Ohio Journal of Public Health
Ohio Public Health Association
Ohio J Public Health, Vol. 4, Iss. 1, pp. 11-22, June 2021 ISSN: 2578-6180

RESEARCH ARTICLE

The Ohio COVID-19 Survey: Preliminary Findings and Their Use During the Pandemic

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Submitted December 18, 2020 Accepted March 15, 2021 Published June 21, 2021 https://doi.org/10.18061/ojph.v4i1.8067

ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) pandemic has created exceptional health and economic uncertainty for Ohioans in 2020. In the spring of 2020, the state commissioned the Ohio COVID-19 Survey (OCS) to ask residential Ohio adults about how the pandemic was affecting them. The purpose of this research is to provide state leadership with real-time information about the effects of the pandemic and concurrent recession on Ohio households.

Methods: The OCS is a special supplement to the Ohio Medicaid Assessment Survey (OMAS), a stratified random digit dial, cell phone and landline telephone survey. This study includes data collected weekly between April 20, 2020, and August 24, 2020. We conducted descriptive time-series analysis of the survey data and provided updates to the state's COVID-19 Response Team throughout the survey period.

Results: Preliminary findings from the OCS reflect 3 themes among respondents: 1) elevated levels of concern over health and household economics; 2) disproportionate effects that exacerbate existing inequities; and 3) majority adjustment to "new normal" and acceptance of public health guidelines .

Conclusion: Preliminary findings indicate that groups that were struggling before the pandemic have faced the biggest challenges with regard to health and household economics since it began. Data from the OCS enabled us to provide real-time analysis to state leadership regarding Ohioans' experience during the first 6 months of the COVID-19 pandemic. Further analysis and integration of additional data will allow us to provide deeper insights as Ohio seeks to move into recovery.

Keywords: Ohio; COVID-19; Economic stress; Survey; Inequities

INTRODUCTION

In the earliest weeks of the coronavirus disease 2019 (COVID-19) pandemic, Ohio's elected leadership quickly moved to address data gaps that could hinder the response and recovery efforts. All states built online dashboards tracking COVID-19 cases, hospitalizations, and deaths. Ohio made the additional step of commissioning a weekly survey, the Ohio COVID-19 Survey (OCS) to track economic, risk mitigation, and health indicators of Ohio households.

All states have struggled with data needs during the pandemic. Existing health behavior and economic surveys produced by the federal and state governments routinely release final estimates 9 to 15 months after data collection. Administrative data such as tax collections often update quarterly or monthly. Even the fastest administrative data sources such as unemployment insurance claims still require weeks before final adjudicated totals are available.

Ohio's leadership's need for near real-time feedback from Ohio households led to their commissioning the Ohio COVID-19 Survey.

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The effort was led by the Ohio Department of Health and Ohio Department of Medicaid with technical expertise from The Ohio State University (OSU) and the RTI International (RTI). Envisioned as a near real-time tracking survey to monitor household impacts, Ohio had its first estimates of the pandemic's health, behavioral, and economic impacts on Ohio residents just 17 days after its initial conception (7 days for design, 7 days of data collection, and 3 days of data preparation). The initial iteration of the OCS covered in this paper ran weekly from April 2020 through August 2020, with subsequent iterations expected to continue through June 2021. The Center for Health Outcomes and Policy Evaluation Studies (HOPES) at OSU College of Public Health has been analyzing the survey data and providing updates to Ohio's COVID-19 Response Team throughout the survey period. A complete methodological description of the survey, including sample questions from the survey instrument, can be found in Berzofsky et al.[1]

This paper will report the key findings from the first 18 weeks of the OCS. Specifically, the OCS produced important initial estimates and the subsequent changes in the elevated levels of concern/stress over health and household economics, disproportionate effects that exacerbate existing inequities, and majority adjustment to a "new normal" and acceptance of public health guidelines.

METHODS

Setting

The Ohio COVID-19 Survey (OCS) is a mixed-mode telephone and web-assisted survey conducted by the Ohio Colleges of Medicine Government Resource Center (GRC), a center for applied health policy research and technical assistance, and its contractor RTI. The GRC is housed at OSU.

Design

The OCS is a special supplement to the Ohio Medicaid Assessment Survey (OMAS). Both the OCS and the OMAS produce representative estimates for the entire Ohio population. The OCS uses the OMAS respondent set, which came from a stratified, random digit dial, dual-frame sample of Ohioans to conduct a telephone and web-assisted design. This study reports findings from data collected weekly between April 20, 2020, and August 24, 2020. Stratification and oversampling ensure survey responses are representative of the overall population, capturing geographic, racial, and generational diversity at the state level. However, the survey is not designed to consistently conduct robust subgroup analyses (eg, by race, ethnicity, county). A demographic description of survey respondents can be found in Appendix A.

Participants

Consistent with the OMAS, Ohio adults aged 19 years and older are eligible to respond to the OCS. Participants were randomly selected from stratified groups designed to ensure a representative sample of Ohio's adult population. Respondents provided informed consent to participate and confirmed eligibility as a current Ohio resident who previously completed the OMAS.

Procedures

Both this study and the survey itself were determined exempt by OSU's institutional review board. The GRC is responsible for survey design, management, and data storage as part of a work for hire agreement with the Ohio Department of Medicaid. A research team made up of GRC staff and OSU College of Public Health faculty selected COVID-19-specific questions. All interviews were conducted in English. The survey contractor, RTI International, conducted data collection over 18 weeks between April 20 and August 24, 2020, yielding 17 032 total responses (average n = 946/week). No data were collected during the Fourth of July holiday week. The sampling frame was randomly divided into 6 subframes that were recontacted every 6 weeks, resulting in 3 waves of survey responses among 6 samples ($n \times 6\,894$ in wave 1, $n \times 5\,299$ in wave 2, $n \times 4\,839$ in wave 3). The OCS is unique in its setting, scope, and procedure; no other COVID-19-related surveys have a such a robust sample of Ohioans or provide so much detail on household conditions over time.

Measures

This paper will focus on primary measures related to disease control or public health behaviors (eg, staying at home, avoiding visiting others outside of the home, wearing a face covering in public) and those related to employment and personal economy (eg, job loss due to COVID-19, concerns about ability to pay rent or utility bills). The OCS includes additional measures that allow the research team to identify patterns in behavior and personal economy in terms of geography, race and ethnicity, age, health status, and household income.[1]

Statistical Analysis

To serve the State of Ohio's need for real-time data on the impact of the COVID-19 pandemic on Ohio households, the study team used descriptive statistics and data visualizations to characterize trends in health, disease control behaviors, and household economics. In addition to state-level proportional responses, the team stratified analyses by demographic variables of interest to the state—including gender, age, race, household income, dependent children in the home, and health status—whenever possible. This allowed state leadership to track variation in how behaviors and attitudes changed as the first 6 months of the pandemic and response unfolded.

The OCS research team designed and executed weighting procedures on raw survey data to enable representative interpretation of the results for all noninstitutional Ohio residents and corresponding subgroups as appropriate.[1] Therefore, all analyses shared with the State of Ohio were conducted as weighted proportional responses from each weekly period. We report only statistically significant findings in this paper. All analyses were

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performed using R statistical software version 4.0.2 (R Foundation for Statistical Computing).

RESULTS

Health Status and Concerns

Racial disparities are evident in self-reported overall health status among OCS respondents. Across the survey period, 27% of Black respondents rated their health as fair or poor compared to 15% of White respondents. Conversely, 55% of White respondents rated their health as very good or excellent compared to 43% of Black respondents (Appendix B).

Survey respondents' concerns about physical and mental health were steady, but high, throughout the period in which the OCS was in the field. Extreme concern for physical health was inversely related to income; as income rises, levels of extreme concern fall. Ohioans with incomes from 139% to 206% federal poverty level (FPL) were most likely to report being moderately to extremely concerned about physical health (45%), followed by those with incomes from 101% to 138% FPL (44%), at or below 100% FPL (40%), from 207% to 399% FPL (39%), and at or above 400% FPL (34%) (Figure 1). A similar pattern exists for mental health concerns (Appendix C).

Infection Control Behaviors

During the statewide stay-at-home (SAH) order (March 23, 2020, to May 1, 2020), 86% to 90% of respondents reported avoiding unnecessary trips outside of the house. While that proportion fell as businesses and facilities opened back up, 61% of respondents continued to largely stay at home in August 2020. Fewer than 8% of respondents reported attending gatherings of 10 or more people during the SAH period; 27% to 38% of respondents attended such gatherings between June 15, 2020, and August 24, 2020 (Figure 2).

Respondents in fair or poor health avoided unnecessary trips out of the home slightly more than their healthier peers (93% versus 87%, on average). By the end of August 2020, 87% of those in fair or poor health reported staying at home compared to 59% of those in good to excellent health (Appendix D). Black respondents consistently reported staying home at higher levels than their White peers (eg, 96% versus 85% the first week of May), but most weeks the differences were not statistically significant.

Mask wearing in indoor, public places was already relatively prevalent by the time the first county-level mandates went into effect in mid-July. Within the first 3 weeks of Ohio's phased reopening (May 1, 2020), 71% of respondents reported wearing masks in-

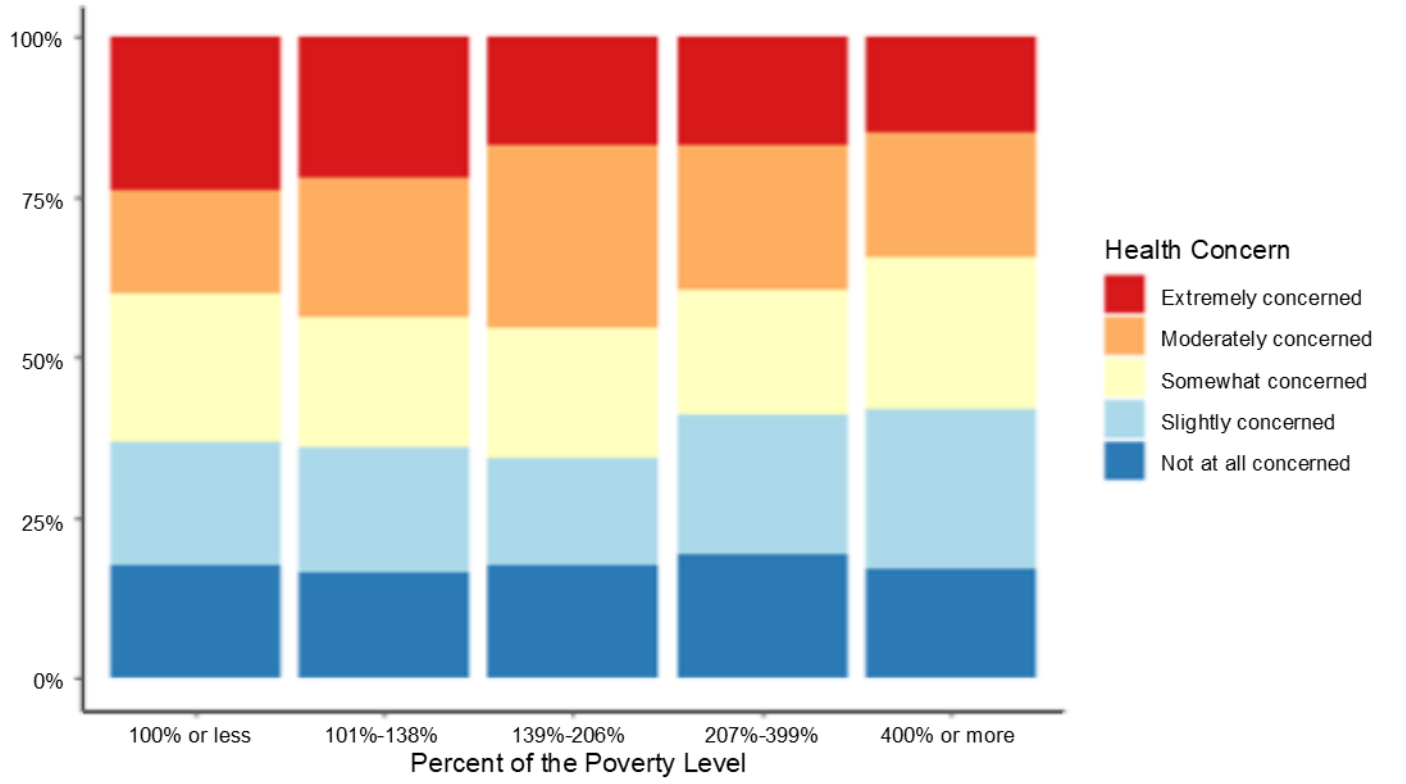

Figure 1. Concern for Physical Health by Income

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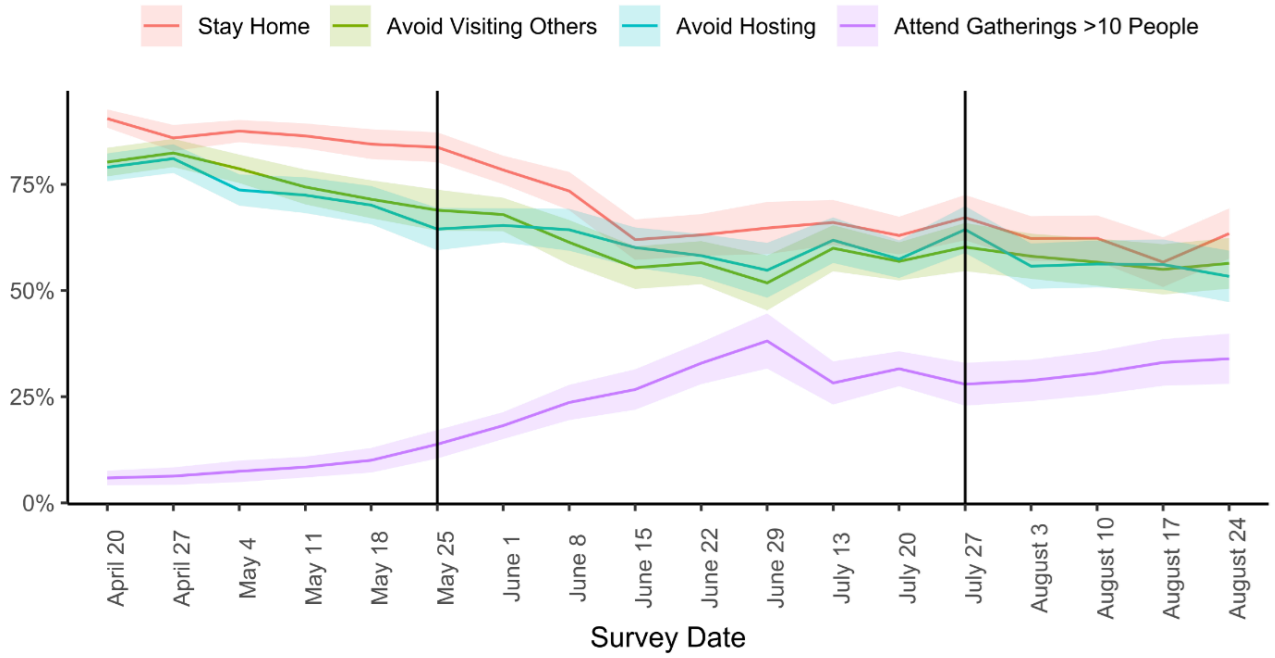

By May 25, 2020 (Memorial Day), restaurant dining, personal care services, campgrounds, and recreational centers were permitted to open, marking an important phase of Responsible Restart Ohio. By July 27, 2020, the entire state was operating under a mask mandate (issued July 23, 2020). Shaded bands represent 95% confidence intervals around central estimates, marked in solid lines.

Figure 2. Trends in Social Distancing Practices

doors. Close to 88% reported wearing masks after the first mandates went into effect in hard-hit counties (July 8-17, 2020). Once the statewide mandate went into effect (July 23, 2020) that number rose slightly (about 92%). Wearing a mask outdoors is much less prevalent, hovering around 22% (Figure 3).

While respondents aged 65 years and older were slightly more likely than those aged 19 to 64 years to wear masks indoors initially, significant differences among age groups disappeared by the middle of June 2020—before any mask mandates went into effect. While Black respondents consistently reported wearing masks (both indoors and outdoors) at higher levels than their White peers, the confidence intervals for those estimates are too large for us to report those differences as statistically significant.

Throughout the 3 waves of the survey, respondents in fair or poor health were more likely to get tested for COVID-19 (6% to 27%) than those in good, very good, or excellent health (2% to 17%). As testing at locations other than state-run sites has expanded, uninsured respondents have been getting tested at lower rates, and with slower growth, than their insured peers (Figure 4).

Employment

Between April 2020 and August 2020, roughly 1 in 7 respondents aged 19 to 64 years reported losing a job due to COVID-19, and 4 in 10 respondents reported being employed (Appendix E). A higher percentage of adults in more urban counties reported working compared to the rest of the state (Appendix F). The proportion of respondents working from home fell from nearly 15% in wave 1 to 10% in wave 3. Conversely, working outside the home and working both inside and outside increased respectively from 18% and 6% in wave 1 to 23% and 8% in wave 3 (Appendix G).

Employment and job loss varied by age, race, health, and income. Employment was highest among Ohioans aged 19 to 44 years (54%); this group also experienced more job loss due to COVID-19 (19%). In comparison, 45% of Ohioans aged 45 to 64 years reported being employed while 11% reported losing a job due to COVID-19 (Appendix H). More Ohioans of color reported losing a job due to COVID-19 (19%) compared to their White peers (12%) Appendix I). Employment is positively correlated with health as 56% of those in excellent health reported being employed compared to 48% of those in very good health, 36% of those in good health, 20% of those in fair health, and just 6% of those in poor health (Appendix J).

Employment is also positively correlated with income as more than half (56%) of respondents with incomes at or above 400% FPL reported being employed throughout the survey period compared to less than one-fourth (24%) of respondents living below the poverty line. Furthermore, low-income workers have been more susceptible to job loss due to COVID-19; 16%, 23%, 13.5%, and 12.5% of Ohioans in the lower income categories reported job loss compared to 9% of those with incomes at or above 400% FPL (Figure 5).

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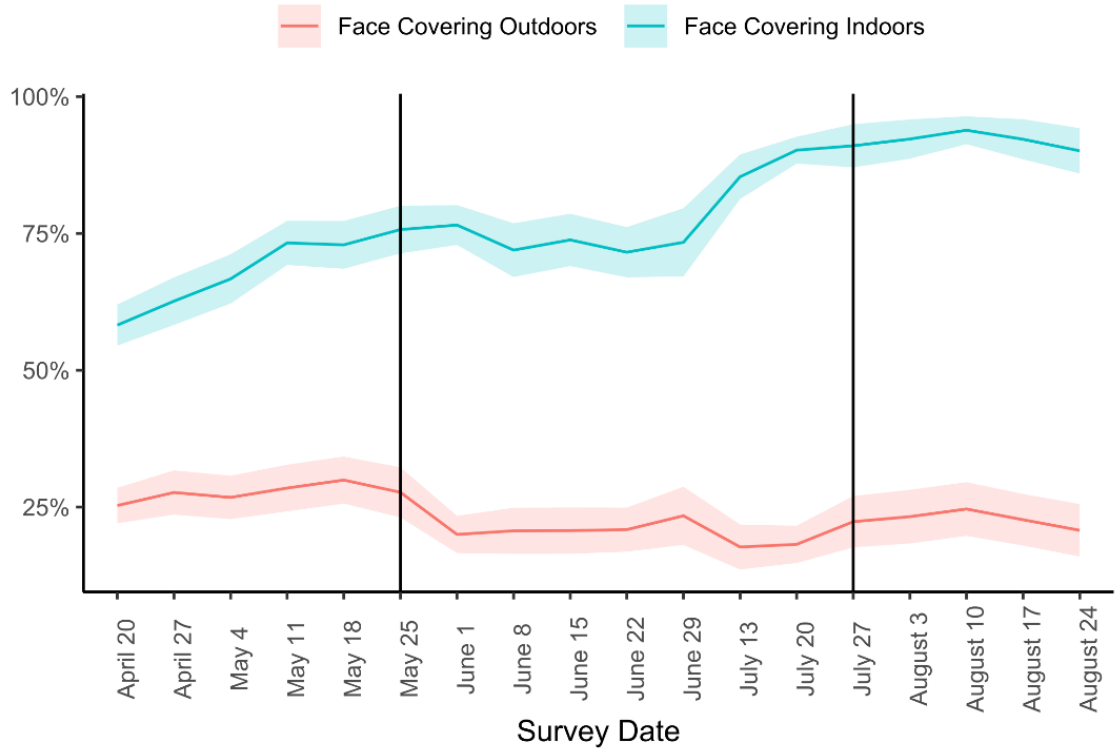

Figure 3. Mask Wearing Indoors Versus Outdoors

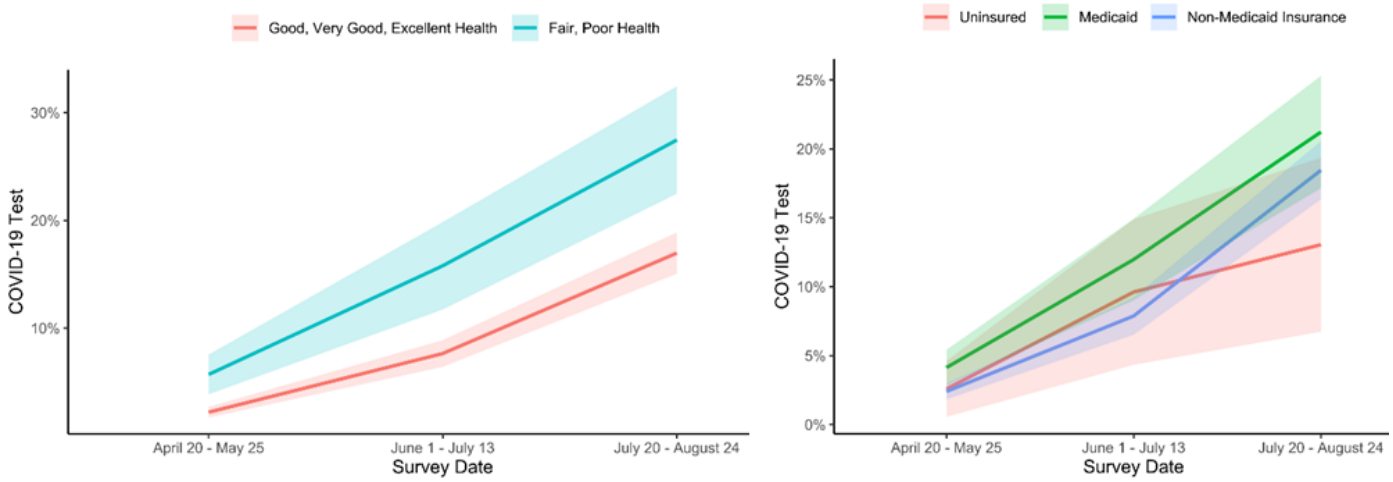

Figure 4. COVID-19 Testing by Health Status, Insurance Coverage

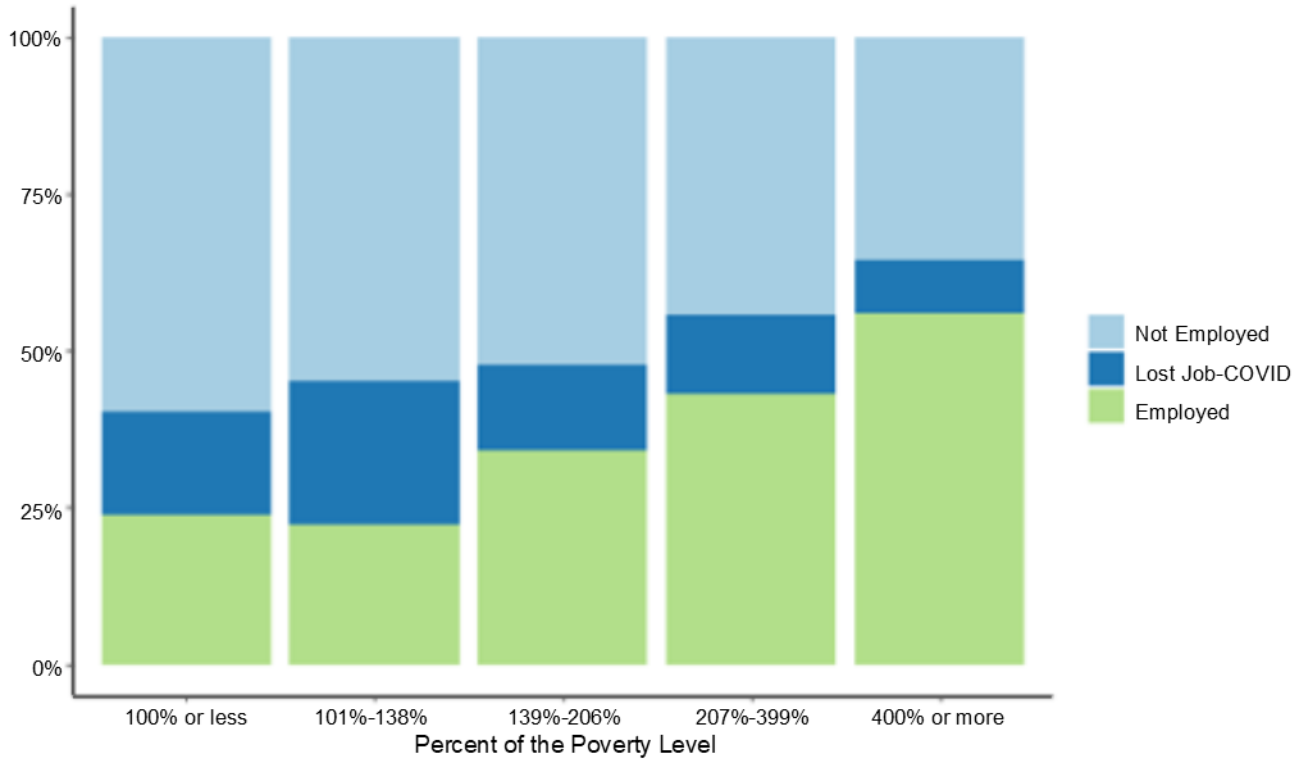

Figure 5. Employment Status by Income

Economic Concerns

Ohioans of color were more likely to report food insecurity than their White peers. For example, 35% of Black respondents reported worrying about running out of food in the last 30 days compared to 15% of White respondents (Appendix K).

There was a strong relationship between health and financial security. Compared to 25% of those in good, very good, or excellent health, 36% of those in fair or poor health reported being moderately or extremely concerned about being able to pay rent, mortgage, or utility bills for themselves or their family. Conversely, 49% of those in good, very good, or excellent health reported not being at all concerned about paying bills compared to 36% of those in fair or poor health (Appendix L).

Those with at least one child dependent in the home reported slightly higher but significant levels of concern for their personal finances than adult-only households; 21% of those with dependents reported extreme concern compared to 17% of those without, and 32% of those without dependents reported no concern at all compared to 25% of those with dependents (Appendix M).

DISCUSSION

These preliminary results provide valuable framing and data to the State about the pandemic and concurrent recession. One consistent, if unsurprising, result from the OCS is that **COVID-19 has put stress on people's health and financial well-being.** Respondents expressed high levels of concern for their physical and mental health as well as that of their families. We cannot make inferences about how much of that concern is attributable to the pandemic because the OCS went into the field in April 2020. However, a Kaiser Family Foundation poll from mid-July found that 53% of adults reported that worry and stress about the coronavirus specifically were harming their mental health.[2]

The National Bureau of Economic Research determined that the current recession began in the United States in February 2020 as COVID-19 began to spread but before issuance of public health orders and business closures.[3] In addition to job losses and reduction in work hours, respondents reported diminished consumer confidence and increased concern for their personal financial outlook. It has been useful to state leadership to see direct evidence of the connection between personal economic and health effects. One respondent made it quite clear: *"The loss of my job has impacted my family financially and left us uncertain about the future. This has also impacted our family's mental health."*

A second theme of the survey results is that **the pandemic has exacerbated existing health and economic disparities and inequities.** Historically marginalized, low-income, and medically vulnerable respondents were more likely to struggle with health-

related issues before the emergence of COVID-19 and are disproportionately experiencing mental and physical health stresses associated with the pandemic. These same groups are shouldering the disease burden of COVID-19. For example, Black and Latinx Ohioans are overrepresented in the state's caseload, hospitalizations, and deaths.[4] Low-income individuals, who are generally more likely to rate their overall health status as fair or poor,[5] also experience higher rates of COVID-19 infection and illness than their higher-income peers.[6]

These disparities and inequities are mirrored in economic indicators. Non-White, low-income, and Ohioans in poor health are more likely to report job loss (and therefore loss of income and perhaps health insurance) than their White, healthier, wealthier peers, reinforcing existing economic disparities. Black employment has been especially hard-hit. Ohioans of color, in poor health, or with low incomes are more likely to report concern about their food security, paying their bills, and personal financial outlook.

Consistent with national findings,[7] results from the OCS also suggest that marginalized and vulnerable groups have been somewhat more compliant with public health recommendations, despite being more likely to encounter barriers to compliance. For example, Ohioans in poor health generally report higher levels of mask wearing, staying at home, and physical distancing; they have also been more likely to get tested for COVID-19. However, these same groups face structural barriers; for example, Black (and Latinx) workers are more likely to have jobs in essential services that cannot be done from home,[8] and costs associated with testing can make it less accessible to low-income workers.[9]

Finally, findings from the OCS indicate that, despite well-publicized pushback among some, **the majority of Ohioans are listening to public health advice and adjusting to a "new normal" of public behavior**. Ohioans consistently reported maintaining 6 feet of distance between themselves and others since such measures were recommended in March 2020 (about 90%).

During the stay-at-home period (March 23, 2020, to May 1, 2020), Ohioans generally stayed home and avoided interacting closely with people outside their household. As the order ended and the summer holidays arrived, people mingled more. However, the majority of respondents continued to report staying home and avoiding gatherings throughout the survey period, noting the change from their normal behavior. *"I'm staying home more than I ever have in my entire life,"* and, *"[i]t's definitely been a change in lifestyle,"* are representative responses.

Wearing masks in indoor, public places gained traction relatively early in the pandemic period and steadily increased over time. Despite being the target of continued political discussion, recommendations and formal policy actions from state leadership appear to have played an important role in increasing mask wearing. On April 4, 2020, state leadership recommended to all Ohioans that they wear masks when in indoor, public places or in outdoor spaces where proper social distancing cannot be maintained. On July 5, the State announced mask mandates would go into effect in counties with very high or severe exposure.[10] On July 23, 2020,a statewide mask mandate went into effect. Each of these events correlate with increases in reported mask wearing.

The OCS shares the standard survey limitations; namely, the results are sensitive to self-report issues, particularly with regard to infection control behaviors. For example, it is likely that social desirability bias is in play regarding mask wearing and avoiding gatherings, resulting in overreporting of those behaviors. However, such a pattern would also reflect that people are aware of what behaviors are recommended and see value in reporting their compliance.

PUBLIC HEALTH IMPLICATIONS

This work raises 3 broad public health implications for Ohio. First, the need for near real-time tracking of the pandemic's effects remains. Tracking through the OCS is expected to continue through at least the middle of 2021 as Ohio rolls out its COVID-19 vaccination efforts. The second iteration of the survey (fall 2020) piloted approaches to track COVID-19 testing and influenza vaccinations that will be refined to produce estimates of COVID-19 vaccination uptake in Ohio.

Second, the smaller sample sizes used for rapid, weekly estimates produce limited precision for county-level estimates. In March and April of 2020, data were limited to a few, outdated federal surveys while case counts escalated daily. The OCS filled this void and created ongoing statewide and regional estimates. However, local health departments faced the same problem as state decision makers in the early days of the pandemic. Surveys are too expensive to produce rapidly updated estimates for all counties, but the pandemic has accentuated the need for developing a low cost, dynamic data source for local public health decision makers.

Third, the same data challenge that prevents county-level estimates from the OCS also hinders monitoring of public health disparities. The differential health and economic impacts of the pandemic are a key finding emerging across the pandemic-related literature. Historically marginalized populations have faced both the greatest mortality and economic losses. Healing the health and economic wounds left by the pandemic will first require efforts monitoring the recovery to include specific mechanisms to measure the long-term impacts of the pandemic on disadvantaged groups.

This paper summarized and highlighted some key findings from the OCS regarding Ohioans' health, health behaviors, and household economics in the initial months of the pandemic and concurrent recession. Ohioans are struggling with what the pandemic and recession mean for themselves and their families, expressing intersecting concerns about their physical, mental, and financial health and highlighting the connection between public health and the economy. While headlines have largely perpetuated a narrative

about political resistance to public health orders, results from the OCS indicate that most Ohioans have adapted to a new normal in which social distancing, mask wearing, and sensitivity to public health issues are everyday practices.

In contrast to other states that were not among the first epicenters of the COVID-19 pandemic, Ohio's leadership emphasized the role of individual infection control behaviors early on. State leadership recommended maintaining at least 6 feet of distance and increasing hygiene practices on March 8, 2020. Several infection control behaviors, such as mask wearing and distancing, were included as requirements for businesses and other facilities to reopen under the Responsible Restart Ohio plan. These requirements remain in place at the time of this report's publication. Public health recommendations and requirements are an important part of the picture of Ohioans' infection control behaviors during the pandemic. (See Appendix N for a timeline of important ordinances and events in Ohio's COVID-19 response.) Although Ohio continues to grapple with pandemic response, the long-term impacts of the pandemic are beginning to emerge and will loom large as increased attention shifts to recovery.

ACKNOWLEDGMENTS

The authors would like to thank the Ohio COVID-19 Survey research team, including Thomas Albani, Robert Ashmead, Michael Nau, Alicia Rooney, Hilary Rosebrook, Tim Sahr (GRC); Marcus Berzofsky, Meagan Brackin, Tom Duffy, Naomi Freedner, TJ Nesius, Dain Palmer, Jean Robinson, Dave Schultz, and Caroline Scruggs; and Dr. Bo Lu (OSU College of Public Health). Additionally, we thank Francis Anagbonu for his additional research support.

Funding. The OCS data collection is funded by the Ohio Department of Health and Ohio Department of Medicaid.

Disclosures. The authors declare that they have no conflict of interest.

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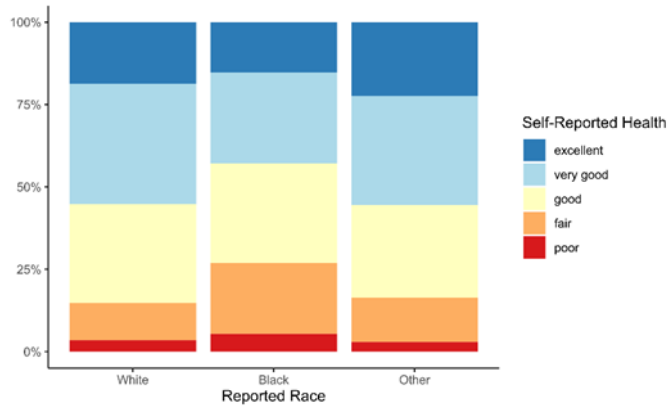
APPENDIX A. Respondent Demographics

Category	Total Responses	% of Total Responses
	17 032	*may not total 100% due to rounding*
Age		
19-44	4530	26.6%
45-64	6779	39.8%
65+	5723	33.6%
Race		
Black	1843	10.8%
White	14 479	85%
Asian	185	1.1%
Other	304	1.8%
Missing, don't know, refuse	221	1.3%
Ethnicity		
Hispanic	334	2.0%
Not Hispanic	16 636	97.7%
Missing, don't know, refuse	62	0.3%
Income		
<101%	2553	15.0%
101-138%	1058	6.2%
139-206%	2036	12.0%
207-400%	4526	26.6%
>400%	6859	40.3%
Gender		
Female	9580	56.2%
Male	7452	43.8%
Child Dependent in Home		
Yes	12 238	71.9%
No	4794	28.1%

APPENDIX B. Health Status by Race



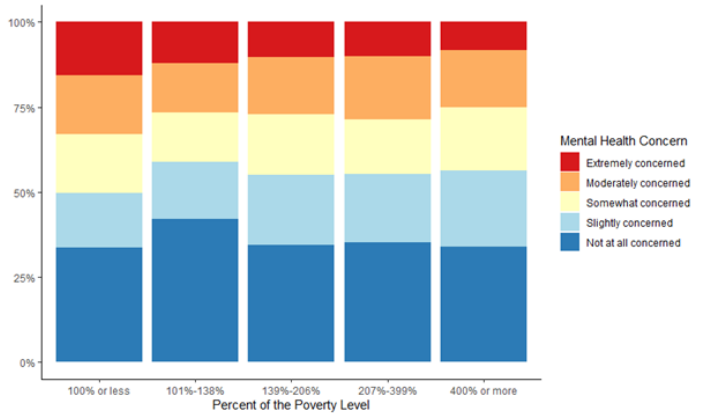
Federal Poverty Guidelines

Table 2. Federal Poverty Guidelines, 2020

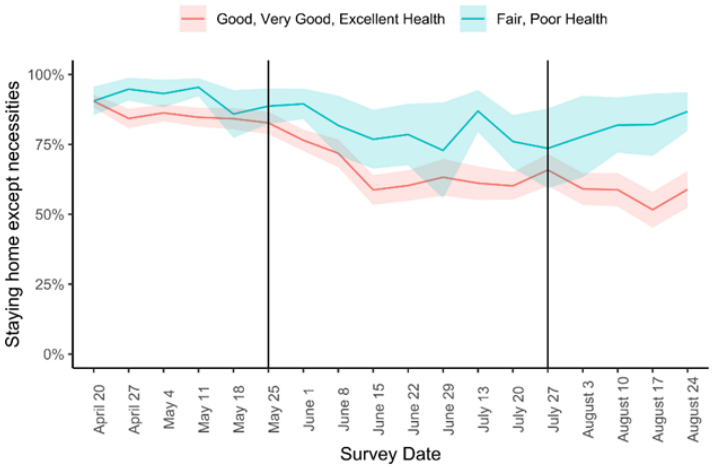
Household size % FPL	**1**	**4**
100%	$12 760	$26 200
138%	$17 609	$36 156
206%	$26 286	$53 972
400%	$51 040	$104 800

Source: Federal Registrar

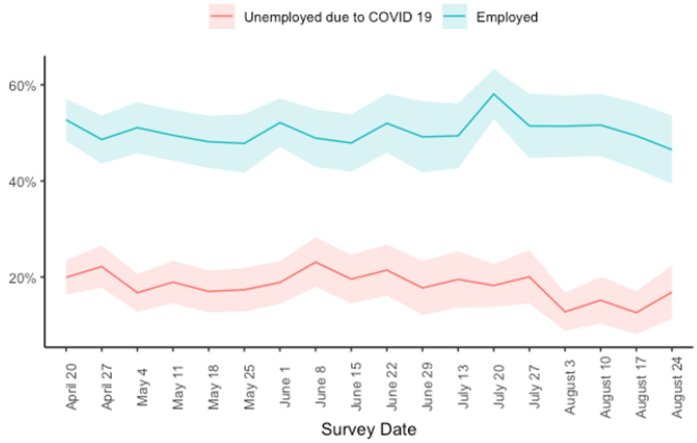
APPENDIX C. Mental Health Concerns by Income



APPENDIX D. Staying at Home by Health Status



APPENDIX E. Employment and Job Loss Due to COVID-19, Adults 19-64



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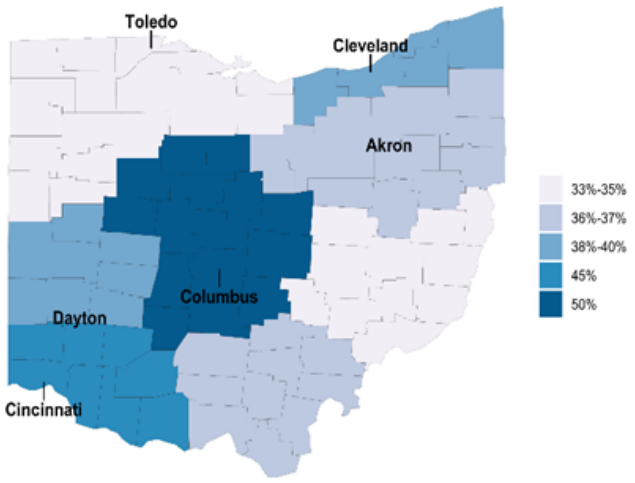
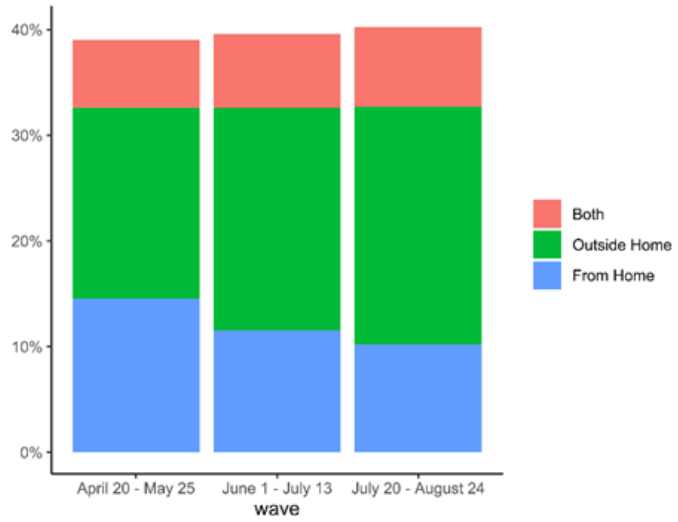
APPENDIX F. Regional Employment

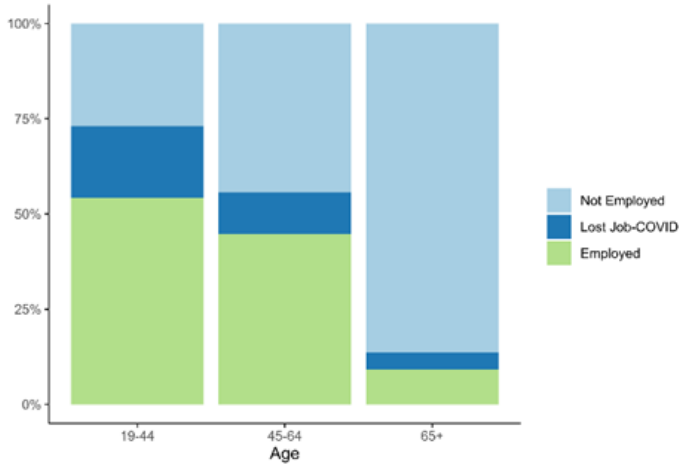


Ohio's regions: Central (Columbus), Northeast (Cleveland), Northeast Central (Akron), Northwest (Toledo), Southeast (Zanesville), Southeast Central (Portsmouth, Athens), Southwest (Cincinnati), West Central (Dayton).

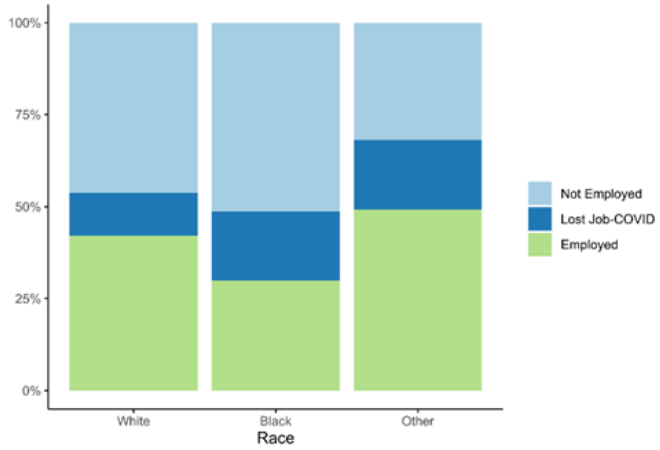
APPENDIX G. Working Location



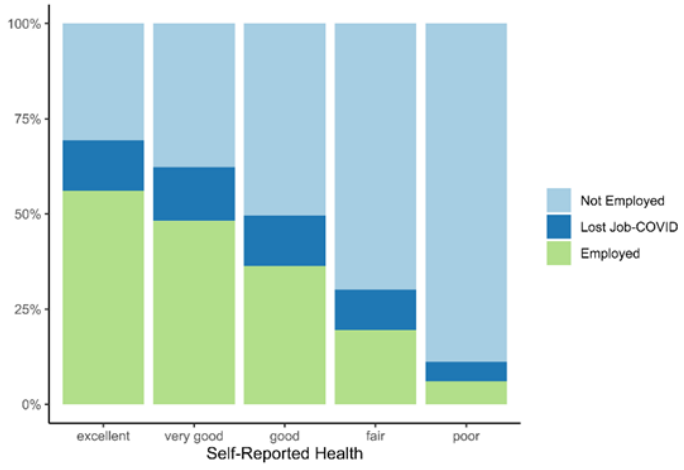
APPENDIX H. Employment Status by Age



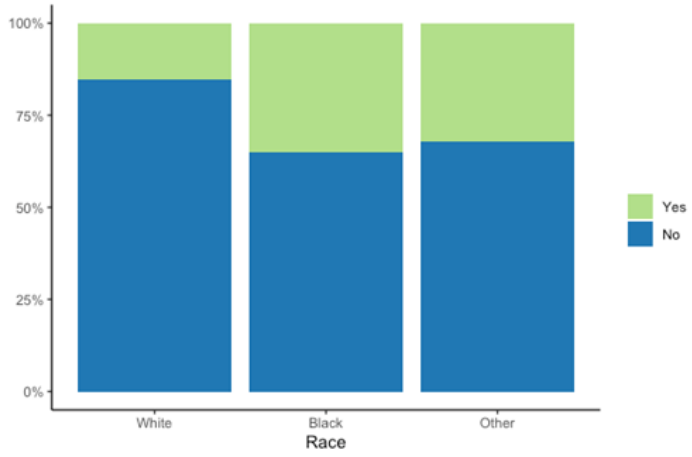
APPENDIX I. Employment Status by Race



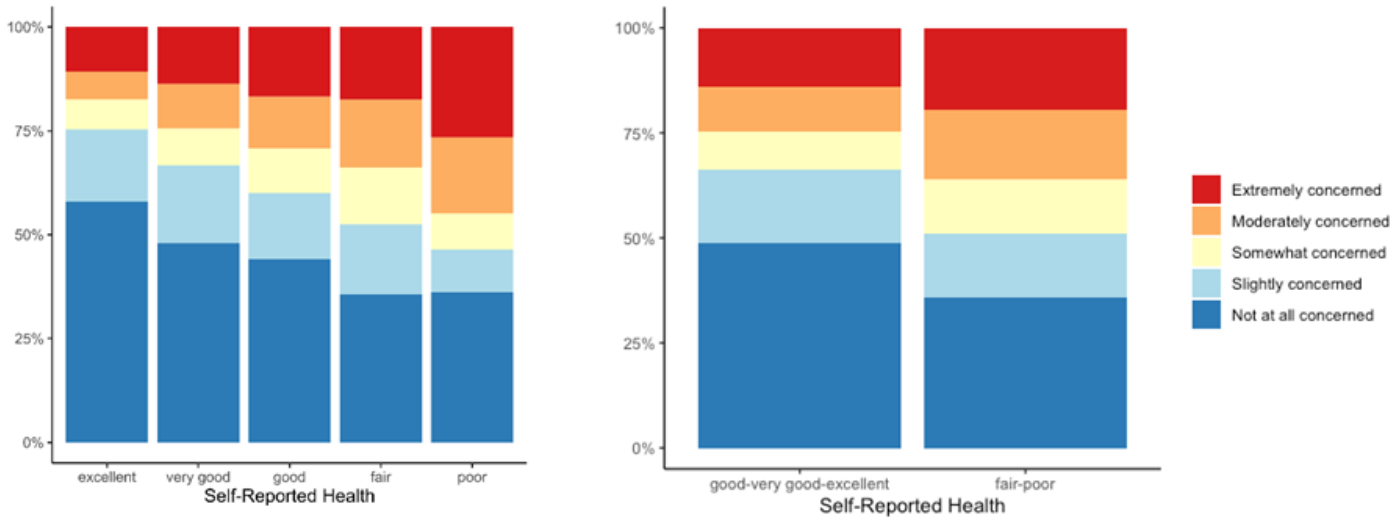
APPENDIX J. Employment Status by Health



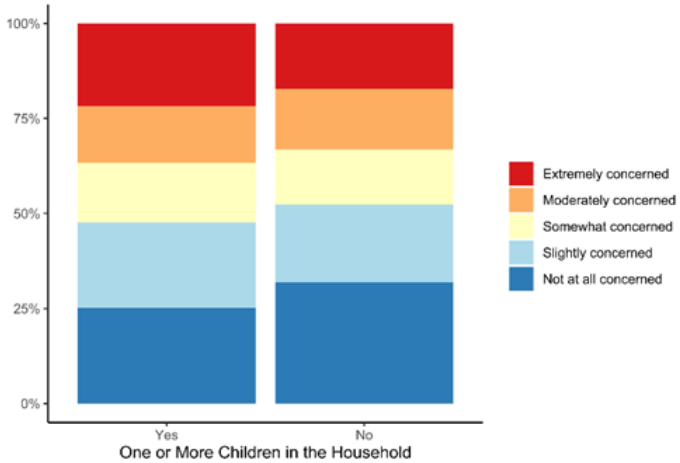
APPENDIX K. In the Last 30 Days Worried That Food Would Run Out by Race



APPENDIX L. Concerns About Paying Bills by Health Status



APPENDIX M. Concern About Personal Finances



Ohio Journal of Public Health, June 2021, Vol. 4, Issue 1 ISSN: 2578-6180

APPENDIX N. Timeline of Selected Public Health Orders, 2020

February 12	First Ohio case reported
March 8	Recommendation: Social distancing and enhanced hygiene
March 9	**State of Emergency (ongoing)**
March 14	Closure of K-12 schools
March 15	Closure of bars, restaurants (dine-in and patio)
March 17	First confirmed Ohio death
March 17	**Prohibition on mass gatherings (50 or more people) (ongoing)**
March 20	Closure of personal care services
March 23	Stay-at-home order goes into effect Closure of campgrounds Closure of recreational centers
March 25	Closure of child care facilities
April 4	Recommendation: masks in public places
May 1	Responsible Restart Ohio / phased reopening begins
May 15	Patio dining may resume * Personal care services may resume *
May 21	Dine-in service may resume * Campgrounds may reopen *
May 25	Memorial Day
May 26	Recreational centers may reopen *
May 31	Child care facilities may reopen *
June 5	Bars may reopen *
June 11	Dr. Acton resigns as Director of Ohio Department of Health
June 30	Reopening of K-12 schools (end of school year)
July 4	Independence Day
July 8	Mask orders go into effect in Butler, Cuyahoga, Franklin, Hamilton, Huron, Montgomery, Trumbull Counties
July 10	Mask orders go into effect in Clermont, Fairfield, Lorain, Pickaway, Summit, Wood Counties
July 17	Mask orders go into effect in Allen, Athens, Delaware, Licking, Lucas, Richland, Scioto, Union Counties
July 23	**Statewide mask order goes into effect (ongoing)**
September 7	Labor Day

* All reopenings occur under social distancing, capacity, and hygiene guidelines
Source: Center for Health Outcomes and Policy Evaluation Studies (HOPES) summary of health and executive orders (coronavirus.ohio.gov)