

DISCUSSION PAPER SERIES

IZA DP No. 14273

**Job Loss and Food Insecurity during the
COVID-19 Pandemic**

Stefani Milovanska-Farrington

APRIL 2021

DISCUSSION PAPER SERIES

IZA DP No. 14273

Job Loss and Food Insecurity during the COVID-19 Pandemic

Stefani Milovanska-Farrington

University of Tampa and IZA

APRIL 2021

Any opinions expressed in this paper are those of the author(s) and not those of IZA. Research published in this series may include views on policy, but IZA takes no institutional policy positions. The IZA research network is committed to the IZA Guiding Principles of Research Integrity.

The IZA Institute of Labor Economics is an independent economic research institute that conducts research in labor economics and offers evidence-based policy advice on labor market issues. Supported by the Deutsche Post Foundation, IZA runs the world's largest network of economists, whose research aims to provide answers to the global labor market challenges of our time. Our key objective is to build bridges between academic research, policymakers and society.

IZA Discussion Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. A revised version may be available directly from the author.

ISSN: 2365-9793

IZA – Institute of Labor Economics

Schaumburg-Lippe-Straße 5–9
53113 Bonn, Germany

Phone: +49-228-3894-0
Email: publications@iza.org

www.iza.org

ABSTRACT

Job Loss and Food Insecurity during the COVID-19 Pandemic

Nutritious eating habits contribute to a stronger immune system necessary for prevention and easier recovery from illnesses. A job loss, experienced by millions of Americans during the Covid-19 pandemic, is expected to negatively affect food security of families. This research explores the effect of a recent job loss during the Covid-19 crisis on food sufficiency. The findings suggest that a job loss in the family is associated with greater food insecurity, reduced likelihood that a family has a sufficient amount of food, and deteriorated child nutrition. There is also a differential effect between currently employed and unemployed job losers, with the latter group being more adversely affected. The negative effect is primarily driven by Hispanic and low-educated individuals. These results have policy implications in the context of identifying vulnerable groups that are most likely to benefit from programs designed to provide sufficient nutrition to the population.

JEL Classification: J63, J60, I19, D12

Keywords: food security, nutrition, job loss, COVID-19

Corresponding author:

Stefani Milovanska-Farrington
Department of Economics
University of Tampa
401 W Kennedy Blvd
Tampa, FL 33606
USA

E-mail: smilovanska@ut.edu

1. Introduction

Living a nutritious lifestyle requires that people get a sufficient amount of nutrients, vitamins and minerals every day. Healthy dietary practices are related to stronger immune system, better prevention and easier recovery from illnesses, lower blood pressure, healthy weight, lower risk of diabetes, heart problems and other medical conditions, and improved overall well-being (WHO 2020). Therefore, to maintain a strong immune system able to prevent diseases and ease recovery, optimal nutrition and healthy habits are of increased importance during a pandemic such as Covid-19. However, according to the Bureau of Labor Statistics, more than 22 million Americans have lost a job between February and October 2020, increasing the unemployment rate from 3.5% in February 2020 to 6.9% in October 2020, reaching a peak of 14.7% in April 2020. Job losses during the Covid-19 crisis are likely to put lots of families at risk of malnutrition and food insecurity.

In this research, we examine the impact of a job loss on nutrition and food safety. Specifically, we explore the effect of a job loss during the Covid-19 pandemic on the level of family and child food sufficiency as perceived by the respondent, confidence about meeting family's dietary needs in the four weeks following the interview, and an indicator of whether the food sufficiency status of the family has deteriorated or not. We also study the differential effect of a job loss by individuals who are still employed despite the loss relative to workers who remained unemployed after a job loss during the Covid-19 crisis. Subsample analyses based on ethnicities, genders and educational attainment are also performed to identify the most vulnerable groups.

This study makes several contributions to the growing literature on food security. First, this study is novel in that it examines the effect of an ongoing event, specifically a labor market disruption as a result of a health and economic crisis, on families' nutrition, and does so using the newest publicly available data designed to track the impact of Covid-19 on the American population. This is the first study that investigates the forementioned impacts in the context of the Covid-19 pandemic. We further contribute to the literature by distinguishing between employed versus unemployed individuals despite a job loss, and by studying distinct groups on the population. The importance and relevance of the results for policy decision-making are also discussed in the paper.

The results provide evidence that a job loss is associated with a highly statistically significant deterioration of food sufficiency for families and children, and a reduction in the confidence in food security for the near future. This effect is observed for all job losers, but from them, it is larger for the ones who are currently unemployed compared to those who are working. The association between a job loss and family's

nutrition insecurity is the greatest for Hispanic, males and people with some college. Children's nutrition suffers the most for children whose parents have not completed high school. These results provide an insight into the adverse effect of Covid-19 on food security. From a policy perspective, they indicate that federal nutrition programs whose goal is to ensure that the dietary needs of Americans, and especially children, are met are most likely to benefit the Hispanic population, individuals with low educational attainment, and individuals who remained unemployed after losing a job.

The remainder of this paper is structured as follows. Section 2 summarizes the most relevant aspects of the literature related to the effects of employment on food security and nutrition. We display the empirical framework and specify the model in Section 3. Data and summary statistics are presented in Section 4. We discuss the results in Section 5, and explore the policy implications of the study in Section 6. Section 7 concludes the paper.

2. Literature review

Layoffs are common during economic downturns. About 8.8 million Americans experienced a job loss during the Great Recession of 2007 – 2009 (BLS 2012), with some groups of the population such as immigrants (MPI 2009; Mooi-Reci and Munoz-Comet 2016) and workers with low levels of education (Kochhar 2020), being more likely to remain unemployed than others. Evidence from the Great Recession also shows that during downturns, employment growth declines significantly, mainly in smaller and younger firm (Siemer 2019).

Statistics show that the Covid-19 health and economic crisis is not an exception. Millions of workers have lost their jobs. For three months, the unemployment rate has increased more than it did during the entire Great Recession. This is a concern because layoffs affect many aspects of life of the displaced workers and their families as well as the society.

Through finite mixture models to account for unobserved heterogeneity and longitudinal data from the Health and Retirement Study (HRS), Deb et al. (2011) find that a job loss due to exogenous business closings leads to higher alcohol consumption and unhealthy weight, and the effect is the largest for people who are already “at risk” (Deb et al. 2011). Using the same dataset, Mandal et al. (2011) show that both an actual job loss and a subjective expectation of a displacement is a statistically significant predictor of depression for individuals at the age of 55 – 65. Similarly, for Germany, Marcus (2014) uses the German SOEP to show that a job loss has a statistically significant although small effect on body weight, and increases the likelihood that a non-smoker starts smoking although smokers do not start smoking more as a result of a job loss.

A job loss also has an effect on health and well-being. For example, using propensity score weighting, Browning and Heinesen (2012) find that a job loss due to a plant closure in the private sector in Denmark between 1982 and 2002 increases the prevalence of a death because of a suicide and a circulatory disease, and mortality or hospitalization because of a traffic accident, mental problem or alcohol-related illness of men with a strong attachment to their job. Evidence from the Panel Study of Income Dynamics (PSID) shows that unemployment is associated with a reduction in well-being in the US (Young 2012). Furthermore, factors that are likely to alleviate the adverse impact of a job loss, such as finding another job, income and unemployment insurance, do not make job losers feel much better. Income has an insignificant impact on well-being; being unemployed with an unemployment benefit is only marginally better than being unemployed without the benefit; and finding a new job improves well-being by less than a job loss reduces well-being (Young 2012).

Parental layoffs might also influence children's well-being. Morrill (2011) examines the effect of maternal employment on children's health. They suggest that there is a trade-off between income and time spent with children. Using youngest sibling's kindergarten eligibility as an instrument for maternal employment, the results suggest that mother's employment increases the likelihood hospitalization, asthma and injuries of children between 7 and 17 in the US (Morrill 2011). However, using administrative tax records of 7 million fathers' layoffs from 2000 – 2009 and a difference-in-differences approach, Hilger (2016) finds that fathers' layoffs significantly reduce family income, but the causal effect on children's long-term outcomes¹ are small.

Potential channels of the effect of a job loss on health and well-being of families and children are likely to be related to the inability to meet basic needs, including but not limited to food insufficiency, inadequate housing and medical care. Using panel data from 1996 – 2000 from the Survey of Income and Program Participation (SIPP), Lovell and Oh (2006) show that a woman being unemployed increases the likelihood of experiencing food insufficiency by 93% if re-employed and 64% if still unemployed, doubles the chances of inability to pay for housing, and decreases the odds of receiving adequate medical care. Additionally, Yeung and Hofferth (1998) use American longitudinal data from the Panel Study of Income Dynamics (PSID) of families with children born between 1967 and 1973 and being at the age of 20 or less at the time of the interview to show that a loss of income or work of the men in a family is associated with a reduction

¹ Children's long-term outcomes considered by Hilger (2016) include college quality, enrollment and early career earnings until the age of 25. The effect of a father's layoff on the first two outcomes is significant but very small in magnitude (about 0.5%), and the effect on early career earnings is insignificant.

in food expenditure, increased likelihood of receiving public assistance, getting divorced and moving. Likewise, a study conducted by Loopstra and Tarasuk (2013), involving a final sample of 331 families in 2005 – 2007 in Toronto, Canada shows that food insecurity is a persistent problem in low-income families although its severity varies. A deterioration of income and employment are associated with greater food insecurity.

We extend this literature in the following ways. First, we explore the association between a job loss during the Covid-19 crisis and food security, child food sufficiency, and confidence in the odds of having enough food in the near future. Second, we study the differential effect of a job loss between employed and unemployed displaced workers. Third, we distinguish between groups of the population based on race and ethnicity, gender and educational attainment to identify the most vulnerable groups. Furthermore, we use the newest available data collected to provide insight into the experiences of the population during the coronavirus health and economic shock in the United States. To the best of our knowledge, this is the first study to explore the forementioned questions in the context of Covid-19.

3. Empirical framework

The purpose of this study is to examine the effect of a job loss during the Covid-19 pandemic on food sufficiency of families. Three of the outcomes used in the analysis are ordered categorical variables that without loss of generality, we collectively call *Food sufficiency* $\in \{1, 2, \dots, J\}$, where J is one of the (a) four distinct categories if the outcome denotes either whether the family has enough food, or whether the respondent feels confident that the household members will have a sufficient amount to eat in the four weeks following the interview, or (b) three categories if the outcome shows how often the children in the household have a sufficient amount of food. In our model,

$$Food\ sufficiency_i = j \text{ if and only if } c_{j-1} \leq y^* = \alpha_1 Job\ loss_i + \alpha_2 Employed_i + \alpha_3 Job\ loss_i * Employed_i + \mathbf{x}'_i \boldsymbol{\beta} + u \leq c_j, j = 1, 2, \dots, J \quad (1)$$

Here, c_0, \dots, c_j are threshold parameters, splitting the underlying latent process y^* into J categories. The latent variable y^* is dependent upon the regressors of interest indicating a job loss and employment status, a set of controls \mathbf{x}_i of individual i and an unobservable error term u with a distribution function $\Phi(u)$ with zero mean and constant variance. We estimate the model parameters α_1 to α_3 , $\beta_{(k-1)}$ and c_j from the following ordered Probit model in which the cumulative probabilities of the discrete response depend on a single set of explanatory variables:

$$Prob(\text{Food sufficiency}_i \leq j | \text{Job loss}_i, \text{Employed}_i, \mathbf{x}_i) = \Phi(c_j - \alpha_1 \text{Job loss}_i - \alpha_2 \text{Employed}_i - \alpha_3 \text{Job loss}_i * \text{Employed}_i - \mathbf{x}'_i \boldsymbol{\beta}), j = 1, 2, \dots, J \quad (2)$$

In this equation, Φ is a standard normal distribution function. We estimate the model using maximum likelihood estimation. However, it is worth mentioning that because the latent y^* is not observable, we are rather interested in the marginal probability effects, that is the effects of the explanatory variables of interest on the distribution of the outcomes. We estimate these marginal effects as follows:

$$\frac{\partial Prob(\text{Food sufficiency}_i = j | \text{Job loss}_i, \text{Employed}_i, \mathbf{x}_i)}{\partial x_{ki}} = [f(c_{j-1} - \alpha_1 \text{Job loss}_i - \alpha_2 \text{Employed}_i - \alpha_3 \text{Job loss}_i * \text{Employed}_i - \mathbf{x}'_i \boldsymbol{\beta}) - f(c_j - \alpha_1 \text{Job loss}_i - \alpha_2 \text{Employed}_i - \alpha_3 \text{Job loss}_i * \text{Employed}_i - \mathbf{x}'_i \boldsymbol{\beta})] \beta_k \quad (3)$$

In addition to the three ordered categorical outcomes, we also consider a binary response variable which indicates the change in the food sufficiency situation of families. In this case, we use a probit model of the following form:

$$Prob(\text{Worsened food sufficiency}_i = 1 | \text{Job loss}_i, \text{Employed}_i, \mathbf{x}_i) = \Phi(\alpha_1 \text{Job loss}_i + \alpha_2 \text{Employed}_i + \alpha_3 \text{Job loss}_i * \text{Employed}_i + \mathbf{x}'_i \boldsymbol{\beta}) \quad (4)$$

In all models, the marginal effects of interest are those of a job loss and employment status on the likelihood of observing each category of the respective outcome. The marginal effect of the interaction term of a job loss and employment on the forementioned probabilities would reveal the difference in the effect of a job loss on the respective probability for those who are employed relative to those who are not.

To further explore the effects of interest, we run regressions in which we condition on self-reported food sufficiency prior to the pandemic. We also check whether the results are robust to controlling for unobserved, time-invariant characteristics between states, that is the addition of state fixed effects. Finally, we estimate all regressions in subsamples of individuals of different race or ethnicity, gender and highest level of education.

Ideally, we would estimate the effect of a job loss due to an exogenous plant closure, that is estimate the differential effect of a job loss due to exogenous factors relative to lack of a job loss. In other words, one could exclude the subsample of individuals who have lost a job because of unwillingness or fear to work during the pandemic, caring for themselves or a relative with the virus, or fulfilling childcare responsibilities, and include only workers who have kept their jobs and those who have lost a job due to the employer shutting down temporarily or going out of business, experiencing a reduction in business, and/or

the employer laying off workers due to the Covid-19 pandemic. Such a specification would allow a researcher to focus on exogenous reasons for a job loss. Unfortunately, our dataset provides information on the reason for not working only if the individual is unemployed at the time of the interview. Thus if the reason for a job loss is taken into account, there would be no variation in the interaction term in equations (1) to (4), preventing a meaningful examination of the differential effect of interest.

4. Data and summary statistics

Data for this study are extracted from the Household Pulse Survey (HPS) – Phase 2, collected by the Census Bureau in collaboration with other federal institutions. These data were collected to provide insight into the experiences of Americans, including employment, health, food security and educational interruptions, during the Covid-19 pandemic. Phase 2 interviews are administered, and data are available on a bi-weekly basis. This second phase of the survey consists of waves 13 (August 19 – August 31), 14 (September 2 – September 14), 15 (September 16 – September 28), and 16 (September 20 – October 12) of the experiment. The sample consists of 413,976 individuals.

We use several dependent variables which capture food sufficiency. The first one, household food sufficiency in the last 7 days (EnoughFood) is an ordered variable which takes one of four values: 1 if the respondent has reported that the family has enough food of the kind family members want; 2 if they have enough food but not the kind they want; 3 if the family sometimes does not have sufficient amount of food; and 4 if food is often not enough. Specifically, respondents were asked the following question: “In the last 7 days, which of these statements best describes the food eaten in your household? Select only one answer,” and were provided the previously mentioned four options. The second outcome we consider elicits information on whether the respondent thinks that children in the household are not eating enough because the family cannot afford a sufficient amount of food. The question was formulated as follows: “Please indicate whether the next statement was often true, sometimes true, or never true in the last 7 days for the children living in your household who are under 18 years old. The children were not eating enough because we just couldn't afford enough food.” For easier interpretation, we construct an ordered variable (ChildFoodEnough) which can take one of three values: 1 indicating that food for children is always enough, 2 denoting that it is sometimes sufficient, and 3 meaning that it is almost never enough. Respondents in the HPS were also asked about their confidence in that their families will have a sufficient amount of food in the four weeks following the interview. We utilize this as another ordered dependent variable that can take one of four answer categories: 1, 2, 3 or 4 depending on whether the respondent has selected, respectively, not at all, somewhat, moderately or very confident as an answer to the following

question: “How confident are you that your household will be able to afford the kinds of food you need for the next four weeks? Select only one answer.” Participants in the survey were also asked about food sufficiency before March 13, 2020, a variable which takes the same values as the previously mentioned EnoughFood. We construct a new variable (WorsenedFoodSuffic) which denotes whether the food sufficiency situation of the respondent’s family has worsened since March 13, 2020 or not. This is the last outcome we use. It is a binary variable which equals 1 if a respondent has reported current food sufficiency worse than food sufficiency prior to the Covid-19 pandemic, and 0, otherwise (no change or improved situation).

The main explanatory variables of interest extract information about a recent (since March 13, 2020) job loss in the household (JobLoss) and the current employment status of the respondent (Employed). (We also include an interaction term of the fore-mentioned two variables.) It is important to include both variables because a job loss does not necessarily imply unemployment. Specifically, an individual who previously had two jobs might have lost one but still be employed, or an individual who used to be employed might have lost a job and might have found a new one before the time of the interview. This is likely to have an impact on the outcomes.

Additionally, HPS provides information about respondents’ age, gender, race and Hispanic origin (Hispanic/ Latino of any race; White non-Hispanic; Black non-Hispanic; Asian non-Hispanic; and Two or more races non-Hispanic, the latter of which is the category we omit), education (less than HS which is the omitted category in our analysis; high school or GED; some college/Associate’s degree; Bachelor’s degree or higher), marital status (married; widowed; divorced/separated; or never married which we omit), household size, number of children in the household under the age of 18, and household income dummies (below 25K; 25-50K; 50-75K; 75-100K; 100-150K; 150-200k; and above 200K which we omit). All of these variables are used as controls in our study. Participants were also asked whether they or anyone in their household has received free groceries and/or meals in the last 7 days or not, and whether they are Supplemental Nutrition Assistance Program (SNAP) recipients or not. We include indicators to control for such assistance as well.

Table 1 provides summary statistics of the variables used in the empirical analysis. While prior to the Covid-19 pandemic 76.55% of the participants in HPS had enough of the food they wanted, this percentage declined to 67.70% after the beginning of the crisis. However, the percentage of people who have a sufficient amount to eat but not the kinds of food they desire increased from 18.14% to 25.59%. We also observe a slight increase in the percentage of Americans who sometimes or often do not have enough to eat.

Children, however, have a sufficient amount of food in 74.17% of the families, followed by 21.05% who sometimes have enough food, and 4.78% who never do. The food sufficiency situation has worsened for 12.83% of families in the US after March 13, 2020. The individuals who feel very confident about food sufficiency for their family in the following four weeks represent 59.37% of all respondents, followed by those who are moderately (19.20%), somewhat (16.04%), and not at all confident (5.39%).

Table 1. Summary statistics

Variable	Mean/ Percent	Std. deviation
Enough food		
1 (enough, kind wanted)	67.70%	
2 (enough, not the kind wanted)	25.59%	
3 (sometimes not enough)	5.27%	
4 (often not enough)	1.45%	
Child food enough		
1 (always)	74.17%	
2 (sometimes)	21.05%	
3 (almost never)	4.78%	
Enough food before Covid-19		
1 (enough, kind wanted)	76.55%	
2 (enough, not the kind wanted)	18.14%	
3 (sometimes not enough)	4.13%	
4 (often not enough)	1.18%	
Confidence that the family will have sufficient food in the next 4 weeks		
1 (not at all)	5.39%	
2 (somewhat)	16.04%	
3 (moderately)	19.20%	

4 (very confident)	59.37%	
Worsened food sufficiency situation	12.83%	
Lost job	38.22%	
Lost job but employed	61.25%	
Lost job and unemployed	38.75%	
Employed	62.12%	
Age	50.979	15.870
Female	58.72%	
Race and Hispanic origin		
Hispanic/Latino of any race	9.11%	
White, non-Hispanic	74.54%	
Black, non-Hispanic	7.70%	
Asian, non-Hispanic	4.89%	
Two or more races, non-Hispanic	3.76%	
Education		
Below high school	2.08%	
High school or GED	11.83%	
Some college/ Associate's degree	32.11%	
Bachelor's degree or higher	53.98%	
Marital status		
Married	57.64%	
Widowed	4.86%	
Divorced or separated	17.06%	
Never married	20.44%	
Household size	2.781	1.494
Number of children	0.675	1.066

Income	
Below 25,000	9.92%
25,000 – 50,000	19.24%
50,000 – 75,000	17.43%
75,000 – 100,000	14.95%
100,000 – 150,000	18.58%
150,000 – 200,000	9.11%
Above 200,000	10.78%
A household member receives free food	6.61%
SNAP recipient	7.11%

Notes: Source: Household Pulse Survey (HPS) – Phase 2, Waves 13 – 16 (August 19 – October 12, 2020)

In the sample, 38.22% of the respondents have lost a job during the pandemic, out of which 61.25% and 38.75% were, respectively, employed and unemployed at the time of the interview. The percentage of employed people who have lost a job indicates that either some respondents had more than one job before March 2020, or some who lost a job found a new one, or both. A little less than two thirds (62.12%) of the respondents in the survey were employed at the time of their interviews. The average age is about 51, and 58.72% of the respondents are female. About 9% of the participants in HPS are Hispanic, and 74.54%, 7.70% and 4.89% of the non-Hispanic respondents are White, Black and Asian, respectively, while 3.76% are non-Hispanics of more than one race. More than half of the respondents (53.98%) have a Bachelor’s or a higher degree, followed by 32.11% with some college or an Associate’s degree, 11.83% with a high school diploma, and 2.08% whose highest education is below a high school diploma. By marital status, 57.64% are married, 20.44% have never been married, 17.06% are divorced or separated, and 4.86% are widowers. The average household size consists of 2.78 individuals, and has 0.68 children. The maximum number of children a family has in the sample is 5 children, but 63.60% of the families are childless.

By annual household income, 9.92%, 19.24%, 17.43%, 14.95%, 18.58%, 9.11% and 10.78% belong to each of the following categories: below \$25,000, between \$25,000 and \$50,000, \$50,000 to \$75,000, \$75,000 to \$100,000, \$100,000 to \$150,000, \$150,000 to \$200,000, and above \$200,000, respectively. A household member receives free food in 6.61% of the families, and 7.11% of the respondents are SNAP recipients.

5. Results

We report the results from the main estimation in Table 2, both for all respondents and conditional on getting sufficient nutrition prior to the Covid-19 outbreak in the US. In Panels A to D, we report the marginal effects of a job loss, employment status and an interaction of the two on food sufficiency, child food sufficiency, confidence in food sufficiency in the following 4 weeks, and deterioration of nutrition, respectively. The reported results represent the redistribution of the marginal effects due to the forementioned events rather than the estimates from the (ordered) probit regressions, because these effects rather than the coefficients are interpretable.

Losing a job is associated with a reduction in the likelihood of having a sufficient amount of the desired kinds of food by 24.3% at the expense of an increase in the probability of having enough but not the wanted kinds, sometimes or often not having enough to eat. The reduction in child food sufficiency of the wanted kinds of food is smaller as a result of a job loss (15.3%) but still highly statistically significant at any significance level. These effects are smaller provided that the family had enough of all kinds of food they wanted prior to the pandemic. Distinguishing between employed and unemployed individuals despite a job loss also yields expected results. From those who have lost a job during the Covid-19 crisis, those who are employed are 7.3% more likely to have sufficient food amounts of the preferred kinds relative to those who are unemployed, and their children are 7% more likely to have these meals relative to the unemployed job losers. Similarly to the previously discussed effect of a job loss, these effects are alleviated if the respondent was not lacking a sufficient amount of the desired types of food before the crisis. In the latter case, there is no significant difference in child food sufficiency between employed and unemployed parents who have lost their jobs. This provides evidence that parents first and foremost provide necessities to children.

Table 2. Marginal effects of a job loss and employment status on food sufficiency

All respondents			Conditional on having sufficient amount of food prior to the Covid-19 outbreak in the US (March 13, 2020)		
(1)	(2)	(3)	(4)	(5)	(6)
Lost job	Employed	Lost job* Employed	Lost job	Employed	Lost job* Employed

Panel A. Enough food

Prob (1)	-0.243*** (0.007)	0.026*** (0.006)	0.073*** (0.008)	-0.184*** (0.005)	0.016*** (0.005)	0.061*** (0.007)
Prob (2)	0.163*** (0.005)	-0.017*** (0.004)	-0.049*** (0.005)	0.149*** (0.004)	-0.013*** (0.004)	-0.049*** (0.006)
Prob (3)	0.065*** (0.002)	-0.007*** (0.002)	-0.020*** (0.002)	0.030*** (0.001)	-0.003*** (0.001)	-0.010*** (0.001)
Prob (4)	0.014*** (0.001)	-0.002*** (0.0004)	-0.004*** (0.0005)	0.006*** (0.0004)	-0.001*** (0.0001)	-0.002*** (0.0002)
Obs.	318,799	318,799	318,799	246,205	246,205	246,205

Panel B. Child food enough

Prob (1)	-0.153*** (0.017)	-0.017 (0.018)	0.070*** (0.022)	-0.130*** (0.024)	0.003 (0.025)	0.043 (0.029)
Prob (2)	0.112*** (0.013)	0.013 (0.013)	-0.052*** (0.016)	0.105*** (0.019)	-0.003 (0.020)	-0.035 (0.023)
Prob (3)	0.041*** (0.005)	0.005 (0.005)	-0.019*** (0.006)	0.025*** (0.005)	-0.001 (0.005)	-0.008 (0.006)
Obs.	39,729	39,729	39,729	15,301	15,301	15,301

Panel C. Confidence that the family will have sufficient food in the next 4 weeks

Prob (1)	0.066*** (0.002)	0.001 (0.001)	-0.025*** (0.002)	0.031*** (0.001)	0.002*** (0.001)	-0.014*** (0.001)
Prob (2)	0.182*** (0.004)	0.004 (0.003)	-0.069*** (0.004)	0.148*** (0.004)	0.007*** (0.003)	-0.064*** (0.004)
Prob (3)	0.078*** (0.002)	0.002 (0.001)	-0.030*** (0.002)	0.142*** (0.003)	0.007*** (0.003)	-0.061*** (0.004)

Prob (4)	-0.326***	-0.006	0.123***	-0.321***	-0.016***	0.139***
	(0.006)	(0.006)	(0.008)	(0.007)	(0.006)	(0.009)
Obs.	319,187	319,187	319,187	246,356	246,356	246,356

Panel D. Worsened food sufficiency situation

Prob (1)	0.105***	-0.016***	-0.018***	0.181***	-0.015***	-0.059***
	(0.004)	(0.004)	(0.006)	(0.006)	(0.005)	(0.007)
Obs.	319,382	319,382	319,382	246,476	246,476	246,476

Notes: The analysis has been performed using the statistical software package Stata ®. All regressions are estimated using an ordered probit (Panels A, B and C) and probit models (Panel D). The marginal effects of a job loss, employment status, and their interaction on the likelihood of different levels of the respective outcomes are presented. The dependent variables used in Panels A, B, C and D are Food sufficiency, Child food sufficiency, Level of confidence that the family will have sufficient food in the following 4 weeks, and Worsened food sufficiency situation, respectively (as described in the Data section of this paper). Columns (1), (2) and (3), and Columns (4), (5) and (6) represent the marginal effects from two regressions, estimated using data from the entire sample of individuals, and a subsample of individuals who had a sufficient amount of food prior to the Covid-19 pandemic in the US (March 13, 2020), respectively. The following control variables are used in all regressions: Age, Gender dummy variable, Race/ ethnicity indicators (Hispanic, White, Black, Asian), indicator variables showing the respondent’s highest education level (below high school, some college/ Associate’s degree, Bachelor’s degree or higher), marital status indicators (Married, Widowed, Divorced or separated), Household size, Number of children, Household income level dummies (below 25K, 25-50K, 50-75K, 75-100K, 100-150K and 150-200K), an indicator for a family member receiving free food, and a SNAP recipient dummy variable. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

The results from an ordered probit regression of respondents’ confidence in food sufficiency in the following month indicates that a job loss decreases the likelihood of being very confident in nutrition sufficiency by 32.6% and increases the chances of being moderately, somewhat and not at all confident by 7.8%, 18.2% and 6.6%, respectively. Comparing employed versus unemployed individuals who have lost a job, those who are employed despite losing a job are 12.3% more likely to be very confident in nutrition prospects of their families than those who are unemployed. Losing a job is related to a 10.5% higher chance of worsening food sufficiency condition and even higher (18.1%) if the family had a sufficient amount of the desired food prior to the pandemic. From those who have lost a job, the ones who are nonetheless employed are 1.8% (or 5.9% conditional on sufficient food of the preferred kind prior to the pandemic) less likely to experience worse nutrition than the ones who are unemployed. These results indicate that even if an individual is employed because of having more than one job prior to the crisis or because of finding another job after losing his/her previous one, employment does not entirely offset the adverse effect of losing a job on nutrition.

Analyses in subsamples by race and ethnicity, gender and highest educational attainment are reported in Tables 3, 4 and 5, respectively. Consistent with Table 2, we present marginal effects in the following tables.

Although all ethnicities are negatively (and statistically significantly) affected by a job loss, the Hispanic population experiences the largest reduction in the likelihood of getting sufficient amount of the desired food after a layoff. Hispanics experience a reduction of 28.2% of this likelihood. Hypothetically, the reason is that a larger proportion of Latino and Hispanic workers (compared to other ethnicities) are employed in hospitality and leisure industries which were most affected by the pandemic because of the difficulty of performing such jobs remotely. Non-Hispanic White and non-Hispanic Asian follow, while non-Hispanic Black individuals experience the lowest reduction in food sufficiency as a result of a job loss. Regardless of ethnicity, from the people who have lost a job, those who are still employed are more likely to not experience deficiency of their preferred food compared to those who are unemployed. The difference is statistically insignificant for the Black, and varies between 6.8% and 9.6% for the other races, being the largest for Asians. For all parents, irrespective of race, a layoff impacts child food sufficiency less than it affects overall food sufficiency. Examining confidence of distinct races shows that the likelihood of being not confident at all increases the most as a result of a job loss for Blacks, followed by Hispanics, and is two to three times less impacted for Whites and Asians. The differences in the effect of a job loss on this probability between employed and unemployed is in the range from 1.7% to 5.1% for different ethnicities being the largest for Blacks and the smallest for Asians.

Table 3. Marginal effects of a job loss and employment status on food sufficiency, By race/ethnicity

	Hispanic/Latino of any race			White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic		
	(1) Lost job	(2) Employed	(3) Lost job* Employed	(4) Lost job	(5) Employed	(6) Lost job* Employed	(7) Lost job	(8) Employed	(9) Lost job* Employed	(10) Lost job	(11) Employed	(12) Lost job* Employed
<i>Panel A. Enough food</i>												
Prob (1)	-0.282*** (0.021)	0.020 (0.020)	0.089*** (0.025)	-0.232*** (0.006)	0.028*** (0.006)	0.068*** (0.008)	-0.190*** (0.025)	0.061*** (0.023)	0.023 (0.028)	-0.194*** (0.032)	-0.019 (0.028)	0.096*** (0.036)
Prob (2)	0.133*** (0.011)	-0.010 (0.010)	-0.042*** (0.012)	0.174*** (0.005)	-0.021*** (0.004)	-0.051*** (0.006)	0.078*** (0.011)	-0.025*** (0.009)	-0.009 (0.012)	0.150*** (0.025)	0.015 (0.021)	-0.075*** (0.028)
Prob (3)	0.120*** (0.010)	-0.009 (0.009)	-0.038*** (0.011)	0.049*** (0.002)	-0.006*** (0.001)	-0.014*** (0.002)	0.082*** (0.011)	-0.026*** (0.010)	-0.009 (0.012)	0.035*** (0.006)	0.003 (0.005)	-0.018*** (0.007)
Prob (4)	0.028***	-0.002	-0.009***	0.010***	-0.001***	-0.003***	0.030***	-0.010**	-0.004	0.008***	0.001	-0.004***

	(0.003)	(0.002)	(0.003)	(0.001)	(0.0003)	(0.0004)	(0.004)	(0.004)	(0.004)	(0.002)	(0.001)	(0.002)
Obs.	26,696	26,696	26,696	243,456	243,456	243,456	21,740	21,740	21,740	15,063	15,063	15,063
<i>Panel B. Child food enough</i>												
Prob (1)	-0.213***	-0.057	0.116**	-0.114***	-0.017	0.043*	-0.168***	-0.028	0.110**	-0.176**	0.028	0.031
	(0.045)	(0.048)	(0.055)	(0.018)	(0.020)	(0.023)	(0.041)	(0.042)	(0.050)	(0.072)	(0.070)	(0.087)
Prob (2)	0.140***	0.037	-0.076**	0.089***	0.013	-0.034*	0.112***	0.019	-0.073**	0.128**	-0.021	-0.023
	(0.029)	(0.031)	(0.036)	(0.014)	(0.015)	(0.018)	(0.027)	(0.028)	(0.034)	(0.052)	(0.051)	(0.063)
Prob (3)	0.074***	0.020	-0.040**	0.025***	0.004	-0.010*	0.056***	0.009	-0.037**	0.048**	-0.008	-0.008
	(0.017)	(0.017)	(0.019)	(0.004)	(0.004)	(0.005)	(0.014)	(0.014)	(0.017)	(0.022)	(0.019)	(0.023)
Obs.	6,297	6,297	6,297	24,118	24,118	24,118	4,817	4,817	4,817	2,022	2,022	2,022
<i>Panel C. Confidence that the family will have sufficient food in the next 4 weeks</i>												
Prob (1)	0.120***	-0.006	-0.038***	0.050***	0.0001	-0.019***	0.124***	0.004	-0.051***	0.040***	0.005	-0.017***
	(0.009)	(0.008)	(0.010)	(0.001)	(0.001)	(0.001)	(0.009)	(0.008)	(0.010)	(0.006)	(0.004)	(0.006)
Prob (2)	0.172***	-0.008	-0.055***	0.167***	0.0005	-0.062***	0.156***	0.005	-0.064***	0.143***	0.019	-0.059***
	(0.012)	(0.011)	(0.014)	(0.004)	(0.003)	(0.004)	(0.011)	(0.010)	(0.013)	(0.019)	(0.014)	(0.021)
Prob (3)	-0.032***	0.002	0.010***	0.117***	0.0003	-0.043***	-0.044***	-0.001	0.018***	0.072***	0.010	-0.030***
	(0.004)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.004)	(0.003)	(0.004)	(0.010)	(0.007)	(0.011)
Prob (4)	-0.260***	0.013	0.083***	-0.335***	-0.001	0.124***	-0.237***	-0.007	0.098***	-0.255***	-0.035	0.106***
	(0.017)	(0.017)	(0.021)	(0.007)	(0.006)	(0.008)	(0.016)	(0.015)	(0.019)	(0.032)	(0.026)	(0.037)
Obs.	26,762	26,762	26,762	243,699	243,699	243,699	21,793	21,793	21,793	15,078	15,078	15,078
<i>Panel D. Worsened food sufficiency situation</i>												
Prob (1)	0.123***	-0.004	-0.028	0.108***	-0.015***	-0.026***	0.074***	-0.046***	0.033*	0.093***	-0.009	-0.034
	(0.016)	(0.016)	(0.020)	(0.005)	(0.004)	(0.006)	(0.016)	(0.016)	(0.020)	(0.020)	(0.018)	(0.024)
Obs.	26,783	26,783	26,783	243,827	243,827	243,827	21,810	21,810	21,810	15,098	15,098	15,098

Notes: The analysis has been performed using the statistical software package Stata ®. All regressions are estimated using an ordered probit (Panels A, B and C) and probit models (Panel D). The marginal effects of a job loss, employment status, and their interaction on the likelihood of different levels of the respective outcomes are presented. The dependent variables used in Panels A, B, C and D are Food sufficiency, Child food sufficiency, Level of confidence that the family will have sufficient food in the following 4 weeks, and Worsened food sufficiency situation, respectively (as described in the Data section of this paper). Columns (1), (2) and (3), Columns (4), (5) and (6), Columns (7), (8) and (9), and Columns (10), (11) and (12) represent the marginal effects from four regressions, estimated using data from subsamples of individuals of distinct races/ethnicities: Hispanic; White, non-Hispanic; Black, non-Hispanic; and Asian, non-Hispanic, respectively. The following control variables are used in all regressions: Age, Gender dummy variable, indicator variables showing the respondent's highest education level (below high school, some college/ Associate's degree, Bachelor's degree or higher), marital status indicators (Married, Widowed, Divorced or separated), Household size, Number of children, Household income level dummies (below 25K, 25-50K, 50-75K, 75-100K, 100-

150K and 150-200K), an indicator for a family member receiving free food, and a SNAP recipient dummy variable. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Evidence from gender differences provided in Table 4 suggests that men’s lost job is responsible for a larger reduction in the likelihood of insufficient food of the preferred kind in a family than women’s loss of employment, 26.9% versus 21.7%. This might indicate that men are the primary source of household income, and thus its reduction affects nutrition more than a women’s job loss. The difference of the effect of parents’ job loss between genders on child nutrition is about 10%, holding all other factors constant. Interestingly, a job loss by both men and women has an approximately identical effect on their confidence in nutrition in the near future. The findings in subsamples of men and women confirm our previous results that for individuals who have lost a job, those who are nonetheless employed are more likely to have a sufficient amount of the preferred food than those who are currently unemployed although the difference is larger for men than for women. The same trend is observed for child nutrition. Further, for job losers, the individuals who are employed are less likely to not be confident about nutrition prospects than the unemployed, but the magnitudes of these differences are identical for men and women.

Table 4. Marginal effects of a job loss and employment status on food sufficiency, By gender

	Female			Male		
	(1) Lost job	(2) Employed	(3) Lost job* Employed	(4) Lost job	(5) Employed	(6) Lost job* Employed
<i>Panel A. Enough food</i>						
Prob (1)	-0.217*** (0.009)	0.011 (0.008)	0.059*** (0.010)	-0.269*** (0.010)	0.040*** (0.009)	0.089*** (0.012)
Prob (2)	0.142*** (0.006)	-0.007 (0.005)	-0.039*** (0.007)	0.186*** (0.007)	-0.028*** (0.006)	-0.062*** (0.008)
Prob (3)	0.062*** (0.003)	-0.003 (0.002)	-0.017*** (0.003)	0.068*** (0.003)	-0.010*** (0.002)	-0.023*** (0.003)
Prob (4)	0.013*** (0.001)	-0.001 (0.0004)	-0.003*** (0.001)	0.015*** (0.001)	-0.002*** (0.001)	-0.005*** (0.001)

Obs.	186,550	186,550	186,550	132,249	132,249	132,249
<i>Panel B. Child food enough</i>						
Prob (1)	-0.120*** (0.020)	-0.023 (0.021)	0.043* (0.025)	-0.221*** (0.035)	-0.038 (0.037)	0.130*** (0.041)
Prob (2)	0.089*** (0.015)	0.017 (0.016)	-0.032* (0.19)	0.161*** (0.026)	0.027 (0.027)	-0.095*** (0.030)
Prob (3)	0.031*** (0.005)	0.006 (0.006)	-0.011* (0.007)	0.060*** (0.011)	0.010 (0.010)	-0.035*** (0.012)
Obs.	27,375	27,375	27,375	12,354	12,354	12,354
<i>Panel C. Confidence that the family will have sufficient food in the next 4 weeks</i>						
Prob (1)	0.064*** (0.002)	0.006*** (0.001)	-0.025*** (0.002)	0.067*** (0.002)	-0.003 (0.002)	-0.025*** (0.002)
Prob (2)	0.174*** (0.005)	0.016*** (0.004)	-0.068*** (0.006)	0.189*** (0.006)	-0.008 (0.005)	-0.071*** (0.007)
Prob (3)	0.058*** (0.002)	0.005*** (0.001)	-0.023*** (0.002)	0.101*** (0.003)	-0.004 (0.003)	-0.038*** (0.003)
Prob (4)	-0.296*** (0.008)	-0.027*** (0.007)	0.116*** (0.009)	-0.357*** (0.010)	0.015 (0.009)	0.134*** (0.012)
Obs.	186,760	186,760	186,760	132,427	132,427	132,427
<i>Panel D. Worsened food sufficiency situation</i>						
Prob (1)	0.103*** (0.006)	-0.012** (0.005)	-0.014** (0.007)	0.106*** (0.007)	-0.022*** (0.007)	-0.021** (0.009)
Obs.	186,866	186,866	186,866	132,516	132,516	132,516

Notes: The analysis has been performed using the statistical software package Stata ®. All regressions are estimated using an ordered probit (Panels A, B and C) and probit models (Panel D). The marginal effects of a job loss, employment status, and their

interaction on the likelihood of different levels of the respective outcomes are presented. The dependent variables used in Panels A, B, C and D are Food sufficiency, Child food sufficiency, Level of confidence that the family will have sufficient food in the following 4 weeks, and Worsened food sufficiency situation, respectively (as described in the Data section of this paper). Columns (1), (2) and (3), and Columns (4), (5) and (6) represent the marginal effects from two regressions, estimated using data from subsamples of female and male respondents, respectively. The following control variables are used in all regressions: Age, Race/ ethnicity indicators (Hispanic, White, Black, Asian), indicator variables showing the respondent's highest education level (below high school, some college/ Associate's degree, Bachelor's degree or higher), marital status indicators (Married, Widowed, Divorced or separated), Household size, Number of children, Household income level dummies (below 25K, 25-50K, 50-75K, 75-100K, 100-150K and 150-200K), an indicator for a family member receiving free food, and a SNAP recipient dummy variable. Robust standard errors are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

When we distinguish between respondents with different educational levels, the largest impact of a job loss on food insecurity is observed in the subsamples of respondents with some college or an Associate's degree, followed by those with high school education. Workers with less than high school and a Bachelor's or a higher educational attainment are effected approximately the same and relatively less than people with other levels of educational attainment. Specifically, a job loss is associated with a decline in the likelihood of having the desired kind and amount of food by 26.5% for people with some college or an Associate's degree. For individuals who have lost a job, those who are employed are 8.5% more likely than those who are unemployed to have a sufficient amount of the preferred food types. There is no statistically significant difference between employed and unemployed job losers who have a lower than a high school diploma. The results are different for child nutrition. The most affected children by a parental job loss are the ones whose parents have not completed high school. A parental job loss is related to a reduction in their likelihood of getting sufficient food of the preferred kinds by 19.2%, which is about 8% larger decline as compared to children with highly educated parents, and about 5% larger reduction compared to children whose parents have completed high school and/or have an Associate's degree. For parents with the lowest educational attainment considered in this analysis who have lost a job, children of those who are nevertheless employed are 17.6% more likely to be getting sufficient preferred nutrition relative to children of parents who are unemployed. This difference is at least 10% larger than the difference in the nutrition between children with employed and unemployed parents who have any higher educational attainment. A comparison of the likelihood of being confident that the family will have a sufficient amount of food in the upcoming weeks between workers with different educational levels shows that workers with less than high school are most adversely affected by a job loss. For people who have lost a job, those who are employed are 3.9% less likely to not have any confidence in their future nutrition relative to the employed individuals with a high school diploma. The latter effect is smaller for people with higher education, and insignificant for those who have not completed high school.

Table 5. Marginal effects of a job loss and employment status on food sufficiency, By educational attainment

	Below high school			High school or GED			Some college/ Associate's degree			Bachelor's degree or higher		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Lost job	Employed	Lost job* Employed	Lost job	Employed	Lost job* Employed	Lost job	Employed	Lost job* Employed	Lost job	Employed	Lost job* Employed
<i>Panel A. Enough food</i>												
Prob (1)	-0.195*** (0.030)	0.069** (0.033)	0.041 (0.042)	-0.260*** (0.013)	0.027** (0.013)	0.064*** (0.017)	-0.265*** (0.008)	0.015* (0.008)	0.085*** (0.011)	-0.193*** (0.006)	0.019*** (0.005)	0.068*** (0.007)
Prob (2)	0.043*** (0.009)	-0.015** (0.007)	-0.009 (0.009)	0.142*** (0.008)	-0.015** (0.007)	-0.035*** (0.009)	0.171*** (0.006)	-0.009* (0.005)	-0.055*** (0.007)	0.165*** (0.005)	-0.017*** (0.004)	-0.058*** (0.006)
Prob (3)	0.103*** (0.017)	-0.036** (0.018)	-0.021 (0.022)	0.093*** (0.005)	-0.010** (0.005)	-0.023*** (0.006)	0.076*** (0.003)	-0.004* (0.002)	-0.024*** (0.003)	0.024*** (0.001)	-0.002*** (0.001)	-0.009*** (0.001)
Prob (4)	-0.050*** (0.008)	-0.018** (0.009)	-0.010 (0.011)	0.025*** (0.002)	-0.003** (0.001)	-0.006*** (0.002)	0.018*** (0.001)	-0.001* (0.001)	-0.006*** (0.001)	0.004*** (0.0003)	-0.0004*** (0.0001)	-0.001*** (0.0001)
Obs.	5,383	5,383	5,383	34,455	34,455	34,455	99,391	99,391	99,391	175,570	175,570	175,570
<i>Panel B. Child food enough</i>												
Prob (1)	-0.192*** (0.056)	-0.085 (0.075)	0.176** (0.089)	-0.143*** (0.029)	0.013 (0.031)	0.040 (0.038)	-0.146*** (0.020)	-0.044** (0.021)	0.072*** (0.025)	-0.111*** (0.020)	0.022 (0.020)	0.039* (0.023)
Prob (2)	0.099*** (0.030)	0.044 (0.038)	-0.091** (0.046)	0.104*** (0.021)	-0.010 (0.023)	-0.029 (0.027)	0.110*** (0.015)	0.033** (0.016)	-0.054*** (0.019)	0.093*** (0.017)	-0.018 (0.017)	-0.033* (0.019)
Prob (3)	0.093*** (0.028)	0.041 (0.037)	-0.085* (0.044)	0.039*** (0.008)	-0.004 (0.008)	-0.011 (0.010)	0.036*** (0.005)	0.011** (0.005)	-0.018*** (0.006)	0.019*** (0.004)	-0.004 (0.003)	-0.007* (0.004)
Obs.	1,785	1,785	1,785	6,504	6,504	6,504	16,136	16,361	16,361	15,304	15,304	15,304
<i>Panel C. Confidence that the family will have sufficient food in the next 4 weeks</i>												
Prob (1)	0.141*** (0.019)	-0.025 (0.021)	-0.025 (0.028)	0.104*** (0.004)	0.004 (0.004)	-0.039*** (0.005)	0.081*** (0.002)	0.003** (0.002)	-0.032*** (0.002)	0.027*** (0.001)	0.001** (0.0005)	-0.012*** (0.001)
Prob (2)	0.069*** (0.011)	-0.012 (0.010)	-0.012 (0.014)	0.188*** (0.007)	0.007 (0.007)	-0.072*** (0.009)	0.203*** (0.005)	0.009** (0.004)	-0.080*** (0.006)	0.130*** (0.003)	0.006** (0.002)	-0.058*** (0.003)
Prob (3)	-0.064*** (0.010)	0.011 (0.010)	0.011 (0.013)	0.017*** (0.002)	0.001 (0.001)	-0.007*** (0.001)	0.057*** (0.002)	0.002** (0.001)	-0.022*** (0.002)	0.151*** (0.003)	0.007** (0.003)	-0.067*** (0.004)
Prob (4)	-0.147*** (0.010)	0.026 (0.010)	0.026 (0.013)	-0.309*** (0.002)	-0.012 (0.001)	0.118*** (0.001)	-0.341*** (0.002)	-0.014** (0.001)	0.134*** (0.002)	-0.308*** (0.003)	-0.014** (0.003)	0.137*** (0.004)

	(0.020)	(0.022)	(0.029)	(0.011)	(0.011)	(0.015)	(0.008)	(0.007)	(0.010)	(0.006)	(0.006)	(0.008)
Obs.	5,419	5,419	5,419	34,539	34,539	34,539	99,517	99,517	99,517	179,712	179,712	179,712
<i>Panel D. Worsened food sufficiency situation</i>												
Prob (1)	0.090***	0.017	-0.037	0.117***	-0.017*	-0.013	0.116***	-0.020***	-0.017*	0.089***	-0.016***	-0.024***
	(0.024)	(0.027)	(0.036)	(0.009)	(0.009)	(0.012)	(0.007)	(0.007)	(0.009)	(0.004)	(0.004)	(0.005)
Obs.	5,426	5,426	5,426	34,570	34,570	34,570	99,577	99,577	99,577	179,809	179,809	179,809

Notes: The analysis has been performed using the statistical software package Stata ®. All regressions are estimated using an ordered probit (Panels A, B and C) and probit models (Panel D). The marginal effects of a job loss, employment status, and their interaction on the likelihood of different levels of the respective outcomes are presented. The dependent variables used in Panels A, B, C and D are Food sufficiency, Child food sufficiency, Level of confidence that the family will have sufficient food in the following 4 weeks, and Worsened food sufficiency situation, respectively (as described in the Data section of this paper). Columns (1), (2) and (3), Columns (4), (5) and (6), Columns (7), (8) and (9), and Columns (10), (11) and (12) represent the marginal effects from four regressions, estimated using data from subsamples of individuals with different highest level of education: below high school; high school or GED; some college or an Associate’s degree; and Bachelor’s degree or higher education, respectively. The following control variables are used in all regressions: Age, Gender dummy variable, Race/ ethnicity indicators (Hispanic, White, Black, Asian), marital status indicators (Married, Widowed, Divorced or separated), Household size, Number of children, Household income level dummies (below 25K, 25-50K, 50-75K, 75-100K, 100-150K and 150-200K), an indicator for a family member receiving free food, and a SNAP recipient dummy variable. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.10.

Overall, a layoff has a negative impact on food sufficiency, at least the kinds of preferred food. In addition, the adverse effect is primarily driven by a job loss of male individuals, Hispanics, and people whose highest education is some college or an Associate’s degree. From the people who have lost a job during the pandemic, those who are nonetheless employed are less likely to experience reductions in the likelihoods of not getting enough of the preferred kinds of food, and to feel insecure regarding the sufficiency of food for their families in the following month. The difference in child nutrition between children whose parents are employed and unemployed despite losing a job is the largest for those with the lowest level of education. These results are robust in that they differ negligible from the ones produced using an (ordered) logit specification. They also change only modestly with the inclusion of state fixed effects.

6. Discussion

This study provides evidence of deteriorating food insecurity during the Covid-19 pandemic. It also highlights that Hispanics and low-educated people are the most vulnerable groups of the population, who are most likely to lack sufficient food to live a healthy lifestyle. Therefore, the pandemic is more likely to have a short- and long-term effects on their health than on other groups of the American population.

The finding of this study that food insecurity is becoming more concerning as a result of layoffs during the ongoing crisis is consistent with the spring 2020 predictions of Feeding America, one of the largest non-profit organizations whose mission is to provide food to the ones in need through a network of partners and engagement of the population to fight hunger. They estimated that the number of food insecure people could increase from 35 million, including 11 million children, before the outbreak of the coronavirus to more than 50 million, including 17 million children (Feeding America 2020). First, federal programs providing support to all families in need of nutritious food are expected to be more needed than prior to the outbreak of Covid-19.

Additionally, given the surge in the demand for assistance food and the supply chain hardship leading to a reduction in the food donations (Feeding America 2020), awareness programs eliciting information about the increased need for food donations and promoting acts of charity to help people in need could alleviate the adverse effects of the crisis on health as a result of food insecurity.

Finally, the increased number of workers losing jobs during the pandemic and the subsequent escalation of food insecurity raises concerns about a potential increase in the prevalence of long-term chronic diseases and overall weak immune system of individuals lacking sufficient nutrition. In this environment, there is a greater need for medical institutions to educate and direct patients to healthy food. Educational campaigns providing information on kinds of nutritious, low-cost food are likely to help people in need make wise and affordable dietary choices. This in turn, might be a way to mitigate the impact of the pandemic on the prevalence of nutrition-related health conditions and health disparities between distinct groups of the population.

7. Conclusion

This paper examines the effect of a recent job loss in the family on food security of families and children, confidence about nutrition in the near future, and the change in the food sufficiency status of families during the Covid-19 pandemic. We find that losing a job during the Covid-19 crisis is associated with a reduced food security for children and families, and lower confidence in future food sufficiency. From the workers who have lost jobs, the ones who are employed at the time of the interview despite the job loss are less negatively affected than their unemployed counterparts.

Given the forementioned effect of the pandemic on food security, awareness programs providing guidance on nutritious, cost-effective food choices are likely to improve dietary outcomes of the population. In addition, we show that assistance programs supporting affected families to get access to sufficient food would help Hispanics, people with less than a Bachelor's degree and those who are currently unemployed

the most. Additionally, federal programs whose aim is to improve child nutrition would be most effective if targeted at children of parents with lowest levels of education.

Although the paper sheds light on the impact of Covid-19 on food security and as such, has relevant policy implications, it also has limitations. First, the data do not provide information about food sufficiency of the respondents prior to the layoff. Availability of such data would allow a better understanding of the impact of losing a job on nutrition. Second, although the reason for lack of employment is available, we do not have the reason for a job loss in the cases where the individual is currently working. This limits our ability to estimate the differential effect of a job loss due to exogenous reasons between currently employed and unemployed individuals. Additionally, food sufficiency is self-reported and therefore, respondents are likely to have different understanding of what a sufficient amount of food is. The category indicating sufficient amount of the kinds of food the family wanted is also unclear in that the preferred foods might be different between people and do not necessarily imply the quality of the diet and the nutrition intake. For instance, an individual who has reported that he/she gets enough food but not the kinds he/she wanted might be getting better nutrition than someone who has reported that he/she has enough of the preferred types of food.

Future research could resolve these concerns with richer data. This study could also be extended to other countries. If data that provide information about the actual nutrition families and children get could be collected, one could examine the effect of a job loss on the actual dietary habits and food sufficiency of families. The results from such research might not coincide with the one we obtain because we base our analysis on self-reported perceptions of food sufficiency. Finally, if actual programs are implemented, exploring the effects of these policies on nutrition will be a fruitful area of future investigation.

Declarations

Declaration of Interest Statement

The author declares no conflict of interest.

Funding Statement

This research did not receive any specific funding.

Ethical Approval

The author declares that this article does not contain any studies with human participants or animals performed by the author.

References

- Browning, M., & Heinesen, E. (2012). Effect of job loss due to plant closure on mortality and hospitalization. *Journal of Health Economics*, *31*, 599 – 616. Doi: 10.1016/j.jhealeco.2012.03.001
- Deb, P., Gallo, W., Ayyagari, P., Fletcher, J., & Sindelar, J. (2011). The effect of job loss on overweight and drinking. *Journal of Health Economics*, *30*, 317 – 327. Doi: 10.1016/j.jhealeco.2010.12.009
- Feeding America. (2020). The impact of the coronavirus on food insecurity in 2020. Retrieved from https://www.feedingamerica.org/sites/default/files/2020-10/Brief_Local%20Impact_10.2020_0.pdf.
- Hilger, N. (2016). Parental job loss and children's long-term outcomes: Evidence from 7 million fathers' layoffs. *American Economic Journal: Applied Economics*, *8*(3), 247 – 283. Doi: 10.1257/app.20150295
- Kocchar, R. (2020). Unemployment rose higher in three months of COVID-19 than it did in two years of the Great Recession. Pew Research Center. Retrieved from <https://www.pewresearch.org/fact-tank/2020/06/11/unemployment-rose-higher-in-three-months-of-covid-19-than-it-did-in-two-years-of-the-great-recession/>
- Loopstra, R., & Tarasuk, V. (2013). Severity of household food insecurity is sensitive to change in household income and employment status among low-income families. *The Journal of Nutrition*, 1316 – 1323. Doi: 10.3945/jn.113.175414.
- Lovell, V., & Oh, G. (2006). Women's job loss and marital hardship. *Journal of Women, Politics and Policy*, *27*(3-4), 169 – 183. Doi: 10.1300/J501v27n03_12
- Mandal, B., Ayyagari, P., & Gallo, W. (2011). Job loss and depression: The role of subjective expectations. *Social Science and Medicine*, *72*(4), 576 – 583. Doi: 10.1016/j.socscimed.2010.11.014
- Marcus, J. (2014). Does job loss make you smoke and gain weight?. *Economica*, *81*, 626 – 648. Doi: 10.1111/ecca.12095
- Migration Policy Institute. (2009). The Recession's impact on immigrants. Migration Policy Institute (MPI). Retrieved from <https://www.migrationpolicy.org/article/recessions-impact-immigrants>
- Mooi-Reci, I., & Munoz-Comet, J. (2016). The Great Recession and the immigrant-native gap in job loss in the Spanish labor market. *European Sociological Review*, *32*(6), 730 – 751. Doi: 10.1093/esr/jcw031
- Morrill, M. (2011). The effects of maternal employment on the health of school-age children. *Journal of Health Economics*, *30*, 240 – 257. Doi: 10.1016/j.jhealeco.2011.01.001
- Siemer, M. (2019). Employment effects of financial constraints during the Great Recession. *The Review of Economics and Statistics*, *101*(1), 16 – 29. Doi: 10.1162/rest_a_00733
- U.S. Bureau of Labor Statistics. (2012). The Recession of 2007 – 2009. U.S. Bureaus of Labor Statistics (BLS). Retrieved from https://www.bls.gov/spotlight/2012/recession/pdf/recession_bls_spotlight.pdf
- U.S. Bureau of Labor Statistics. (2020). Economy at a glance. Retrieved from <https://www.bls.gov/eag/eag.us.htm>.

U.S. Census Bureau. (2020). Household Pulse Survey Public Use file (PUF). Retrieved from <https://www.census.gov/programs-surveys/household-pulse-survey/datasets.html>.

World Health Organization (WHO). (2020). Healthy diet. Geneva: World Health Organization. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/healthy-diet>.

Young, C. (2012). Losing a job: The nonpecuniary cost of unemployment in the United States. *Social Forces*, 91(2), 609 – 634. Doi: 10.1093/sf/sos071

Yeung, W. J., & Hofferth, S. (1998). Family adaptations to income and job loss in the U.S. *Journal of Family and Economic Issues*, 19(3), 255 – 283. Doi: 10.1023/A:1022962824012