Food Scarcity's Influence on Mental Health During the COVID-19 Pandemic in New York State

Methods

Data

Data come from the COVID-19 Household Pulse Survey. The Census Bureau contacted households via e-mail and/or a mobile phone number to complete an internet questionnaire. Only adults were surveyed.

The Census Bureau drew the sampling frame from the Census Bureau Master Address File, supplemented by the Census Bureau Contact Frame. The Census Bureau weighted the survey responses to account for nonresponse. Weighted data were used in this analysis based on the weights provided by the Census Bureau. The unweighted counts of weekly responses in New York State are displayed in *Table 1*.

Table 1. Unweighted Survey Responses by Week

Survey week	Data Collection Took Place From	Assigned Month in Analysis	Survey Respondents
1	Apr 23–May 5, 2020	Incomplete month	1,698
2	May 7–May 12, 2020	May 2020	1,052
3	May 14–May 19, 2020		3,103
4	May 21–May 26, 2020		2,184
5	May 28–Jun 2, 2020		2,397
6	Jun 4–Jun 9, 2020	June 2020	1,788
7	Jun 11–Jun 16, 2020		1,804
8	Jun 18–Jun 23, 2020		2,327
9	Jun 25–Jun 30, 2020		2,190
10	Jul 2–Jul 7, 2020	July 2020	2,080
11	Jul 9–Jul 14, 2020		2,117
12	Jul 16–Jul 21, 2020		1,995
13	Aug 19–Aug 31, 2020	Incomplete month	2,338
14	Sep 2–Sep 14, 2020	September 2020	2,415
15	Sep 16–Sep 28, 2020		2,135
16	Sep 30–Oct 12, 2020	October 2020	2,123
17	Oct 14–Oct 26, 2020		1,939
18	Oct 28–Nov 9, 2020	November 2020	1,175
19	Nov 11–Nov 23, 2020		1,376
20	Nov 25–Dec 7, 2020	December 2020	1,496
21	Dec 9–Dec 21, 2020		1,384
22	Jan 6–Jan 18, 2021	January 2021	1,360
23	Jan 20–Feb 1, 2021		1,627
24	Feb 3–Feb 15, 2021	February 2021	1,616
25	Feb 17–Mar 1, 2021		1,473
26	Mar 3–Mar 15, 2021	March 2021	1,537

27	Mar 17–Mar 29, 2021		1,500
28	April 14–April 26, 2021	Incomplete month	1,410
29	April 28–May 10, 2021	May 2021	1,517
30	May 12–May 24, 2021		1,397
31	May 26–Jun 7, 2021	June 2021	1,353
32	Jun 9–Jun 21, 2021		1,331
33	Jun 23–Jul 5, 2021		1,210
34	Jul 21–Aug 2, 2021	Incomplete month	1,165
35	Aug 4–Aug 16, 2021	August 2021	1,279
36	Aug 18–Aug 30, 2021		1,292
37	Sep 1–Sep 13, 2021	September 2021	1,120
38	Sep 15–Sep 27, 2021		1,174
39	Sep 29–Oct 11, 2021	Incomplete month	1,076

Calculation of Proportions

We calculated proportions as the percentage of the applicable (weighted) population that self-reported symptoms of anxiety and/or depression. As recommended by the Census Bureau, proportions exclude individuals who did not respond to the question. We created monthly estimates by averaging the weekly or biweekly data approximately corresponding to each month (see month assignments in **Table 1**).

Categorizations

The Household Pulse Survey included questions to measure the frequency of anxiety and depression symptoms. These questions were developed based on the Patient Health Questionnaire (PHQ-2) and the Generalized Anxiety Disorder (GAD-2) scale. One difference is that the Household Pulse Survey measured symptoms over the last 7 days, as opposed to the typical 14 days.

Adapted PHQ-2 questions:
- Over the last 7 days, how often have you been bothered by having little interest or pleasure in doing things? Would you say not at all, several days, more than half the days, or nearly every day?
- Over the last 7 days, how often have you been bothered by feeling down, depressed, or hopeless? Would you say not at all, several days, more than half the days, or nearly every day?

Adapted GAD-2 questions:
- Over the last 7 days, how often have you been bothered by the following problems: Feeling nervous, anxious, or on edge? Would you say not at all, several days, more than half the days, or nearly every day?
- Over the last 7 days, how often have you been bothered by the following problems: Not being able to stop or control worrying? Would you say not at all, several days, more than half the days, or nearly every day?

The answers to each scale were assigned a numerical value (not at all = 0, several days = 1, more than half the days = 2, and nearly every day = 3). The answers for each scale (for PHQ-2 and GAD-2) were summed together. A sum of three or greater on the PHQ-2 score is associated with diagnoses of major

depressive disorder, while a sum of three or greater on the GAD-2 scale is associated with diagnoses of generalized anxiety disorder. The proportion of adults with symptoms in this analysis is based on the composite scores. Only adults who responded to both questions were included in each scale's calculation.

An adult was considered to be food scarce if their household often or sometimes did not have enough to eat in the last week. An adult was considered to be food secure if their household had enough of the kinds of food wanted, or enough food, but not always the kinds wanted, in the last week. Rates are calculated across a month-long period using multiple weeks of data. Months of August 2020, April 2021, and July 2021 are not shown because of gaps between survey periods.

To analyze adults by race/ethnicity, we categorized adults with an ethnicity of Hispanic identified in the data as Hispanic. We categorized adults with an ethnicity of Non-Hispanic as Black, Asian, or white, according to their race code identified in the data. Adults with a race identified in the data as "Other or two or more races" were excluded from analyses by race/ethnicity as a result of low counts.

Statistical Analyses

We used a logistic regression model to examine the association between household food scarcity and symptoms of anxiety and/or depression while controlling for other socioeconomic and demographic variables. We used BRR variance estimation and replicate weights provided in the dataset. We calculated the marginal effect of each variable using the odds ratios from the regression model. Marginal effects were calculated as the average effect across all observations (see marginal effects in **Table 2**).

Table 2. Marginal Effects of Variables in Logistic Regression Model

Variable	Change in Probability of Experiencing Anxiety and/or Depression, Compared to Reference Group (Marginal Effect)	Odds Ratio	95% Confidence Limits	P-Value
Household often food scarce in last 7 days	34.49	7.43	3.2 - 17.27	<.0001
Household sometimes food scarce in last 7 days	30.34	5.84	3.44 - 9.91	<.0001
Household had enough food in last 7 days, but not always the kinds wanted	18.27	2.90	2.15 - 3.89	<.0001
Total 2020 household income (before taxes) less than $25,000	7.38	1.54	0.91 - 2.59	0.1066
Widowed	5.96	1.41	0.8 - 2.5	0.2306
Separated	4.99	1.34	0.71 - 2.51	0.3623
Household experienced a loss of employment income in the last 4 weeks	4.94	1.33	0.94 - 1.9	0.1105
Total 2020 household income (before taxes) $25,000 - $34,999	4.79	1.32	0.9 - 1.95	0.1589
Total 2020 household income (before taxes) $35,000 - $49,999	1.89	1.12	0.77 - 1.63	0.5644

Female	0.45	1.03	0.83 - 1.27	0.807
Education level - Some college, but degree not received or is in progress, or Associate's degree	0.30	1.02	0.84 - 1.24	0.8612
Total 2020 household income (before taxes) $75,000 - $99,999	0.29	1.02	0.69 - 1.5	0.9298
Total 2020 household income (before taxes) $50,000 - $74,999	-0.31	0.98	0.68 - 1.43	0.9244
Age	-0.49	0.97	0.96 - 0.98	<.0001
1-2 people under 18 years in household	-0.53	0.97	0.78 - 1.21	0.7827
Total 2020 household income (before taxes) $100,000 - $149,999	-0.74	0.96	0.7 - 1.31	0.7864
Other or Combination	-2.39	0.87	0.55 - 1.39	0.5562
Hispanic	-2.80	0.85	0.62 - 1.18	0.3207
Divorced	-3.06	0.84	0.59 - 1.19	0.3213
Education level - less than high school, some high school, or high school graduate or equivalent	-3.26	0.83	0.63 - 1.09	0.1686
Married	-3.81	0.80	0.59 - 1.1	0.1643
Total 2020 household income (before taxes) $150,000 - $199,999	-4.58	0.77	0.5 - 1.17	0.2145
≥3 people under 18 years in household	-4.84	0.76	0.51 - 1.12	0.1603
Black	-6.76	0.68	0.45 - 1.01	0.0576
Asian	-16.70	0.38	0.24 - 0.6	<.0001