Featured Article

Measuring Food Insecurity during the COVID-19 Pandemic of Spring 2020

Sunjin Ahn, and F. Bailey Norwood*

Sunjin Ahn is a postdoctoral associate at the Department of Agricultural Economics at Mississippi State University. F. Bailey Norwood is a professor at the Department of Agricultural Economics at Oklahoma State University.
Editor in charge: Craig Gundersen
*Correspondence may be sent to: E-mail: bailey.norwood@okstate.edu

Abstract *The COVID-19 pandemic in the spring of 2020 resulted high levels of unemployment, higher food prices, and loss of business sales. This deterioration in households' financial status likely increased food insecurity in the US, but by how much? While the US government will not measure food insecurity until December of 2020, previous research has developed a methodology whereby internet surveys that can be rapidly deployed using opt-in panels can approximate government numbers. We employ this methodology to measure food insecurity in May of 2020. Results suggest that while there is little to no detectable rise in food insecurity for all households, the percent of households with children classified as food insecure is about three percentage points higher than it was in 2016 and 2017.*

Key words: COVID, COVID-19, Food insecurity, Pandemic, Poverty, Sampling, Survey methods.

JEL codes: I31, Q18, Q28.

Introduction

As employees were furloughed or laid off, businesses saw their sales plummet in the spring of 2020 due to COVID-19, and some food prices rose, it was evident that many people would be in financial straits. Concerns arose that an unprecedented number of Americans would have trouble obtaining their food needs. On April 19, 2020 a representative of Feeding America remarked that requests for food assistance at food pantries were expected to rise by almost 50% and that they had spent more money on food in the past month than the previous six months combined (CBS 2020). The unemployment rate for April 2020 was 14.7%, up from 4.4% in the previous month (USBLS 2020), and Feeding America (with help from agricultural economists) projected on April 22 that such a rise in unemployment should be associated with a 5% increase in the food insecurity rate (Feeding America 2020).

This projected rise in food insecurity was based on historical relationships between the unemployment rates and official federal government numbers

on food insecurity (for detailed information on measuring food insecurity and its relationship with economic conditions see Gundersen, Kreider, and Pepper 2011 and Gundersen and Ziliak 2018). Would this relationship hold during the pandemic? Or would the state and governmental measures to mitigate the damages of the pandemic, accompanied by greater efforts in the food charity system, keep food insecurity in check? To answer this question, we conducted an internet survey on May 13–14, 2020 measuring food security following the methods in Ahn, Smith, and Norwood (2020). It is referred to as the ASN survey.

The ASN Survey in May 13–14, 2020

The ASN survey entails using a nonrepresentative opt-in sample where individuals are administered the food security questionnaire used by the USDA in its official food security estimates. While the USDA survey represents the gold standard in food security estimates due to its use of expensive probability sampling, it is only administered once a year, in December. If rapid, timely food security estimates are desired then less representative samples like the ASN survey is required. Internet surveys using opt-in panels are not the ideal method for measuring the impact of COVID-19 on food insecurity. They may appear representative in terms of a few demographics but because they are not true probability samples, they are unrepresentative in terms of other demographics. Our previous research has shown these samples can differ greatly from the US population in terms of variables like unemployment, for example.

Even when careful sample balancing is used and procedures are set in place to mimic the screening procedures employed by the USDA (where some households are automatically deemed to be food secure and are not administered the food security questionnaire), food insecurity rates can be 9%–14% higher than those estimated by the USDA. However, our research also demonstrates that results from internet surveys can be calibrated to mimic closely the USDA statistics. By using a more stringent screening process than that used by the USDA one can obtain insecurity numbers that closely resemble the USDA numbers for 2016 and 2017. The two years of prior experience with the ASN survey, however, suggests that it will still overpredict the percentage of food insecure households by 2%–3% (Ahn, Smith, and Norwood 2020).

Our survey differs from the ASN survey given in 2016 and 2017 in only one regard: how household income is elicited. The household income question typically asks respondents' total household pretax income, but during COVID-19, many households may feel they are unsure exactly what their income will be. As such, we ask two income questions. The first asks their actual income in 2019 and the second asks their expected income for 2020. An additional question also asks if the size of their household has changed between 2019 and 2020 to help isolate income changes caused by changes in household composition.

The sample was acquired from the Qualtrics company, who selected a sample of respondents from its opt-in panel that is similar to the demographic profile of the US in terms of age, income, gender, education, and race. These individuals are recruited using a variety of methods, including internet recruitment and referrals. Compensation for taking surveys is performed through airline miles, cash, gift cards, and the like, and third-party validation is used to confirm the participants' contact information. The survey was

administered on the Qualtrics software platform during the period May 13–14, 2020.

Each household was administered ten to eighteen questions (depending on whether they have children) to evaluate their food security status. This is the identical questionnaire used by the USDA in its official food insecurity estimates (ERS 2012). We follow the same protocol as Ahn, Smith, and Norwood (2020) for translating the ten to eighteen responses for each household into to one of four food security status groups: high food security, marginal food security, low food security, and very low food security. A household is then considered food insecure if the status is low or very low. Details on the questions and this protocol are discussed fully in Ahn, Smith, and Norwood (2020).

The USDA survey employees a protocol by which households are given a preliminary food security question, and if they indicate no food insecurity in this question and indicate a household income above 185% of the poverty line then they are assumed to be food secure and are not administered the food security questionnaire. This is referred to as "screening" and is done to limit respondent fatigue, as the USDA contains many questions in addition to food security (it is conducted in addition to the Current Population Survey), but since our internet survey contains far fewer questions we ask both the preliminary question and the food security questions of all respondents. Our previous research showed that if you employ sample balancing to reconcile demographic differences between the sample and the population, and if the screening procedure is simulated the internet survey will overestimate food insecurity by 9–14%. However, if the screening procedure is replaced with a calibration that simply assumes all households above 185% of the poverty line are food secure, the internet survey closely mimics the USDA numbers, so that is the procedure we employ. This survey was approved by the Institutional Review Board at Oklahoma State University: application number IRB-20-245.

We previously administered the identical food security questionnaires in 2016 and 2017, allowing us to compare May 2020 rates to those in recent years where economic conditions were more normal. Table 1 shows the demographic profile of the respondents in the May 2020 survey compared to our similar surveys in December of 2016 and 2017 (Ahn, Smith, and Norwood 2020). A number of demographics are consistent across surveys, like income and gender. Other demographics have some variations, like household size, region, and education. Demographics like the percentage of households with an unemployed member can differ considerably. While sample balancing can be used to correct for these demographic differences, it is an imperfect correction. A main difference is that unemployment is not a variable used in sample balancing for May 2020 because as of May the percent of households with an unemployed member was unknown.

The respondents reported being affected by COVID-19. One survey question asked how their financial status had changed since March 2020 due to the pandemic. Four responses were available (no change in household income, lost job, lower household income, higher household income) and respondents could select multiple options. While 50% reported no change in their financial status, 19% indicated that one or more household members lost their job and 33% said their household would make less money. When comparing households' expected 2020 income to their 2019 income, on average households expect to make about $3,000 less this year than the previous year.

Table 1 Demographics of Samples in May 2020 and Previous ASN Surveys

Demographic	December 2016 Survey	December 2017 Survey	May 13–14, 2020 Survey
Percent of households …			
With three or more members	54.96	40.70	50.72
With income < $20,000	17.02	18.00	18.91[a]
With unemployed member[b]	24.44	14.87	32.00
Who own their home	59.95	66.34	67.24
Who use SNAP benefits	19.32	16.54	13.28
Who use food pantries	14.65	10.18	12.23
Northeast	24.31	22.41	21.68
Midwest	22.65	22.02	21.11
South	28.38	37.38	37.82
West	24.70	18.20	19.39
Percent of respondents …			
Ethnicity: white only	77.35	78.18	72.49
Bachelor's degree or higher	40.11	45.30	29.23
Female	53.49	49.32	50.81
18–24 years of age	17.98	7.53	14.61
24–54 years of age	61.94	51.76	51.39
> 54 years of age	20.09	40.70	34.00
Married	49.14	54.60	55.01

[a]*2019 actual income, not expected 2020 income.*
[b]*The question asks whether the household has a member who is unemployed but looking for work.*

Also, when asked whether any household member experienced symptoms resembling Covid-19, 11% said "yes", 2% said "maybe," and 87% said "no." Of those who said "yes" or "maybe," 37% were not tested, 42% tested positive, and 21% tested negative.

Results

This section discusses the results of the ASN survey measuring how COVID-19 potentially increased the percent of US households classified as food insecure during May of 2020. First consider the ASN survey results in Table 2, juxtaposed with the same survey administered in 2016 and 2017. Also provided in the table are the food security rates from the USDA surveys in 2018 and 2008. Insecurity rates for May 2020 are provided with confidence intervals, which was acquired using 1,000 simulations; at each simulation, a new sample is acquired from the original sample by sampling with replacement. Within each of these simulations, new sample balancing weights and food security rates are calculated. After 1,000 simulations the standard deviation of the rates is then calculated and used to display the point estimate plus and minus two standard deviations, thereby providing a roughly 95% confidence interval. The percentages for all other surveys are taken as fixed numbers.

The percent of all households classified as food insecure in the May 2020 ASN survey is 15.4%. This is higher than the rates observed in the previous ASN surveys during normal years but given the confidence interval it is not significantly higher, suggesting COVID-19 has not increased food insecurity. When comparing the percentages to the official USDA numbers there are more food insecure households compared to 2018, but roughly the same amount as in 2008; while this would suggest that COVID-19 has increased

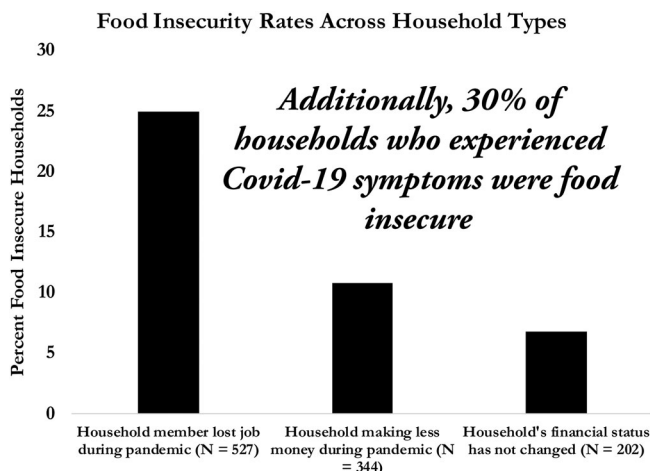**Table 2** Food insecurity status in May 13–14, 2020 ASN survey

Food Security Status marginal or high = food secure; low or very low = food insecure	May 2020 ASN Internet Survey [a] Point estimate ± two standard deviations [c]	2016 ASN Internet Survey [a,b]	2017 ASN Internet Survey [a,b]	USDA Numbers in 2008	USDA Numbers in 2018
All households (N = 1,047)					
Marginal or high food security	84.6% ±1.61%	83.9%	87.2%	85.40%	88.90%
Low food security	6.2% ±0.89%	7.6%	6.2%	8.90%	6.80%
Very low food security	9.2% ±1.38%	8.5%	6.6%	5.70%	4.30%
Percent food insecure	*15.4% ±1.61%*	*16.1%*	*12.8%*	*14.6%*	*11.1%*
Households w/out children (N = 626)					
Marginal or high food security	86.4% ±1.94%	85.5%	87.8%	88.70%	90.10%
Low food security	5.97% ±1.41%	6.4%	5.5%	6.00%	5.40%
Very low food security	7.61% ±1.36%	8.2%	6.8%	5.30%	4.50%
Percent food insecure	*13.58% ±1.94%*	*14.6%*	*12.3%*	*11.3%*	*9.9%*
Households w/ children (N = 421)					
Marginal or high food security	79.88% ±2.49%	81.2%	85.9%	79.00%	86.10%
Low food security	6.73% ±1.24%	9.8%	7.8%	14.40%	9.90%
Very low food security	13.39% ±1.97%	9.0%	6.3%	6.60%	4.00%
Percent food insecure	*20.12% ± 2.49%*	*18.8%*	*14.1%*	*21%*	*13.9%*

[a]*Food security rates using sample balancing to reconcile differences between the sample demographics and national demographics in 2020, accounting for gender, ethnicity, marital status, age, household size, and number of children. Mimicking the screening procedure in the USDA, all households making above 185% of the poverty threshold are deemed food secure regardless of their answers to the questionnaire.*

[b]*The average percentages for the numbers published in Ahn, Smith, and Norwood (2020).*

[c]*Standard deviations calculated using bootstraps. For 1,000 simulations the original data are sampled with replacement. At each simulation new sample balancing weights are calculated and used to calculate new percentages.*

Figure 1 Impacts of COVID-19 food on food insecurity

Food Insecurity Rates Across Household Types

Additionally, 30% of households who experienced Covid-19 symptoms were food insecure

food insecurity by a similar amount as the Great Recession, the ASN tends to overpredict food insecurity by a few percentage points (Ahn, Smith, and Norwood 2020). Everything considered, the ASN survey suggests that for all households, if food insecurity rose due to COVID-19, the rise is not remarkable.

A rise is detectable among households with children though. The percentage of food insecure households among those with children is significantly higher in May 2020 than the 2016–2017 ASN numbers and the 2018 USDA numbers. Moreover, this percentage is roughly equal to the percentage in 2008, during the Great Recession. From this we conclude that COVID-19 has placed greater stress on households with children, causing food access problems reminiscent of the Great Recession.

It might be useful to ask how food insecurity rates in ASN differ among those who lost a job and/or experiencing an income loss due to COVID-19 and those who did not. Figure 1 shows the percentage of food insecure households among those households where a member lost their job, among those households who are making less money than last year, and among those whose financial status has not changed. One-quarter of those with a household member who lost a job are classified as food insecure, compared to only 7% of those whose financial status has not changed. While COVID-19 may not seem to raise overall food insecurity numbers much, for those whose employment was terminated due to COVID-19 the insecurity numbers are quite high, though it is not known what percent of these households would be food insecure if COVID-19 did not exist.

Summary

The spring of 2020 gave rise to concerns that COVID-19 would not only inflict direct harms on the American public, but indirect harms as well, as a reduction in economic activity would lead to income losses that would hinder households' ability to acquire food. Although the USDA measures food security it does so only in December, making it difficult to provide timely information on food insecurity impacts. Fortunately, recently published research has demonstrated that internet surveys using opt-in panels, while

nonrepresentative in nature, can mimic the USDA food insecurity numbers—provided that certain methods are employed, including using the full USDA food security questionnaire, sample balancing, and a more stringent screening procedure (Ahn, Smith, and Norwood 2020).

These methods were replicated in a survey administered in May 13–14 of 2020. The results show no detectable rise in food insecurity for all households overall. A stable food insecurity rate could be explained by the rapid and heroic efforts made by governments and nonprofit groups to protect the public but could also be the result of a Type II Error. A rise in food insecurity among households with children is detected though, with the percent of households with children classified as food insecurity rising by around three percentage points. While this may seem modest, consider that food insecurity rose by a few percentage points during the Great Recession, suggesting that even a small rise in the percent of food insecure households may indicate considerable suffering.

References

U.S. Department of Agriculture, Economic Research Service. 2012. *U.S. Adult Food Insecurity Survey Module: Three-Stage Design, With Screeners. Economic Research Service*. Washington DC.

(U.S. Department of Labor, Bureau of Labor Statistics. 2020. Labor Force Statistics From the Current Population Survey. https://data.bls.gov/pdq/SurveyOutputServlet.

Ahn, S., T.A. Smith, and F.B. Norwood. 2020. Can Internet Surveys Mimic Food Insecurity Rates Published by the US Government? *Applied Economic Perspectives and Policy* 42(2): 187–204.

CBS News. April 19, 2020. The increasing demands upon food banks. https://www.cbsnews.com/news/the-increasing-demands-upon-food-banks/ (accessed May 21, 2020).

Feeding America. April 22, 2020. The Impact of the Coronavirus on Food Insecurity. https://www.feedingamerica.org/sites/default/files/2020-04/Brief_Impact%20of%20Covid%20on%20Food%20Insecurity%204.22%20%28002%29.pdf (accessed May 21, 2020).

Gundersen, C., and J.P. Ziliak. 2018. Food Insecurity Research in the United States: Where we Have Been and Where We Need to Go. *Applied Economic Perspectives and Policy* 49(1): 119–135.

Gundersen, C., B. Kreider, and J. Pepper. 2011. The Economics of Food Insecurity in the United States. *Applied Economic Perspectives and Policy* 33(3): 281–303.