shifts in demand, repackaging products for retail markets, and

[2]*Before the outbreak, food retailers' and distributors' contingency plans centered on natural disasters in one region of the country and for a short time frame (Kang and Gasparro 2020). Furthermore, the efficiency of the US food distribution system relies on predictability, set schedules, and largely follows a "just-in-time" model to reduce storage costs (Charles 2020). Consequently, because ramifications of COVID-19 are worldwide and for a prolonged period, the food system was not prepared for a pandemic of this magnitude and is struggling to adapt, particularly in the early stages.*

[3]*As supply chain disruptions deepened, by April 2020, the dairy industry was forced to dump between 2.5 and 4 million gallons of fluid milk per day from Arizona to Idaho to Wisconsin to Vermont because farmers and distributors were unable to repackage the perishable liquid for food retail industry in time (Jahnke 2020; Lum 2020; Lush 2020; Wiener-Bronner 2020c). Furthermore, expecting prolonged demand shocks and reduced processing capacity due to outbreaks at slaughterhouses, chicken and pork companies euthanized millions of animals (Newman and Bunge 2020).*

[4]*To assist struggling farmers, the US Congress included $23.5 billion for agriculture in the March 2020 coronavirus stimulus bill (Lilliston 2020; Brasher 2020; Michigan Farmer 2020).*

shutdowns due to quarantined workforce, they relied on the continued operation of primary agricultural production, particularly labor-intensive crops, such as fruits and vegetables. The US government recognized this crucial dependency and implemented additional measures to ensure a strong labor force.

As with all workers along the food supply chain, agricultural workers were deemed essential. While labor demand was low at the start of the outbreak as crops rotted in the field, demand for field workers rebounded as food distributors repackage products to more retail-centric markets and the food service industry reopened.

April, the peak of COVID-induced business closure, is a crucial time of the year for labor-intensive agricultural producers to secure labor, primarily foreign born from Mexico, for summer harvest. Labor-intensive agriculture heavily relies on undocumented workers, but H-2A guest workers are becoming more common.[5] ICE temporarily focused efforts only on undocumented workers that were potentially violent or criminals. Furthermore, in addition to issuing exemptions from stay-at-home orders, the US government eased H-2A visa rules for temporary guest workers to reduce barriers for foreign guest workers to enter the United States on temporary work visas. Specifically, while the US Department of State formally suspended routine visa services, they continued to process H-2A visas and temporarily waived the in-person interview requirement (USDS 2020). Moreover, the Department of Homeland Security and USDA temporarily allowed farmers with a valid temporary labor certification to hire H-2A workers that already reside in the US after Citizenship and Immigration Services receives the H-2A petition. Also, the three-year maximum to stay in the US has temporarily been lifted.

In addition to lacking health insurance and working in close proximity, many immigrant agricultural laborers work and travel in close quarters with each other. An outbreak among these workers will adversely impact producers because replacements are difficult to find in short notice and will also harm workers due to lost income, medical bills, and even death (Read 2020). Consequently, the rapid spread of the virus would be costly for workers and producers alike and could lead to further disruptions in upstream segments of the US food supply chain. To help reduce the risk to field workers, farmers are implementing social distancing rules where possible, which slows down harvest time. Furthermore, the United Farm Workers union asked employers to extend paid sick leave to these essential workers to ease financial worries and ensure they take time off if sick or exposed, which will reduce risk to other workers and keep primary agricultural produce flowing upstream (Cagle 2020; Jordan 2020). While widespread shortages of food are not expected, the labor disruption, social distancing measures, outbreaks among farm workers has led to limitation of fresh produce at grocery stores (Borunda 2020).

Impacts of COVID-19 on Reservation Wages

With widespread business closures causing skyrocketing unemployment, substantial income uncertainty, heightened unemployment benefits, and

[5]*Estimates range between half to three-quarters of all field workers (between about 1 to 1.5 million), are undocumented immigrants (Jordan 2020). During the height of the pandemic, many undocumented works carry an employer-written letter that their job, as declared by the Department of Homeland Security, is "critical to the food supply chain," to lower the change of being arrested for violating stay-at-home orders. There were 257,667 workers on H-2A visas in 2019.*

substantial risk of infection to workers in essential industries, such as food and agriculture, many workers may consider employment in jobs at wages they would have considered unacceptable before the pandemic. Therefore, it is worth examining how COVID-19 could impact workers' reservation wage to accept essential food and agricultural jobs.

We can analyze changes in employee job standards from a job-search theoretic point of view. In a job-search model, an unemployed worker accepts a job if the wage—often considered a bundle of job attributes, including wage rate, risk, prestige, location, *etc.*—is above their reservation wage (defined as the lowest acceptable wage for a given job). The reservation wage is determined by the value of unemployment benefits minus job search cost plus the net-present expected value of receiving a wage offer greater than the reservation wage. The COVID-19 pandemic could have conflicting impacts on the reservation wage: The increase in unemployment benefits (making unemployment less painful) and higher chance of exposure to COVID-19 (enhancing health risk of employment) through work will increase the reservation wage, implying workers will be more hesitant in accepting essential jobs. By contrast, the enhanced risk of being laid off, severe income shock, and lower probability of receiving a high-paying job offer will lower workers' reservation wage, implying workers are more willing to accept essential jobs. The longer the pandemic continues to stymie the food-service industry, to cause wide-spread outbreaks at meatpacking plants, and to decimate workers' income and the overall economy, the more likely workers' reservation wage will fall. Next, we gain insight into how the pandemic has impacted past, current, and potential low-skilled food-supply-chain workers by assessing their attitude toward food production, guest workers, and the government's response to COVID-19.

Survey Results

Through surveys administered before and during the spread of the coronavirus, we assess the impact of the coronavirus pandemic on low-skilled domestic workers' attitudes toward food production, agricultural guest workers, immigration policy, level of concern of a food shortage, and whether shelter-in-place orders and economic damage are justified by comparing these two surveys. The surveys were administered online within the US using Dynata, which has a country demographic-balanced representative sample (Lorch, Cavallaro, and van Ossenbruggen 2010). The surveys targeted low-skilled domestic workers that are most likely to compete with H-2A workers for agricultural field jobs by restricting the sample to respondents with income below $50,000, without a college degree, and who are below the retirement age of sixty-five.

The survey was conducted in two rounds. The first round of surveys was collected before the first known case of COVID-19 between November 18 to November 22, 2019. Of the 612 total respondents, 322 were in the control group and 290 were given additional information regarding the need for agriculture field workers and the use of H-2A visas to fill this need when domestic workers are not available (see Supplemental Material for information set 1 in Appendix S1). The second round of surveys was collected in the middle of the pandemic between April 8 and April 13, 2020. Of the 1,036 total respondents, 345 were in the control group, 345 were given the same information set on agriculture field workers and H-2A visas as in the first round, and 346 were

given an information set on the impact of COVID-19 on agricultural production (see Supplemental Material for information set 2 in Appendix S1).[6]

Table 1 reports the questions administered in the surveys. Questions 1–4 are not specific to COVID-19 and ask if food is a national security issue, degree of empathy toward H-2A workers, political bias toward immigration policy, and level of knowledge of the H-2A guest-worker program. Questions 5–9 are related to COVID-19 and ask about the importance of food production amid the crisis, level of concern of a food shortage, whether the shelter-in-place orders are an under-reaction or over-reaction, if the economic damage

Table 1 Questions Asked in the Survey

	Questions	Answer range
	Both pre- and post-COVID1-19 survey	
Q1	Do you consider food production a national security issue?	Yes; No; Unsure
Q2	In terms of immigration policy, with 1 having a very liberal bias and 7 having a very conservative bias, what is your political leaning?	1 (very liberal) to 7 (very conservative)
Q3	With 1 being no empathy and 7 being extremely empathetic, what is your level of empathy toward H-2A workers (foreign workers on a temporary visa to work in agricultural fields)?	1 (no empathy) to 7 (extremely empathetic)
Q4	What is your level of knowledge about the H-2A Guest Worker Program?	1 (very unfamiliar) to 7 (very familiar)
	Only in the post-COVID1-19 survey	
Q5	How important is agriculture food production amid the coronavirus crisis?	1 (Less important than before the crisis) to 5 (More important than before the crisis)
Q6	Please rate how concerned you are about the US having a food shortage due to the effect of COVID-19 on agricultural food workers?	1 (Not concerned at all) to 5 (Extremely concerned)
Q7	With shelter-in-place orders in most states, is the US government overreacting or under reacting to the crisis?	1 (Extremely underreacting) to 5 (Extremely overreacting)
Q8	Please rate your level of agreement with the following statement, "The economic damage caused by the shelter-in-place orders is justified to keep hospitals from becoming overwhelmed and to save as many lives as possible."	1 (Strongly disagree) to 5 (Strongly agree)
Q9	Have you experienced a loss of income due to COVID-19?	Yes, Permanently; Yes, temporarily; Yes, hours reduce; No

[6]*This survey was administered as part of a larger research project analyzing the impact of nonpecuniary benefits on US domestic workers' willingness to accept agricultural field jobs, see Luckstead et al. (2020).*

from shelter-in-place orders is justified to save lives, and whether income loss occurred due to COVID-19.

Table 2 reports and compares mean responses of the pre-COVID-19 respondents to those of the post-COVID-19 respondents (those surveyed during the pandemic) for the full sample, the control group subsample with no additional information, and the subsample that viewed information set 1. The analysis shows that, for the full sample, only 33.8% (=100 × 0.338) of respondents consider food a national security issue (question 1 in table 1) before the crisis, but this number jumped to 40.8% (=100 × 0.408) amid the crisis; this difference in means is statistically significant. This finding suggests that, even though COVID-19 did increase respondents' overall concern, the majority of working-class Americans do not find food a national security issue. It is worth noting that the survey was administered in early April as meat processing plants started to close due to coronavirus outbreaks. However, for the control group and information set 1 subsamples, while the percent of respondents that consider food a national security issue is similar to the full sample, the difference in mean before and during COVID-19 are no longer statistically significant. This lack of significant differences in means for these subsamples is expected because these subgroups were not provided any additional information on food or national security.

The survey indicates that respondents generally had a slight conservative bias toward immigration policy. Specifically, with 4 indicating neutral political views on a 1 to 7 scale, respondents' average ranking for question 2 in table 2 was just on the conservative side of the midpoint, ranging between 4.038 to 4.208 for all three groups and for both before and after the pandemic. As anticipated, the coronavirus outbreak did not impact respondents' political biases on immigration policy, as the differences in means before and during COVID-19 are not statistically different.

Focusing on guest workers, despite a general lack of familiarity with the H-2A program both before and during the pandemic (*i.e.*, the average scores were below the mid-point for question 4 in table 2, ranging from 2.451 to 2.723),[7] respondents showed sympathy toward agricultural guest workers, with average scores above the midpoint, ranging from 4.742 to 5.100. Furthermore, the coronavirus outbreak increased respondents' sympathies toward H-2A workers, as the mean responses are slightly larger, though statistically significant, after COVID-19 for the full sample and control group. These heightened sympathies are likely due to agricultural workers being classified as essential workers—which puts them at higher risk of exposure to COVID-19—to keep the food supply chain functioning.

Table 3 reports the mean responses for the survey conducted during the spread of the coronavirus and compares differences in means for the control group and information set 1 and for information set 1 and information set 2. As previously mentioned, information set 2 was only given to respondents in the 2nd round survey (i.e., during COVID-19). For questions 1–4, the mean responses are largely consistent in magnitude with those reported in table 2. Apart from a statistically higher mean for information set 2 compared to that of information set 1 for question 1, information sets 1 and 2 did not lead to

[7]*As would be expected, COVID-19 generally did not impact respondents' knowledge of the H-2A program as the mean values before and after the pandemic are statistically insignificant for the full sample and the information set 1 subsample, though the control groups does show a slight increase in mean after the pandemic.*

Table 2 Comparing Means Pre-COVID-19 to Post-COVID-19 Responses for Questions Unrelated to COVID-19

	All			Control			Information set 1		
	Mean-Pre	**Mean-Post**	**P-value**	**Mean-Pre**	**Mean-Post**	**P-value**	**Mean-Pre**	**Mean-Post**	**P-value**
Q1: National Security	0.338 (0.473)	0.408 (0.492)	0.004**	0.326 (0.470)	0.365 (0.482)	0.289	0.352 (0.478)	0.397 (0.490)	0.239
Q2: Politics of Immigration	4.191 (1.708)	4.087 (1.675)	0.231	4.208 (1.725)	4.120 (1.658)	0.504	4.171 (1.693)	4.038 (1.718)	0.325
Q3: Empathy toward H-2A	4.822 (1.579)	5.031 (1.510)	0.008**	4.742 (1.607)	4.981 (1.471)	0.046*	4.910 (1.545)	5.100 (1.526)	0.122
Q4: Knowledge of H-2A	2.580 (1.701)	2.679 (1.811)	0.266	2.451 (1.650)	2.681 (1.815)	0.088*	2.723 (1.747)	2.714 (1.811)	0.948

*Standard Deviations are in parentheses. **,* statistically significant at the 5% and 10% level, respectively.*

Table 3 Full Sample Mean Responses and Differences in Mean for All Questions for the Post-COVID Subsample

	Full Sample	**Control *vs* Information Set 1**			**Information Set 1 *vs* 2**		
		Control	**Info 1**	**P-value**	**Info 1**	**Info 2**	**P-value**
Q1: National Security	0.408 (0.492)	0.365 (0.482)	0.397 (0.490)	0.389	0.397 (0.490)	0.462 (0.499)	0.083*
Q2: Politics of Immigration	4.087 (1.675)	4.120 (1.658)	4.038 (1.718)	0.521	4.038 (1.718)	4.103 (1.650)	0.611
Q3: Empathy toward H-2A	5.031 (1.510)	4.981 (1.471)	5.100 (1.526)	0.301	5.100 (1.526)	5.012 (1.534)	0.452
Q4: Knowledge of H-2A	2.679 (1.811)	2.681 (1.815)	2.714 (1.811)	0.809	2.714 (1.811)	2.642 (1.811)	0.603
Q5: Importance of Food Production	3.970 (0.915)	3.870 (0.960)	3.991 (0.891)	0.085*	3.991 (0.891)	4.049 (0.885)	0.392
Q6: Food Shortage from COVID-19	3.786 (1.101)	3.687 (1.095)	3.797 (1.141)	0.196	3.797 (1.141)	3.873 (1.061)	0.367
Q7: Shelter-in-Place order	2.991 (1.097)	3.055 (1.089)	2.957 (1.095)	0.236	2.957 (1.095)	2.962 (1.107)	0.944
Q8: Hospitals overwhelmed	3.876 (1.002)	3.777 (1.037)	3.910 (1.003)	0.087*	3.910 (1.003)	3.942 (0.958)	0.668
Q9: Income loss	0.493 (0.500)	0.481 (0.500)	0.504 (0.501)	0.543	0.504 (0.501)	0.493 (0.501)	0.761

*Standard Deviations are in parentheses. **,* statistically significant at the 5% and 10% level, respectively.*

statistical differences in means for these first four questions. Thus, since information set 2 contained information on the impact of COVID-19 on agricultural production, it would be expected that this information might increase concern of food as a national security issues, but have no impact on immigration outcomes unrelated to the pandemic. However, it is striking that the food and COVID-19 related information set 2 only increases the mean by 5.5%, which further confirms that over half the respondents do not view food as a national security issue, even amid a global pandemic that created extensive disruptions to the food supply chain.

With a midpoint of 3 on a 1 to 5 scale, the survey indicates that, for the full postoutbreak sample, with an average response of 3.970, respondents generally found food production to be an important issue since the coronavirus outbreak (question 5 in table 1). Interestingly, information set 1 on H-2A workers did lead to a slight, but statistically significant, increase in means from 3.870 to 3.991 relative to the control group, whereas information set 2 on the impact of COVID-19 on the food supply chain did not lead to a statistically significant difference in means relative to that for information set 1. Respondents also indicated concern that COVID-19 will result in a food shortage (question 6) with mean responses in the range of 3.687 to 3.873, above the midpoint. However, neither information set led to statistically significant differences in means.

Our survey results also indicate that respondents generally agree with the stay-at-home or shelter-in-place orders given by state governors. Specifically, when asked if the shelter-in-place orders are an over- or underreaction (question 7), the mean responses in the range of 2.957 to 3.055 envelop the midpoint. These results are consistent with national polls that about 80% of Americans approved of the shelter-in-place orders on a bipartisan basis (Chappell 2020). Corroborating the shelter-in-place results, respondents also generally agree that, with mean responses ranging between 3.777 and 3.942 greater than the midpoint, the economic damage caused by the shelter-in-place orders is justified to keep hospitals from becoming overwhelmed and to save as many lives as possible (question 8). For both questions 5 and 8, information set 1 increased the mean relative to the control group, while information set 2 did not lead to a statistically significant difference in the mean relative to information set 1. This finding could be a result of the substantial media coverage on the importance of agricultural workers in keeping the food supply chain running since the start of the pandemic, which made information set 2 superfluous. Thus, this suggests that working-class Americans are responsive to clear and concise communication of the impact of this pandemic on food production. Finally, our results indicate that about half of the respondents have experienced income loss (either permanent, temporary, or reduction in hours) because of the pandemic.

Next, we analyze how various factors (e.g., gender, political leaning, information set 1 and 2, income, etc.) impacted respondents' answers to questions 1, 3, 5–8 in the survey. For this analysis, we run ordered Logistic regressions with answers to the questions as the dependent variable and the various factors as independent variables. Based on the regression results, we calculate the marginal effect for each factor. Table 4 reports the marginal effects for questions 1 and 3 that were asked in both the pre- and post-COVID-19 surveys. The second column in table 4 reports the marginal impacts on the probability of answering "Yes" to question 1 (is food a national security issue). Key factors that significantly influenced respondents' answers include gender,

Table 4 Marginal Effect for Questions 1 and 3

	Q1: Security	Q3: Degree of Empathy Toward H-2A Worker[a]		
	Yes	Low	Medium	High
Male	0.050 (0.026*)	0.038 (0.010***)	0.062 (0.016***)	−0.100 (0.025***)
Current Ag. Field	0.206 (0.052***)	0.012 (0.021)	0.018 (0.031)	−0.030 (0.053)
Past Ag. Field	0.143 (0.038***)	−0.008 (0.013)	−0.014 (0.024)	0.022 (0.037)
Conservative	0.018 (0.031)	0.014 (0.011)	0.024 (0.019)	−0.038 (0.030)
Rural	−0.011 (0.026)	0.006 (0.010)	0.010 (0.016)	−0.016 (0.026)
Grade school	0.068 (0.051)	−0.001 (0.018)	−0.001 (0.030)	0.001 (0.048)
Professional	0.101 (0.063)	−0.024 (0.019)	−0.046 (0.042)	0.070 (0.061)
Information set 1	0.020 (0.042)	−0.017 (0.014)	−0.028 (0.025)	0.045 (0.039)
Info set 1 and Post-COVID interaction	0.013 (0.057)	0.012 (0.022)	0.019 (0.033)	−0.031 (0.054)
Post Covid subsample	0.023 (0.040)	−0.026 (0.015*)	−0.042 (0.023*)	0.068 (0.038*)
Information set 2	0.106 (0.039***)	−0.0004 (0.014)	−0.001 (0.023)	0.001 (0.037)
Empathy for H-2A workers	0.026 (0.008***)			
Familiarity with H2A program		−0.015 (0.003***)	−0.025 (0.005***)	0.040 (0.008***)
HH income	0.011 (0.012)	−0.008 (0.005*)	−0.014 (0.008*)	0.022 (0.012*)
Number of children	0.010 (0.012)	−0.005 (0.004)	−0.008 (0.007)	0.012 (0.011)
Political leaning with respect to immigration	0.026 (0.009***)	0.011 (0.004***)	0.019 (0.006***)	−0.030 (0.009***)
Age	−0.013 (0.006**)	0.005 (0.002**)	0.008 (0.004**)	−0.013 (0.006**)
Age squared	0.0002 (0.0001***)	−0.0001 (0.0000**)	−0.0001 (0.0001**)	0.0002 (0.0001**)

Note: Marginal impacts for Q1 and Q3 are calculated from the Logistic and Order Logistic regressions, respectively. Standard errors are in parentheses;.,,**,*** indicate significance at the 0.1, 0.05,0.01, and < 0.01% significance levels.* [a] *Respondents that answered Q3 in the range (1,3) are classified as Low, [3,5) are Medium, and (5,7] are High.*

current and past experience working in agricultural field jobs, information set 2, degree of empathy for H-2A workers, political bias in immigration policy, and age. The results show that for males, the probability of considering food a nonnational security issue increased by a modest 0.05. Respondents with current or past experience in agriculture were substantially more likely to find food production a national security issue: those employed in field work at the time of the survey had the strongest marginal impact of 0.21, while those employed in agriculture before the survey had a lower marginal impact of 0.14. However, the novel coronavirus pandemic alone did not alter respondents' view on this issue (the indicator variable identifying respondents from the post-COVID survey is statistically insignificant), while more information on the impact of COVID on the food supply is associated with an increase in respondents' concern of food as a national security issue (marginal impact of 0.106). Empathy for H-2A workers and conservative political leaning both have small, yet statistically significant, impacts of 0.026. Finally, age has the smallest significant effect of −0.013, indicating older respondents are less likely to see food as a national security issue.

The marginal impacts of various factors that influenced respondents' level of empathy toward H-2A workers are reported in the third through fifth columns of table 4.[8] The results show that males, the COVID-19 pandemic, H-2A family members, income level, political leaning, and age all impact respondents' degree of empathy. Males, conservative political leaning toward immigration policy, and respondents over fifty increased the likelihood of showing a low degree of empathy by 0.038, 0.011, and 0.005, respectively, while they lowered the probability of a high degree of empathy by 0.100, 0.030, and 0.013. As expected, the COVID-19 pandemic, having a higher degree of familiarity with the H-2A program, and having a relatively higher income level lowered the probability of a low degree of empathy by 0.015 and 0.008, respectively, and increased the probability of a high degree of empathy of H-2A workers by 0.040 and 0.022. Therefore, these results suggest conservative males are most likely to have low empathy for H-2A workers, whereas higher income females that are familiar with H-2A visas are most likely to be empathetic.

The marginal impact of factors that influenced respondents' answers to the COVID-19-related questions 5–8 that were only in the survey administered during the pandemic are reported in table 5. For question 5 on the importance of agricultural food production amid the pandemic (columns 2–4),[9] only three factors influenced respondents' answers: gender, household income, and information set 2. The results indicate that male respondents were less likely to be concerned about food production during COVID-19. For instance, for less concerned, the marginal impact of males was positive at 0.015, indicating males were more likely to select this option; whereas for more concerned, the marginal impact of −0.067 indicates males were less likely to select this option. However, respondents that viewed information set 2 generally showed greater concern for food production amid the pandemic, as were

[8] *In the survey, for question 3, respondents answered on a scale 1–7. To simplify the marginal analysis and limit the size of Table 4, we sort respondents into three groups based on their degree of empathy: low (1,3), medium [3,5), and high (5,7].*

[9] *In the survey, for questions 5–8, respondents answered on a scale 1–5. To simplify the marginal analysis and limit the size of Table 4, we sort respondents into three groups. For question 5, the groups are low (1,2), medium [2,4), and high (4,5]; we used similar breakdowns for questions 6–8.*

Table 5 Marginal Effect for Questions 5 through 8

	Q5: Importance of food prod.[a]			Q6: Concern of food shortage			Q7: Shelter-in-place order			Q8: Economic damage is justified		
	Less	**Neutral**	**More**	**Not**	**Neutral**	**Extreme**	**Under**	**Neutral**	**Over**	**Disagree**	**Neutral**	**Agree**
Male	0.015	0.051	−0.067	0.087	0.079	−0.166	−0.098	0.005	0.093	0.021	0.036	−0.057
	(0.007**)	(0.023**)	(0.029**)	(0.017***)	(0.015***)	(0.030***)	(0.027***)	(0.004)	(0.026***)	(0.011*)	(0.019*)	(0.030*)
Current Ag. field	−0.013	−0.047	0.060	−0.066	−0.078	0.144	−0.173	−0.039	0.212	−0.030	−0.059	0.088
	(0.011)	(0.043)	(0.054)	(0.021***)	(0.030***)	(0.051***)	(0.039***)	(0.025)	(0.063***)	(0.017*)	(0.037)	(0.054)
Past Ag. field	−0.003	−0.009	0.011	−0.035	−0.037	0.071	−0.055	−0.000	0.055	0.026	0.041	−0.067
	(0.010)	(0.033)	(0.043)	(0.020*)	(0.023)	(0.043*)	(0.038)	(0.004)	(0.041)	(0.019)	(0.027)	(0.046)
Conservative	−0.010	−0.032	0.042	−0.060	−0.057	0.117	−0.056	0.003	0.052	−0.015	−0.026	0.040
	(0.008)	(0.027)	(0.035)	(0.019***)	(0.018***)	(0.036***)	(0.032*)	(0.003)	(0.030*)	(0.013)	(0.023)	(0.035)
Rural	−0.001	−0.005	0.006	−0.018	−0.018	0.035	−0.026	0.001	0.025	−0.000	−0.000	0.001
	(0.007)	(0.023)	(0.030)	(0.016)	(0.016)	(0.031)	(0.028)	(0.001)	(0.027)	(0.011)	(0.020)	(0.031)
Grade school	−0.016	−0.058	0.074	−0.011	−0.011	0.022	−0.112	−0.013	0.125	−0.001	−0.002	0.004
	(0.011)	(0.045)	(0.056)	(0.031)	(0.032)	(0.063)	(0.046**)	(0.015)	(0.060**)	(0.021)	(0.038)	(0.059)
Professional	0.013	0.040	−0.053	0.015	0.014	−0.029	−0.107	−0.012	0.119	−0.030	−0.060	0.090
	(0.018)	(0.053)	(0.071)	(0.040)	(0.034)	(0.074)	(0.052**)	(0.017)	(0.068*)	(0.021)	(0.048)	(0.070)
Info. set 1	−0.012	−0.041	0.053	−0.012	−0.012	0.024	0.033	−0.002	−0.030	−0.020	−0.036	0.055
	(0.007)	(0.026)	(0.033)	(0.018)	(0.018)	(0.035)	(0.033)	(0.003)	(0.030)	(0.012*)	(0.022)	(0.034)
Info.Set 2	−0.018	−0.062	0.079	−0.029	−0.029	0.057	0.040	−0.003	−0.037	−0.018	−0.032	0.049
	(0.007**)	(0.026**)	(0.033**)	(0.017*)	(0.018)	(0.035)	(0.033)	(0.003)	(0.030)	(0.012)	(0.022)	(0.034)
HH Income	−0.006	−0.020	0.026	−0.002	−0.002	0.003	0.038	−0.002	−0.036	−0.008	−0.014	0.023
	(0.003*)	(0.011*)	(0.014*)	(0.007)	(0.007)	(0.014)	(0.013***)	(0.002)	(0.013***)	(0.005)	(0.009)	(0.015)
Number of children	−0.002	−0.005	0.007	−0.013	−0.013	0.026	−0.001	0.000	0.001	0.008	0.013	−0.021
	(0.003)	(0.011)	(0.014)	(0.008*)	(0.008*)	(0.015*)	(0.012)	(0.001)	(0.012)	(0.005)	(0.009)	(0.013)

(Continues)

Table 5 Continued

	Q5: Importance of food prod.[a]			Q6: Concern of food shortage			Q7: Shelter-in-place order			Q8: Economic damage is justified		
	Less	**Neutral**	**More**	**Not**	**Neutral**	**Extreme**	**Under**	**Neutral**	**Over**	**Disagree**	**Neutral**	**Agree**
Political bias immigration	−0.001 (0.002)	−0.005 (0.008)	0.006 (0.011)	0.012 (0.006**)	0.011 (0.005**)	−0.023 (0.011**)	−0.035 (0.010***)	0.002 (0.002)	0.033 (0.009***)	0.004 (0.004)	0.006 (0.007)	−0.010 (0.011)
Age	−0.002 (0.002)	−0.006 (0.005)	0.008 (0.007)	−0.003 (0.004)	−0.002 (0.003)	0.005 (0.007)	−0.002 (0.006)	0.000 (0.000)	0.002 (0.006)	−0.001 (0.003)	−0.002 (0.004)	0.003 (0.007)
Age Squared	0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)	−0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	−0.000 (0.000)

*Note: Marginal impacts for Q5–Q8 are calculated from Order Logistic regressions. Standard errors are in parentheses, and *,**,*** indicate significance at the 0.1, 0.05,0.01% significance levels.*
[a]*Respondents that answered Q5 in the range (1,2) are classified as Less,*
(3) are Neutral, and (4,5) are More; We use similar breakdowns for Q6–Q8.

those with higher incomes. For example, information set 2 reduced the likelihood that respondents fell into the "Less" group by 0.018, while increasing the probability that they were in the "More" group by 0.079.

For the level of concern of a COVID-19-induced food shortage (question 6, table 5, columns 5–7), seven factors—gender, working in an agricultural field job (past or present), conservative political affiliation, information set 2, number of children, and political views on immigration—impacted respondents' answers. As with question 5, male respondents were not as concerned of a food shortage due to COVID-19 as seen by the positive marginal impact of 0.087 for "Not" concerned and negative impact of 0.166 for "Extreme." Respondents with current field jobs and past field jobs are more likely to be concerned (marginal effect of 0.144 and 0.071 for "Extreme"). Information set 2 led to respondents becoming more concerned of a food shortage. This enhanced concern is observed by the negative marginal impact of 0.012 for "Not" and a positive impact of 0.024 for "Extreme." With the addition of each child to a household, the probability of being highly concerned increases by 0.026. Regarding political views, conservative affiliation increases the probability of being in the "Not" group by 0.012 and decreased the probability of being in the "Extreme" group by 0.023. While these seem contradictory, the conservative variable is binary, while the view on immigration is treated as continuous with a range 1–7 and mean of 4.1.

Seven factors—gender, current agricultural field position, conservative affiliation, no high school degree, professional degree, income level, and political bias toward immigration policy—impacted respondents' opinion about whether the shelter-in-place orders were under-reactions or over-reactions to the pandemic (question 7, columns 8–10, table 5). Males, workers employed in an agricultural field job at the time of the survey, conservative affiliation, no high school degree, respondents holding a professional/technical degree, and respondents with a conservative bias in immigration policy were all less likely to find the shelter-in-place order an underreaction (with marginal impacts of −0.098, −0.173, −0.056, −0.112, −0.107, −0.035, respectively) and more likely to find the shelter-in-place orders an overreaction (with marginal impacts of 0.093, 0.212, 0.052, 0.125, 0.119, and 0.033). However, respondents with higher income levels were more likely to find the order an under-reaction (0.038) and less likely to find the orders an overreaction (−0.036).

For question 8 on the respondents' attitude about whether the economic damage was justified to keep hospitals from being overwhelmed and save lives (columns 11–13), only three factors influenced respondents' answers: gender, current agricultural field position, and information set 1. Male respondents were more likely to disagree and less likely to agree, with marginal effects of 0.021 and −0.057, respectively, that the economic damage was justified to save lives. However, respondents currently working in an agricultural field job or provided information set 1 were less likely to disagree and more likely to agree with the statement as demonstrated by marginal impacts of −0.30 and −0.20, respectively, for "Disagree".

Conclusion

COVID-19-induced stay-at-home orders for nonessential workers and illness of essential workers are major factors that led to disruptions in the food supply chain. While many food-service industry workers were deemed

unessential, workers from field jobs picking fruit, to meat-packing plants, to delivery and retail were all deemed essential and continued to work during the pandemic. This inherently enhances the exposure risk of essential workers due to the difficulties of social distancing in the shoulder-to-shoulder working conditions. Despite attempts at social distancing, COVID-19 rapidly spread among workers, particularly in labor-intensive agricultural production and meatpacking (Ho 2020; Schlosser 2020). Therefore, despite the essential workers status, the rapid spread sidelined many infected workers. This led to difficulties in harvesting crops, reduced production capacity, and several meatpacking plants to close, which disrupted the food supply chain.

By surveying low-skilled domestic workers before and during the spread of COVID-19, this paper analyzed how the pandemic impacted these workers' views on H-2A guest workers, food production, immigration policy, level of concern of a food shortage, and if shelter-in-place orders and economic damage are justified. For questions in both the pre- and post-COVID surveys, the outbreak resulted in respondents, on average, shifting their view toward food being a national security issue and a higher degree of empathy for H-2A guest workers. As expected, the pandemic did not impact respondents' political views on immigration or general knowledge about the H-2A guest worker program. The results also suggest that providing an additional information set on the impact of COVID-19 on agricultural field workers did not impact average responses to questions related to empathy toward H-2A guest workers, to food production, to immigration policy, to concern of a food shortage, and to whether the shelter-in-place orders and economic damage are justified. This is likely because of media saturation on COVID-19 and food supply chains amid the pandemic.

The regression analysis provides strong evidence that gender (a) played a strong role in influencing the responses and (b) is the only factor that was statistically significant for all of the questions in tables 4 and 5. Men generally showed less empathy toward H-2A workers and less concern about the impacts of the COVID-19 pandemic on food production and food shortages. They are also less likely to agree that the shelter-in-place order and economic damage are justified. Other important factors include currently working in agricultural field jobs, which impacted respondents' answer for questions 6–8 and information set 2, which impacted responses for questions 5, 6, and 8.

Policy makers and business leaders must develop methods to protect essential workers through effective social distancing strategies or equipment that reduces the risk of infection while keeping essential workers on the job. A pandemic will impact workers' assessment of the minimum wage necessary for them to accept a job: enhanced unemployment benefits and risk of exposure to COVID-19 will increase the reservation wage or make workers less willing to work. However, greater layoff risk, severe income shocks, and lower chance of receiving a high-paying job offer will lower the reservation wage or make workers more willing to work. Disentangling these two counteracting effects on workers' employment decisions will be an important area of research as the pandemic continues or subsides.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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References

Ahn, Sunjin, and Bailey Norwood. 2021. Measuring Food Insecurity during the Covid-19 Pandemic of Spring 2020. *Applied Economic Perspectives and Policy* 43(1): 162–168. https://doi.org/10.1002/aepp.13069.

Birch, Tommy and Tyler Jett. 2020. *Tyson Foods Processing Plant in Rural Iowa Hit Hard by Coronavirus with 186 Positive Cases. USA Today*, April 15, 2020, https://www.usatoday.com/story/money/business/2020/04/15/testing-rural-iowa-covid-19-coronavirus-tyson-food-pork-processing/5136043002/?utm_source=feedblitz&utm_medium=FeedBlitzRss&utm_campaign=usatodaycomnation-topstories (accessed April 16, 2020).

Borunda, Alejandra. 2020. *Farmworkers Risk Coronavirus Infection to Keep the U.S. Fed. National Geographic*, April 10, 2020, https://www.nationalgeographic.com/science/2020/04/farmworkers-risk-coronavirus-infection-keep-us-fed/#close (accessed August 5, 2020).

Brasher, Philip. 2020. *Massive Stimulus Deal Authorizes Billions in New Farm Aid. Agri-Pulse Communications*, March 26, 2020, https://www.agweek.com/news/government-and-politics/5017358-Massive-stimulus-deal-authorizes-billions-in-new-farm-aid (accessed April 12, 2020).

Cagle, Susie. 2020. *'A Disastrous Situation': Mountains of Food Wasted as Coronavirus Scrambles Supply Chain. The Guardian*, April 9, 2020, https://www.theguardian.com/world/2020/apr/09/us-coronavirus-outbreak-agriculture-food-supply-waste?CMP=Share_iOSApp_Other (accessed April 9, 2020).

Chappell, Bill. 2020. *8 In 10 Americans Support COVID-19 Shutdown, Kaiser Health Poll Finds*. National Public Radio, April 23, 2020, https://www.npr.org/sections/coronavirus-live-updates/2020/04/23/843175656/8-in-10-americans-support-covid-19-shutdown-kaiser-health-poll-finds (accessed April 27, 2020).

Charles, Dan. 2020. *Food Shortages? Nope, Too Much Food In The Wrong Places*. National Public Radio, April 3, 2020, https://www.npr.org/sections/thesalt/2020/04/03/826006362/food-shortages-nope-too-much-food-in-the-wrong-places (accessed April 7, 2020).

Frias, Carlos and Kevin G. Hall. 2020. *'It's Catastrophic.' Coronavirus Forces Florida Farmers to Scrap Food they Can't Sell*. *The Miami Herald*, March 31, 2020, https://www.miamiherald.com/news/coronavirus/article241627101.html (accessed April 7, 2020).

Gasparro, Annie and Micah Maidenberg. 2020. *General Mills Says Demand Rises as Consumers Stockpile. The Wall Street Journal*, March 18, 2020, https://www.wsj.com/articles/cheerio-general-mills-says-demand-rises-as-consumers-stockpile-11584533445 (accessed April 6, 2020).

Gross, Marion. 2020. *McDonald's Exec: The Covid-19 Meat Shortages Taught us All an Important Lesson*. CNN Business, July 17, 2020. https://www.cnn.com/2020/07/17/perspectives/coronavirus-meat-shortages-mcdonalds/index.html (accessed August 2, 2020).

Gundersen, Craig, Monica Hake, Adam Dewey, and Emily Engelhard. 2021. Food Insecurity during COVID-19. *Applied Economic Perspectives and Policy* 43(1): 153–161.

Ho, Vinian. 2020. *'Everyone Tested Positive': Covid Devastates Agriculture Workers in California's Heartland. The Guardian*, August 8, 2020, https://www.theguardian.com/us-news/2020/aug/08/california-covid-19-central-valley-essential-workers?CMP=Share_iOSApp_Other (accessed August 27, 2020).

Jackson, Katie. 2020. *Meat Factories are Shutting Down Across the Country: Will there be a Shortage of Food?* NBC News Today, April 14, 2020, https://www.today.com/food/meat-factories-are-shutting-down-across-country-will-there-be-t178527 (accessed April 16, 2020).

Jahnke, Pam. 2020. *Why Is This Happening? Milk Dumping Explanation For Non Farm Consumers. The Mid-West Farm Report*, April 1, 2020, https://www.midwestfarmreport.com/2020/04/01/why-is-this-happening-milk-dumping-explanation-for-non-farm-consumers/ (accessed April 7, 2020).

Jordan, Miriam. 2020. *Farmworkers, Mostly Undocumented, Become 'Essential' During Pandemic. The New York Times*, April 3, 2020, https://www.nytimes.com/2020/04/02/us/coronavirus-undocumented-immigrant-farmworkers-agriculture.html (accessed April 7, 2020).

Kang, Jaewon and Annie Gasparro. 2020. *Grocers Fail to Keep Up with Demand as Coronavirus Pandemic Spreads. The Wall Street Journal*, March 15, 2020, https://www.wsj.com/articles/grocers-fail-to-keep-up-with-demand-as-coronavirus-pandemic-spreads-11584196579?mod=article_inline (accessed April 6, 2020).

Kevany, Sophie. 2020. *Millions of US Farm Animals to be Culled by Suffocation, Drowning and Shooting. The Guardian*, May 19, 2020, https://www.theguardian.com/environment/2020/may/19/millions-of-us-farm-animals-to-be-culled-by-suffocation-drowning-and-shooting-coronavirus (accessed August 4, 2020).

Lilliston, Ben. 2020. *Will COVID-19 Stimulus Reach All Farmers?* Institute for Agriculture and Trade Policy, March 25, 2020, https://www.iatp.org/blog/202003/will-covid-19-stimulus-reach-all-farmers (accessed April 12, 2020).

Lorch, Jackie, Kristin Cavallaro, and Robert van Ossenbruggen (2010). White Paper, Sample Blending: 1+1 > 2. Technical Report, Survey Sampling International.

Luckstead, Jeff, Rodolfo M. Nayga, Jr., and Heather Snell. 2020. 'U.S. Domestic Workers' Willingness to Accept Agricultural Field Jobs Before and During COVID-19. Working Paper, Washington State University and University of Arkansas. SSRN 3698183.

Lum, Justin. 2020. *Arizona Dairy Farmers Struggle to Sell Enough Milk, Dumping Over 100K Gallons a Day*. FOX 10 Phoenix, April 6, 2020, https://www.fox10phoenix.com/news/arizona-dairy-farmers-struggle-to-sell-enough-milk-dumping-over-100k-gallons-a-day (accessed April 7, 2020).

Lush, Tamara. 2020. *Coronavirus Claims an Unexpected Victim: Florida Vegetables*. Associated Press, April 8, 2020, https://www.usnews.com/news/us/articles/2020-04-08/coronavirus-claims-an-unexpected-victim-florida-vegetables (accessed April 7, 2020).

Mansoor, Sanya. 2020. *'The Food Supply Chain Is Breaking.' Tyson Foods Warns of Meat Shortage as Plants Close Due to COVID-19. Time*, April 26, 2020, https://news.yahoo.com/food-supply-chain-breaking-tyson-213539680.html (accessed April 27, 2020).

Mervosh, Sarah, Denise Lu and Vanessa Swales. 2020. *See which States and Cities Have Told Residents to Stay at Home. The New York Times*, April 3, 2020, https://www.nytimes.com/interactive/2020/us/coronavirus-stay-at-home-order.html (accessed April 6, 2020).

Michigan Farmer. 2020. *COVID-19 Stimulus Package to Aid Michigan's Farmers*. March 30, 2020, https://www.farmprogress.com/legislative/covid-19-stimulus-package-aid-michigans-farmers (accessed April 12, 2020).

Morath, Eric and Sarah Chaney. 2020. *U.S. Jobless Claims Top 20 Million since Start of Shutdowns. The Wall Street Journal*, April 16, 2020, https://www.wsj.com/articles/u-s-unemployment-claims-likely-continued-at-record-levels-11587029401?mod=hp_lead_pos1&mod=article_inline&mod=hp_lead_pos1 (accessed April 6, 2020).

Newman, Jesse and Jacob Bunge. 2020. *Farmers Dump Milk, Break Eggs as Coronavirus Restaurant Closings Destroy Demand. The Wall Street Journal*, April 9, 2020, https://www.wsj.com/articles/farmers-deal-with-glut-of-food-as-coronavirus-closes-restaurants-11586439722?mod=hp_lead_pos6 (accessed April 9, 2020).

Rainey, Rebecca and Quint Forgey. 2020. *Unemployment Claims near 17 Million in Three Weeks as Coronavirus Ravages Economy. Politico*, April 9, 2020, https://www.politico.com/news/2020/04/09/coronavirus-unemployment-claims-numbers-176794 (accessed April 12, 2020).

Read, Richard. 2020. *COVID-19 Strikes Washington State Farmworkers and Swamps Rural Hospitals. Los Angeles Times*, August 4, 2020, https://www.latimes.com/world-nation/story/2020-08-04/coronavirus-northwest-farm-workers (accessed August 5, 2020).

Schlosser, Eric. 2020. *America's Slaughterhouses Aren't Just Killing Animals. The Atlantic*, May 12, 2020, https://www.theatlantic.com/ideas/archive/2020/05/essentials-meatpeacking-coronavirus/611437/ (accessed August 27, 2020).

USDS. 2020. Important Announcement on H2 Visas. U.S. Department of State—Bureau of Consular Affairs. https://travel.state.gov/content/travel/en/News/visas-news/important-announcement-on-h2-visas.html (accessed April 7, 2020).

van der Zee, Bibi, Tom Levitt and Andrew Wasley. 2020. *Environment 'No Way Food Safety Not compromised': US Regulation Rollbacks during Covid-19 Criticised*. *The Guardian*, April 20, 2020, https://www.theguardian.com/environment/2020/apr/20/no-way-food-safety-not-compromised-us-regulatory-roll-backs-during-covid-19-criticised?CMP=Share_iOSApp_Other (accessed April 20, 2020).

Wiener-Bronner, Danielle. 2020a. *Meat Plants Are Shutting Down as Workers Get Sick*. CNN, April 8, 2020, https://www.cnn.com/2020/04/08/business/meat-plant-closures-coronavirus/index.html (accessed April 12, 2020).

Wiener-Bronner, Danielle. 2020b. *One of the Largest Pork Processing Facilities in the US Is Closing until Further Notice*. CNN, April 12, 2020, https://www.cnn.com/2020/04/12/business/meat-plant-closures-smithfield/index.html (accessed April 12, 2020).

Wiener-Bronner, Danielle. 2020c. *Why Dairy Farmers across America Are Dumping their Milk*. CNN, April 12, 2020, https://www.cnn.com/2020/04/15/business/milk-dumping-coronavirus/index.html (accessed April 14, 2020).

Ziliak, James P. 2021. Food Hardship during the Covid-19 Pandemic and Great Recession. *Applied Economic Perspectives and Policy* 43(1): 132–152.