Report – July 2022

UFCW Essential Worker Health Survey

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❶ Introduction

The COVID-19 pandemic has resulted in unprecedented global morbidity and mortality, yielding substantial disruptions in human social and economic structures. Early in the pandemic, U.S. government and business entities implemented a range of precautions to limit close human interactions and thus, the person-to-person spread of the SARS CoV-2 virus, the cause of COVID-19. These measures often included shuttering of congregate settings like offices, schools and many retail and business workplaces, with a shift to home-based remote work for people whose jobs allowed. However, essential industries whose products and services are deemed critical to public safety, health, national security, and societal function were obligated to maintain productivity and therefore, required the physical presence of millions of employees(1-3). Remote work is simply not feasible for the 30 to 50 million workers who are estimated to fall into an “essential” category (although no formal definition of “essential” work exists), including health care workers, teachers, local government workers in police, emergency management, water and energy delivery, as well as a wide array of manufacturing, food service and production, and retail workers(4, 5). This latter group of workers are often overlooked in their “essential” capacity with respect to their exposure and vulnerability to COVID-19 infection(1, 3). Unlike health care workers or teachers, they are typically working in high turnover jobs (grocery, food service and retail workers) and/or have low public visibility (meatpackers, food production), yet are in close contact with the public and/or co-workers, thus escalating their risk for acquiring SARS CoV-2. Racial and ethnic minorities, as well as immigrants, are overrepresented in the frontline worker pool, exacerbating their already increased risk of COVID-19 illness(4-7). Few studies have examined the attitudes and evolving understanding of the COVID-19 pandemic within this group of essential workers.

Since the beginning of the pandemic, the United Food and Commercial Workers International (UFCW) union, which represents a large proportion of essential

workers with almost a million members in the food service and production and retail sales industries, has taken an active role in encouraging employers to implement stronger workplace safety measures for the protection of their frontline employees. Additionally, the UFCW initiated an aggressive educational campaign through local meetings, and social media and print communications, to make members aware of the hazards of COVID-19 and the steps needed to protect themselves from illness. To better understand union members' attitudes, reactions, and perceptions of how employers, co-workers and the public have responded to the pandemic, the UFCW partnered with researchers at the University of Nebraska Medical Center Colleges of Medicine and Public Health in the spring of 2021 to create the UFCW Essential Worker Health Survey (EWHS). Between June 2021 and May 2022, the EWHS included a longitudinal series of monthly surveys of UFCW members across the country, with the primary goal of having a better understanding as to how the COVID-19 pandemic was affecting their work life, personal health, personal behavior and attitudes about COVID-19 and vaccination, and employer responses to the pandemic threat. Specific aims were to determine: 1) the frequency, severity, duration, and work impact of COVID-19 illness among respondents; 2) employer safety measures, mandates, and specific support measures to workers during the pandemic; and 3) attitudes toward and uptake of COVID-19 vaccinations as they were rolled out in spring 2021, going forward. These project aims were pursued over the course of a year during the COVID-19 pandemic with reiterative monthly surveys. Thus, the surveys were performed in the context of ever-changing real-world consequences in health, occupation, and quality of life as new infectious COVID-19 variants surged, as state and local mandates waxed and waned, and as the demand for services provided by UFCW members fluctuated with consumer behavior.

❷ Methods

Survey population

Survey participants were recruited from UFCW membership rosters provided by the UFCW international headquarters, which has registered an estimated million individual members throughout the U.S. UFCW has direct access to approximately two-thirds of their members' mobile phone numbers that were used for initial survey invitations. In April 2021, UFCW staff manually sent an individual text message invitation to sign up for the EWHS via the Hustle software platform to approximately each of their 650,000 U.S. members with mobile phone numbers. They also advertised the surveys via email newsletters and social media. Members enrolled in the EWHS electronically at https://www.ufcw.org/actions/campaign/essentialworkerstudy/ by providing their contact information and preference, age, sex at birth, occupation, and COVID-19 infection and vaccination status (Appendix S1).

All individuals who signed up for the EWHS then received a text created through the Phone2Action software inviting them to click on a unique link and complete a short survey. The initial survey text was sent Wednesday, June 23, 2021, and then other surveys sent every four weeks thereafter, from June 2021 through May 2022, for a total of 12 surveys. An example text from December 8, 2021, was the following: "UFCW Essential Worker Survey Participants: Survey #7 is LIVE. Share any concerns about the new COVID variant & workplace safety this holiday season: [short survey URL]" For the May 2022 survey, an additional personalized text was manually sent to all who enrolled online as a final effort to get responses on items summarizing the past year of the surveys.

Survey Distribution

The surveys were created using Typeform, an online survey creation platform, which are easy to complete on a smartphone or computer as the screenshot shows (Figure 1). Because the Phone2Action text messages to UFCW members did not directly contain unique identifiers, each survey asked for the participant to enter their phone number so we could match respondents to prior surveys. Results from each survey were available in aggregate for the teams to review immediately as they came in. Final data from each survey were exported to an analytical data set for analyses.

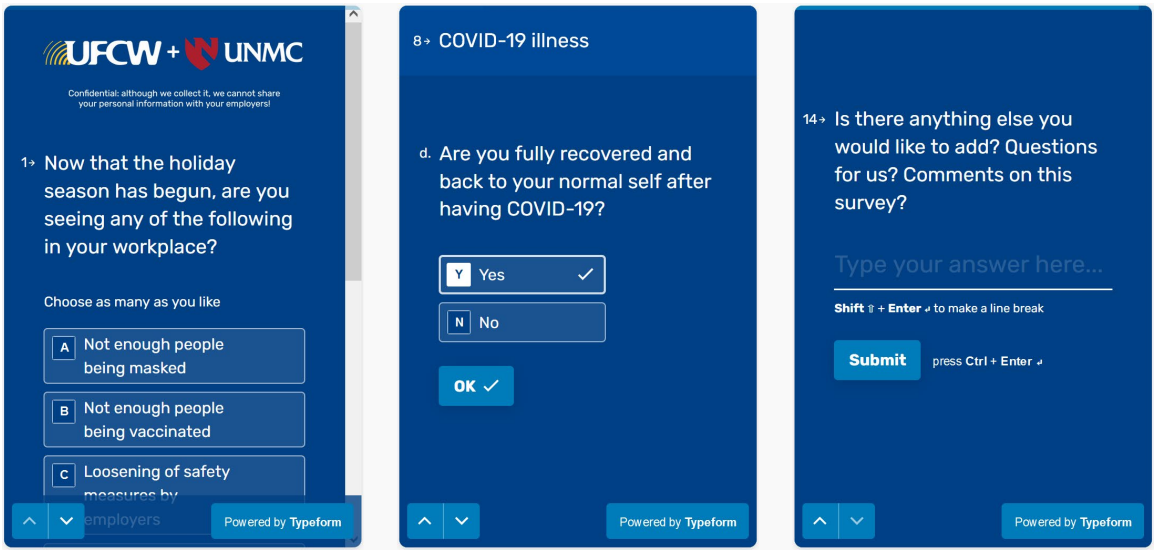

Figure 1. *Smartphone screenshots of monthly survey items from December 2021.*

Data Collected

Each of the 12 monthly surveys included some questions that were repeated each month, some that were asked only once and others that were newly added in each month, depending on changing features of the COVID-19 pandemic, vaccine availability and recommendations for non-pharmaceutical interventions in society and at workplaces. Questions were added and/or re-asked to gauge the participants' attitudes and experiences over the course of the pandemic.

The UNMC investigators and UFCW Communications department personnel met by zoom weekly to review data from the prior month's results and decide on questions for the next month. Appendix S2 contains a data dictionary table of items asked and rules for when they were asked depending on prior responses. When possible, we created multiple choice responses to reduce the overall amount of free text comments, though the latter were encouraged for gathering participant opinions.

Two core questions/outcomes were repeated monthly: a) "Have you ever tested positive for, or been told you have, COVID-19?" and b) "Have you ever received a COVID-19 vaccine?" A "yes" answer to either question triggered specific follow-up questions for that participant, including whether the event occurred in the last month. This timing question allowed us to distinguish recent events or vaccinations from prior. [Appendix S2] Our primary outcome of interest was incident COVID-19 infection (in the past month) and secondary outcome was incident COVID-19 vaccination (in the past month).

Basic descriptive results from these items were highlighted along with short text answers to selected common questions about COVID-19 and the pandemic, provided by Dr. Alison Freifeld, an infectious diseases physician in a monthly newsletter texted to participants. This newsletter was also available to full UFCW membership on the union website. See Appendix S6 for example newsletter.

Statistical Analyses

The responses for each monthly survey were checked for consistency and clarity prior to aggregation with the responses from previous months. For all individual questions, results were reported each month as either frequencies and percentages for categorical measures or means and standard deviations for continuous measures. A question utilization matrix was used to track which questions were included on each monthly follow-up survey and to allow for quick

reference of where data trends may be examined. Crosstabulations were used to evaluate possible associations between respondent characteristics and question responses.

We constructed two sets of multivariable regression general estimating equation (GEE) models to better understand characteristics associated with the primary outcome, incident COVID-19 infection, treated as dichotomous outcome of a new infection within the past month (April-June for June survey, April-July for July survey). Explanatory variables included categorical variables for age, sex, grocery store worker (yes/no), census region (Northeast, South, Midwest, West), survey month, and vaccination status. The second set of models also includes an indicator for whether the subject reported ever having COVID-19 at the time of their baseline (P2A) survey. An exchangeable correlation structure was assumed within each set of responses (ranging from 1-8) from each person. To alleviate problems (e.g., perfect prediction) coming from the small number of persons in the 80+ age category, these persons were combined with the 50-79 age group to create a 50+ age group. For models with interactions, similar problems were arising from the small numbers of persons aged 16-24 within individual months, so age was dichotomized to a 50+ indicator variable.

Similarly, we created two sets of GEE models for our secondary outcome, new vaccination, a dichotomous outcome of new vaccination within the past month. Explanatory variables included categorical variables for age, sex, grocery store worker (yes/no), census region (Northeast, South, Midwest, West), and survey month. The second set of models also includes an indicator for whether the subject reported ever having COVID-19 at the time of their baseline survey. An exchangeable correlation structure was assumed within each set of responses (ranging from 1-6) from each person.

❸ Results

Survey Participants

Among around 650,000 UFCW members were contacted via the Hustle software platform in April 2021, and 17,414 participants completed the online registration form for the EWHS. Of these, 22.6% reported ever having a positive COVID-19 test and 73.9% reported having received at least one vaccination. In addition, 19% preferred email communication and 1% preferred non-English language for follow-up. All registered participants received a EWHS survey each month thereafter (Figure 2). In June 2021, 5,764 people completed the survey and the participation decreased most months to a low of 1,674 in March 2022.

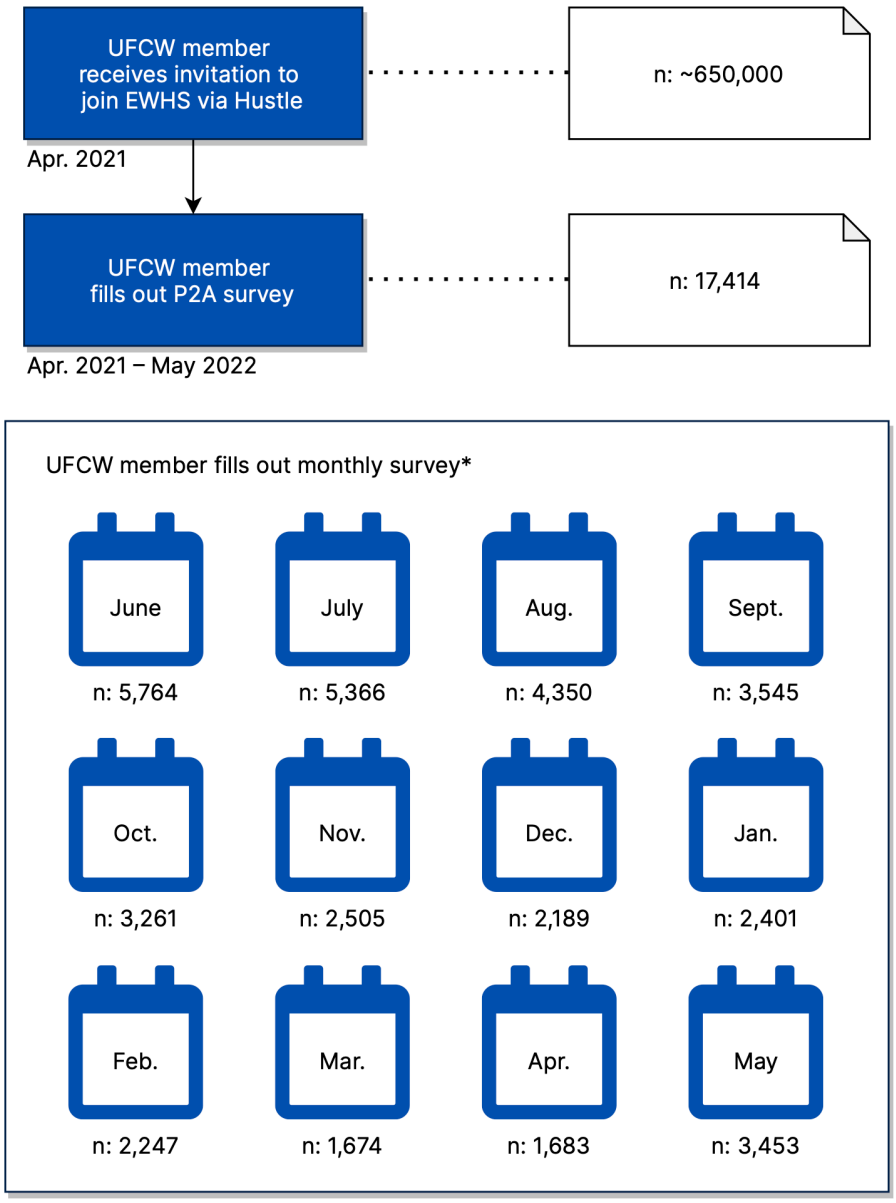

Figure 2. *Flow diagram of participation in EWHS. May 2022 had an additional P2A text reminder to help increase the number of responses.*

Across the survey period, 9,619 individuals participated in the monthly surveys, although respondents completed different numbers of surveys. For example, 3,238 (31%) completed only one survey while 140 (1.4%) completed all 12. In all, 44,561 surveys were completed for analysis. Table 1 shows the number of

monthly surveys completed by those who completed at least one monthly survey. An additional 7,223 people only completed the baseline survey and up to 707 people completed monthly surveys but could not be matched to a baseline survey.

Table 1. Frequency count of total participants matched to baseline survey by monthly surveys completed.

Surveys	Freq.	Percent	Cum.
1	3,238	31.46	31.46
2	1,918	18.63	50.09
3	1,336	12.98	63.07
4	920	8.94	72.01
5	657	6.38	78.39
6	538	5.23	83.62
7	424	4.12	87.74
8	349	3.39	91.13
9	278	2.70	93.83
10	278	2.70	96.53
11	217	2.11	98.64
12	140	1.36	100.00
Total	**9,619**	**100**	

While UFCW members come from all over the U.S., the location of participation highlights areas likely to have the largest density of membership in Figure 3.

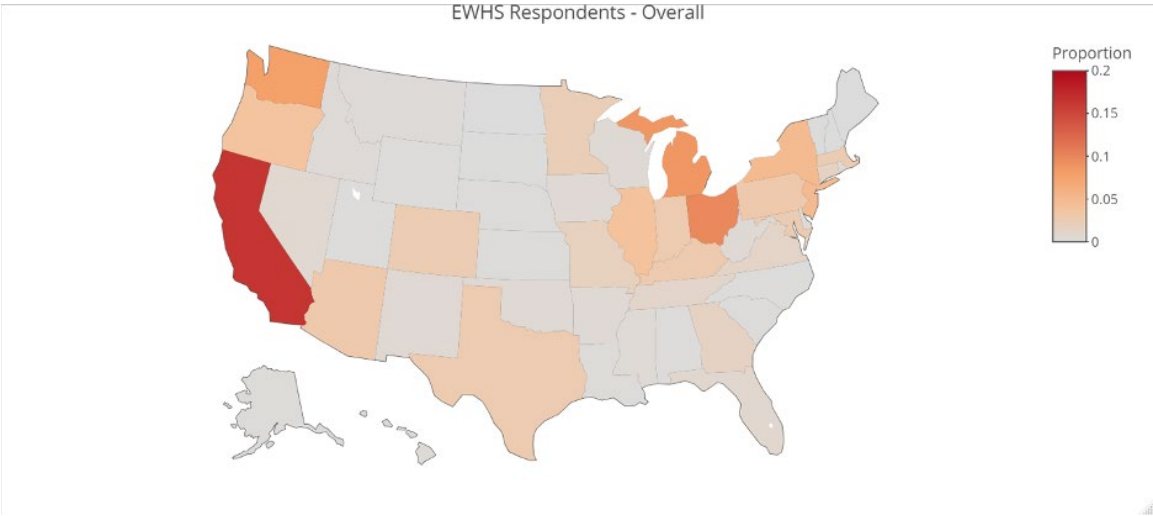

Figure 3. *U.S. heat map of survey respondents by state.*

Of those who completed the baseline survey, 47% reported they were age 50 years or greater, two-thirds were female, and two-thirds worked in the West or Midwest United States. Representation by occupation was dominated by grocery workers, with 73% of respondents indicating they worked in grocery, while most of the rest were workers in health care 8%, meatpacking and processing 3%, and other food packing 2%. The older age group (50+ years) and grocery occupation increased in respondent proportion over time, while most other participant characteristics remained steady (Table 2).

The proportion of participants in the EWHS versus the overall UFCW membership varied by state and demographic, as made visual in Figure 4 heat map. This showed a higher ratio of EWHS participants from North Dakota and much fewer in the great plains, North Carolina, and Maine. Some of these ratio differences were based on very small actual differences; for example, while it had the largest ratio, there were only 2 EWHS respondents from North Dakota (0.02%), which had 3x the percentage of UFCW members there (0.007%). These differences are shown in greater detail by sex and age in Appendix S3.

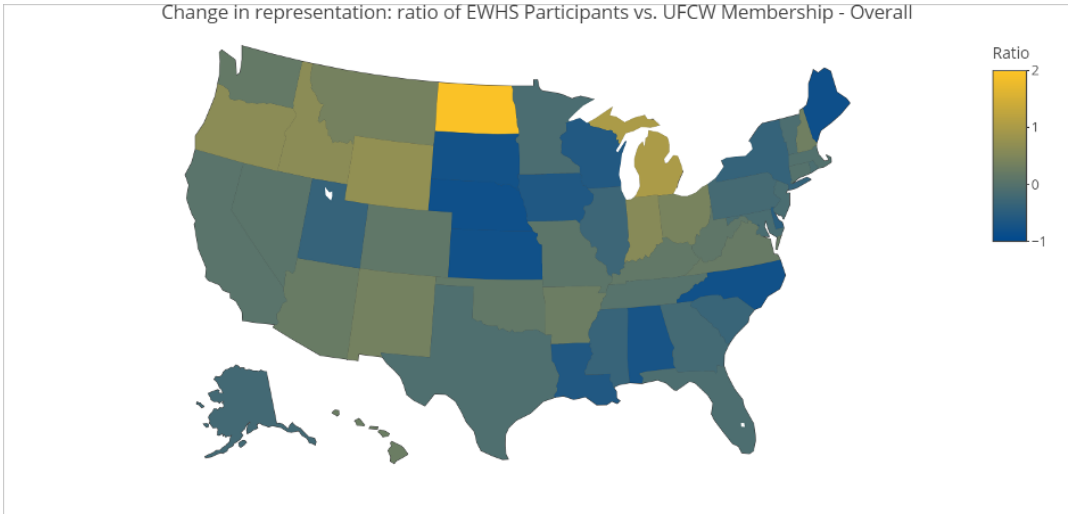

Figure 4. *U.S. heat map representing ratio of EHWS participants vs. UFCW membership.*

Table 2. Demographics by survey response

	Enrollment N=17414	Monthly Follow-Up Surveys							
		Jun 2021 N=5678	Jul 2021 N=5202	Aug 2021 N=4111	Sep 2021 N=3211	Oct 2021 N=3132	Nov 2021 N=2422	Dec 2021 N=2189	Jan 2022 N=2479
Age Category (N)	(17414)	(5583)	(5101)	(4031)	(3155)	(3058)	(2359)	(2132)	(2398)
16-24	2151 (12)	471 (8)	341 (7)	205 (5)	137 (4)	104 (3)	57 (2)	59 (3)	76 (3)
25-49	6909 (40)	2200 (39)	1898 (37)	1422 (35)	1175 (37)	1017 (33)	772 (33)	686 (32)	796 (33)
50-79	8310 (48)	2899 (52)	2850 (56)	2394 (59)	1831 (58)	1928 (63)	1522 (65)	1382 (65)	1521 (63)
80+	44 (0)	13 (0)	12 (0)	10 (0)	12 (0)	9 (0)	8 (0)	5 (0)	5 (0)
Sex assigned at birth (N)	(17414)	(5583)	(5101)	(4031)	(3155)	(3062)	(2367)	(2136)	(2398)
Female	11486 (66)	3853 (69)	3556 (70)	2821 (70)	2230 (71)	2144 (70)	1656 (70)	1481 (69)	1703 (71)
Male	5928 (34)	1730 (31)	1545 (30)	1210 (30)	925 (29)	918 (30)	711 (30)	655 (31)	695 (29)
Region (N)	(17364)	(5554)	(5071)	(4007)	(3140)	(3048)	(2361)	(2134)	(2385)
Northeast	3102 (18)	1024 (18)	962 (19)	717 (18)	598 (19)	570 (19)	422 (18)	410 (19)	476 (20)
South	2710 (16)	831 (15)	724 (14)	621 (16)	507 (16)	462 (15)	328 (14)	329 (15)	359 (15)
Midwest	5235 (30)	1846 (33)	1636 (32)	1283 (32)	986 (31)	937 (31)	737 (31)	658 (31)	731 (31)
West	6317 (36)	1853 (33)	1749 (34)	1386 (35)	1049 (33)	1079 (35)	874 (37)	737 (35)	819 (34)
Occupation (N)	(17413)	(5583)	(5101)	(4031)	(3155)	(3062)	(2367)	(2136)	(2398)
Cannabis	58 (0)	14 (0)	9 (0)	7 (0)	8 (0)	9 (0)	3 (0)	3 (0)	5 (0)
Chemical	48 (0)	12 (0)	10 (0)	9 (0)	5 (0)	7 (0)	5 (0)	6 (0)	5 (0)
Distillery (wine, spirits, beer)	125 (1)	36 (1)	30 (1)	27 (1)	25 (1)	26 (1)	11 (0)	14 (1)	13 (1)
Food packing (non-meat)[a]	368 (2)	98 (2)	95 (2)	66 (2)	46 (1)	52 (2)	44 (2)	26 (1)	51 (2)
Grocery store	12657 (73)	4260 (76)	3861 (76)	3106 (77)	2402 (76)	2363 (77)	1821 (77)	1677 (79)	1872 (78)
Health care	1402 (8)	400 (7)	361 (7)	293 (7)	239 (8)	225 (7)	166 (7)	135 (6)	165 (7)
Meat packing and processing	564 (3)	149 (3)	150 (3)	94 (2)	74 (2)	72 (2)	52 (2)	44 (2)	51 (2)
Retail (non-grocery)	990 (6)	309 (6)	289 (6)	220 (5)	178 (6)	149 (5)	139 (6)	118 (6)	122 (5)
Other	1201 (7)	305 (5)	296 (6)	209 (5)	178 (6)	159 (5)	126 (5)	113 (5)	114 (5)

Table 2 (cont.)

	Enrollment N=17414	Monthly Follow-Up Surveys			
		Feb 2022 N=2188	Mar 2022 N=1640	Apr 2022 N=1664	May 2022 N=3422
Age Category (N)	(17414)	(2134)	(1604)	(1637)	(3327)
16-24	2151 (12)	54 (3)	46 (3)	34 (2)	135 (4)
25-49	6909 (40)	661 (31)	484 (30)	510 (31)	1080 (32)
50-79	8310 (48)	1414 (66)	1069 (67)	1086 (66)	2101 (63)
80+	44 (0)	5 (0)	5 (0)	7 (0)	11 (0)
Sex assigned at birth (N)	(17414)	(2134)	(1604)	(1637)	(3327)
Female	11486 (66)	1494 (70)	1133 (69)	1156 (71)	2339 (70)
Male	5928 (34)	640 (30)	471 (31)	481 (29)	988 (30)
Region (N)	(17364)	(2121)	(1598)	(1633)	(3314)
Northeast	3102 (18)	381 (18)	302 (19)	289 (18)	596 (18)
South	2710 (16)	325 (15)	232 (15)	220 (13)	515 (16)
Midwest	5235 (30)	620 (30)	489 (31)	527 (32)	1021 (31)
West	6317 (36)	795 (37)	575 (36)	597 (37)	1182 (36)
Occupation (N)	(17413)	(2134)	(1604)	(1637)	(3327)
Cannabis	58 (0)	2 (0)	4 (0)	2 (0)	6 (0)
Chemical	48 (0)	4 (0)	5 (0)	4 (0)	6 (0)
Distillery (wine, spirits, beer)	125 (1)	10 (0)	11 (1)	9 (1)	14 (0)
Food packing (non-meat)[a]	368 (2)	31 (1)	34 (2)	38 (2)	68 (2)
Grocery store	12657 (73)	1681 (79)	1246 (78)	1263 (77)	2551 (77)
Health care	1402 (8)	148 (7)	109 (7)	108 (7)	239 (7)
Meat packing and processing	564 (3)	46 (2)	36 (2)	34 (2)	85 (3)
Retail (non-grocery)	990 (6)	104 (5)	77 (5)	89 (5)	172 (5)
Other	1201 (7)	108 (5)	82 (5)	90 (6)	186 (6)

Limited to those at each follow-up who completed UFCW website enrollment. The first number in parentheses in each cell is the number with data for that cell. All other values are “n (%)” for their respective response category. The Ns across the top are the total number of responses to each follow-up survey, regardless of whether they completed or could be matched via phone number to Survey #1.
a – “Food packing and processing (non-meat)”

COVID-19 Infections

Of the 17,414 participants who completed the online P2A registration, 22.5% reported ever having a positive COVID-19 test. Participants who reported in our monthly text surveys *ever* testing positive for COVID-19 rose from 15% to 34% between June 2021 and May 2022. Of these, approximately 15% each month reported this being a "new" infection (incident disease). These new infections peaked during January and February 2022 when 35 and 45% of those with any positive COVID-19 test reported newly acquired COVID-19, concomitant with the Omicron surge in the U.S. (Table 3, Figure 4). For example, from Table 3 the February 2022 survey had 2,188 respondents, 33% (722) reported ever having COVID-19, and 45% of those 722 (325) reported having COVID-19 in the past month. A significant proportion (59%) of ever-infected workers indicated that their infection was likely acquired at work rather than at home or elsewhere in the community.

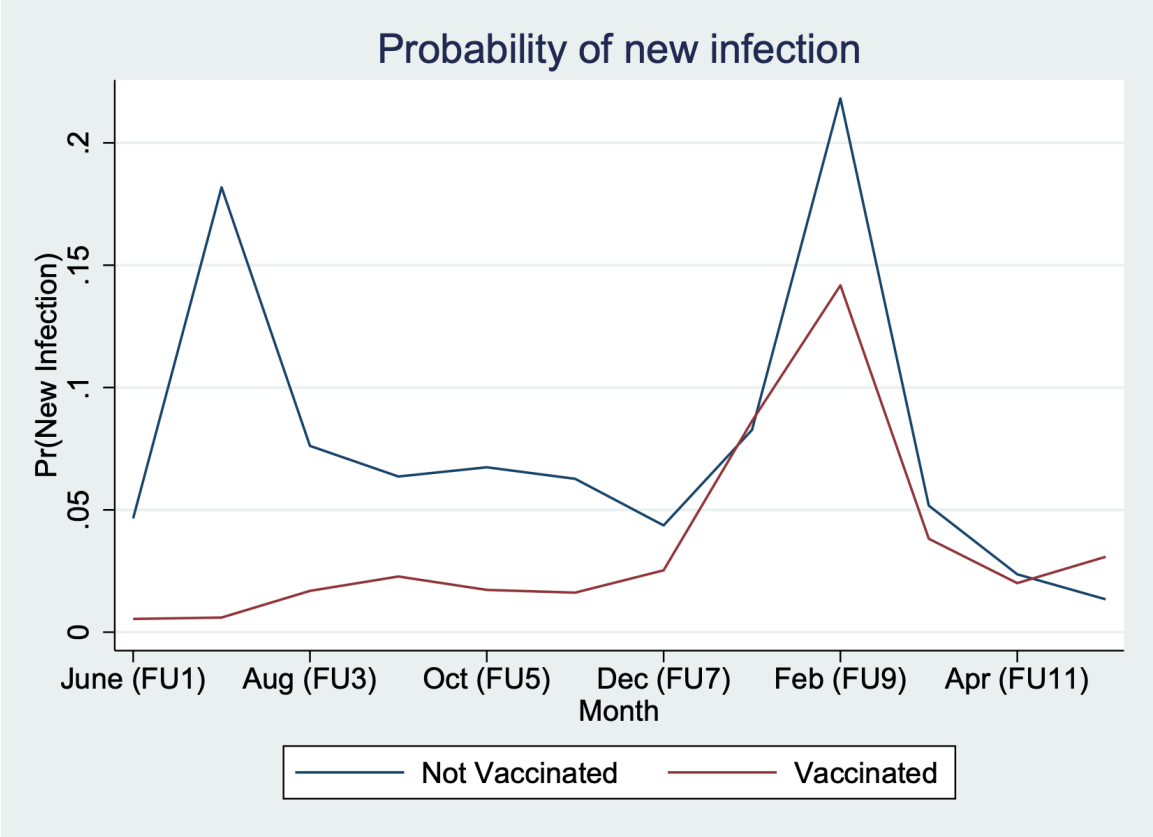

Figure 5. *Probability of new COVID-19 infection by survey month and vaccination status.*

Fever, cough, or shortness of breath were common symptoms, reported in a majority of those who developed COVID-19. A more detailed interrogation of symptoms in January through March 2022, during the Omicron surge, revealed fewer COVID-19 illnesses associated with loss of taste or smell, or with shortness of breath, but a majority having flu-like or cold symptoms like runny nose, sore throat, and aches (Table 4). During the summer months of the survey, over 90% of those with COVID-19 missed work for 20 days, on average, but this became progressively shorter over time thereafter with most being absent from work for two weeks or less, likely reflecting CDC guidance to isolate for 10-14 days. Approximately 20% of respondents who had COVID-19 visited an emergency room and about 6% were hospitalized. Hospitalizations lasted one week or less in 59% of cases. Hospitalization rates decreased during the winter, but as the overall infection rates were much higher then, the result was a similar number of participants being hospitalized. A small proportion of hospitalized cases (<7%) required mechanical ventilation (Table 4).

Interestingly, about 37% who had experienced COVID-19 illness indicated that they were not fully back to their “normal self” at the time this question was asked. Of those who were recovered, approximately two thirds said that it took less than a month to return to normal, which means a third of those who recovered took more than a month and ~5% took more than six months to fully recover. Among those who were not fully back to their normal self, fatigue was reported by 71% as a significant post-COVID symptom, with cough, shortness of breath, memory problems, anxiety and/or depression also reported less often. In that same group 9% indicated that they were unable to return to work, which is about 4% of all who had COVID-19. Over 12% of respondents with COVID-19 indicated that it took more than four months before they felt back to normal (Table 4).

Results from the GEE models examining associations with incident COVID-19 infection are listed in Appendix S4. These models consistently showed the

strongest associations with incident COVID-19 infections were the following in order of significance (Figure 4):

- Calendar month of the pandemic (increasing until Feb 2022),
- COVID-19 infection prior to June 2021 (Odds Ratio [OR] 2.17 [1.85, 2.51]),
- COVID-19 vaccinated (OR 0.49 [0.41, 0.58]),
- male sex (OR 0.78 [0.66, 0.92]),
- and South region vs Northeast (OR 1.31 [1.03, 1.67]).

In sensitivity models that included interactions of survey month with other measures, there were significant interactions of older age (50+ years) with the February survey (OR 0.52 [0.29, 0.93]), though the strongest interaction was between vaccination status and calendar month as each month vaccination tended to have less of a reduction in new infections (OR 0.01 in July to OR 2.04 in May).

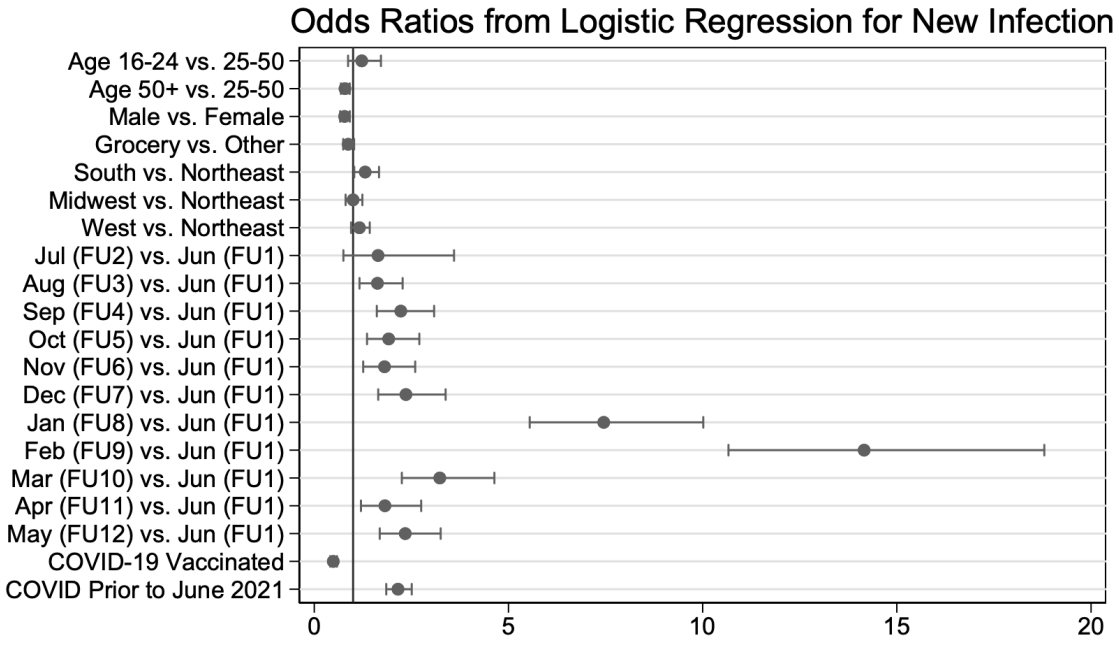

***Figure 6**. Odds ratios by variables in the GEE model for new COVID-19 infection. February (Feb) had the highest rates of infections, so all other months had comparably much lower. Older age, gender, South vs Northeast regions, months, vaccination, and prior COVID-19 infection were all statistically significant (95% Confidence Intervals did not cross 1.0).*

COVID-19 Vaccination

At enrollment, 72.9% of the 17,516 registered respondents indicated having received at least one vaccination shot. Each month thereafter, between 82 and 93% (mean of 88%) reported at least some level of vaccination. Roughly equal numbers received Pfizer-BioNtech and Moderna vaccines (about 42-45% each), while 11% received Johnson & Johnson, and 1-2% did not know which vaccine they had received. The percentage of people reporting new vaccinations was consistently below 10% each month until boosters became available in the fall of 2021 and 31% reported receiving a new shot in November 2021 (Table 3). There was a steady increase in receipt of a booster vaccinations (third injection) in the fall, rising to 74% having had a booster by May 2022. The workplace was the site of vaccination for half of all those receiving vaccines; only 8% received vaccinations at their doctor's office (Table 5).

Mild side effects from the vaccine were relatively common and similar to national reports: three quarters reported arm soreness, half reported fatigue, 38% headache, 23% fever and 1.5% reported a severe allergic reaction. The vast majority (90%) reported experiencing these side effects within 24 hours of vaccination and 90+% reported side effects ending within three days (Table 5).

Respondents who chose not to get vaccinated over the course of the study period represented ~15% overall. While this proportion varied somewhat over the year (range 7-18%), this group were less likely to complete multiple surveys. These workers were consistent in their reasons with "Concern about long term effects on my body," "Concern about side effects," and "I don't trust the science / review process / government / drug companies" all being chosen most often each month (Table 6).

The GEE models consistently showed that the strongest associations with incident COVID-19 vaccinations were the following in order of significance:

- calendar month of survey,
- older age of 50+ years (OR 1.28 [1.16, 1.41]),
- and grocery work setting (OR 0.86 [0.78, 0.95]).

In sensitivity models which included interactions of survey month with other measures, there were significant interactions between older age (50+ years) and almost every calendar month, including the highest odds in December, which was after booster vaccinations became more commonplace, and between grocery setting and the September survey (OR 0.47 [0.32, 0.68]) and the October survey (OR 0.65 [0.46, 0.91]).

Worker Attitudes About the Pandemic

Early and later surveys asked a series of questions about workers' experiences and thoughts about the pandemic. In July, 70% of respondents felt the pandemic was not over while 18% thought it was "somewhat" over and 13% felt it was mostly or completely over. When asked again in May, 56% felt it was not over, 22% thought it was "somewhat" over, and 22% felt it was mostly or completely over. In July about half felt that people around them were not taking the pandemic seriously enough, but 41% indicated it was just the right amount of concern and 8% said those around them were taking it "too seriously." Most considered that their co-workers and management were taking the pandemic with an appropriate degree of concern, but only a quarter of respondents thought that customers in their workplace were approaching it with enough seriousness.

In October, November, and December 2021, we asked a series of questions about how the holiday season might impact pandemic precautions. The greatest concern for 72% was being understaffed for the holidays. Not enough people being masked (47%) or vaccinated (42%) and loosening of safety measures by employers (46%) were also weighing on workers' minds. Lack of social

distancing was also a reported concern (33%) (Table 3). When asked in May to rank the priorities in case of a future COVID-19 surge, additional hazard pay and sick leave were on top followed by enforcing customer safety measures (Figure 6).

In July, at a time when case numbers were declining nationally, again in December, when case numbers were widely increasing with the Omicron surge, and in April and May during another decline, participants were asked to rate their "day-to-day life" compared to a time before the Covid-19 pandemic began. The proportion who felt their lives were "completely back to normal" changed from 21% in July to 12% in December and back to 22% in May. There was a similar U-shape change in those who felt their lives were "somewhat back to normal", from 57% to 42% to 55% and "far from being back to normal" with 22% in July to 46% in December and then back to 23% in May (Table 3, Figure 5). These responses appeared to reflect the sudden onset of widespread illness due to the Omicron variant of SARS CoV-2 virus in the U.S. and then return to much lower infection rates in the spring.

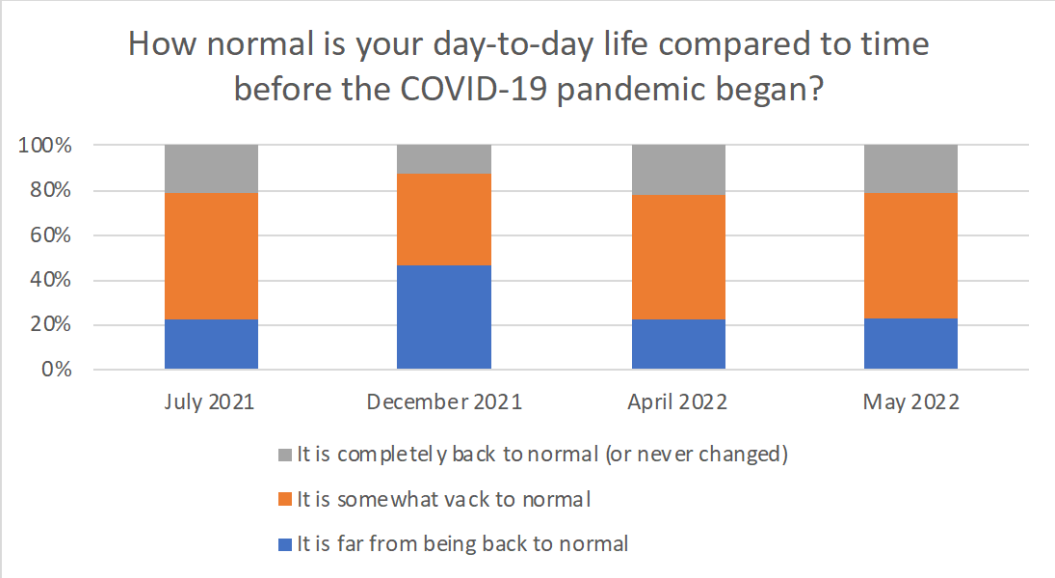

Figure 7. *Bar graph of response percentage on how back to normal your day-to-day life is by month.*

At the end of each monthly survey, members were given the opportunity to leave free-form comments about anything they hoped the UFCW could help with. There were many themes, but the common thread throughout was that workers are stressed, tired, angry, and underpaid relative to the increased risks of infection being faced at work. More specific themes include but are not limited to:

- calls for hazard and hero pay,
- frustrations with employers and management,
- calls for increased intervention to ensure that *customers* adhere to safety guidelines,
- comments about vaccines,
- and general feelings of not being appreciated.

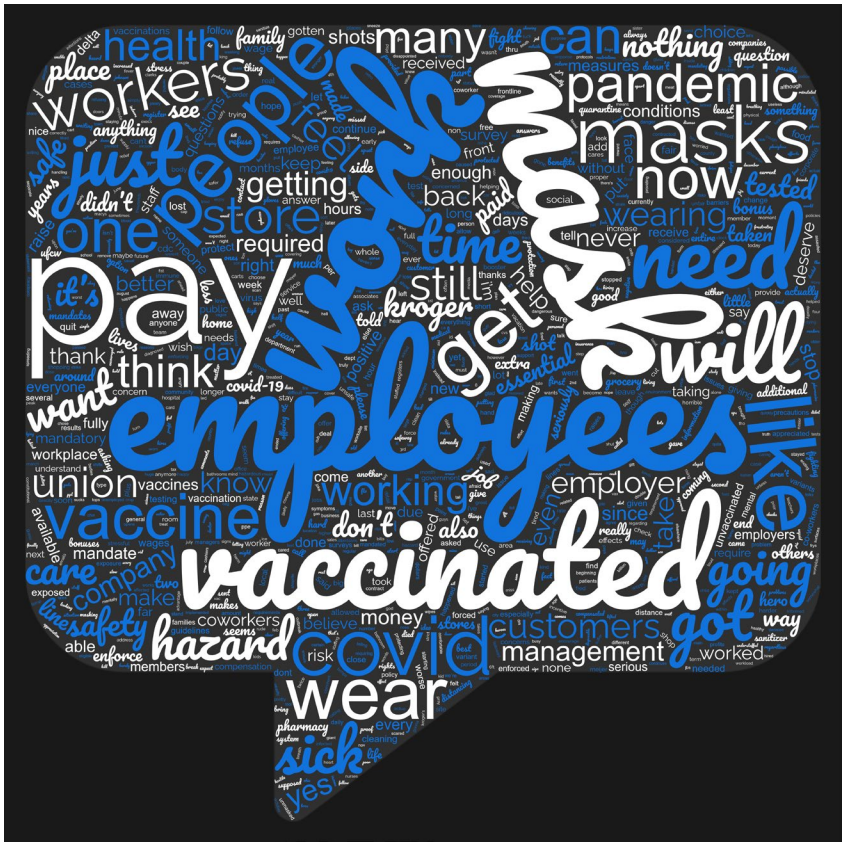

Figure 8. *Word cloud from participant comments.*

Employer Responses and Worker Perceptions

Early in the survey period, specifically June and July 2021, respondents noted that substantial safety measures were added or required by most employers, including masks (98%), social distancing (85%), physical barriers between people (68%), and hand washing (81%). During winter 2022, 45 to 52% of respondents noted that employers were enforcing safety measures against COVID-19 transmission, representing a significant drop-off from the prior summer. Among those safety measures, masks (93%) and handwashing (59%) were the only ones still being enforced most of the time. Work vaccine requirements were present in 24% of respondent workplaces and COVID-19 testing was present in 17% of respondent workplaces and increased dramatically to 39% in March. During the winter, around half reported that “if you or a co-worker get sick,” their workplace required a COVID-19 test and if positive, staying home was then required by 89% of employers. Time off for those testing positive was offered by 62% of employers while time off for getting vaccinated was offered by 30% of employers. Approximately 35% of employers provided paid time off for workers who developed any side effects to COVID-19 vaccinations, although 41% of workers indicated that they would be more likely to get vaccinated if paid time off for vaccination or for vaccine side effects was offered.

A majority (71%) of respondents felt that employers should require masks when asked during the summer of 2021 when the Delta variant was increasing infection rates. Approximately two-thirds of respondents also believed that COVID-19 vaccinations should be required by employers in summer 2021. At the same time, only 13% of employers had a vaccine requirement, but by March 2022, 24% of employers had a vaccine requirement.

Response to Text Surveys

We completed additional analyses on the timing of responses to the monthly text message. There was a large amount of response within the first hour and the vast majority had completed the survey within a week, so that providing

additional time to complete often was only used by those who received another follow-up text about the newsletter a week or two later (Appendix S5).

Table 3. Questions asked of all respondents for given month. Reported data are percentages of "Yes" responses unless otherwise indicated.

Question N	Jun 5678	Jul 5202	Aug 4111	Sep 3211	Oct 3132	Nov 2422	Dec 2189	Jan 2479	Feb 2188	Mar 1640	Apr 1664	May 3422
Have you ever tested positive for, or been told you have, COVID-19?	15	18	17	18	17	17	18	24	33	31	30	34
If yes: Have you tested positive for, or been told you have, COVID-19 in the past month?			12	16	14	13	15	35	45	13	7	9
How many times have you had COVID-19?												
1												85
2												13
3												1.4
4												0.3
6												0.2
How was COVID-19 ever diagnosed for you? (select all that apply)												
Lab test (not at home)												69
At-home test												27
Doctor diagnosed; only due to symptoms												20
Myself diagnosed; only due to symptoms												5
I assumed I had it due to proximity exposure												5
How was COVID-19 diagnosed for you in the past month? (NOTE: Single answer, not "check all")												
Lab test (not at home)												42
At-home test												47
Doctor diagnosed; only due to symptoms												7
Myself diagnosed; only due to symptoms												3
I assumed I had it due to proximity exposure												0
Were you tested for COVID-19 in the past month?									34	20	13	16
If no: Can you tell us why you did not get tested?												
No symptoms									88	87		
Cost too high									1	1		
Test unavailable									7	4		
No time									3	3		
I didn't know how									1	1		
I didn't want to									6	7		
Fear of workplace retaliation									2	2		
Have you ever received a COVID-19 vaccine?	82	88	93	86	89	87	88	90	90	89	90	89

If yes: Have you received any COVID-19 vaccine shots in the past month?			7	8	14	28	31	22	16	8	8	11
Was the vaccine offered at your worksite?	73	76	78	78	77	77	77	75	72			
How normal is your day-to-day life compared to time before the COVID-19 pandemic began?												
It is completely back to normal (or never changed)		21					12				22	22
It is somewhat back to normal		57					42				56	55
It is far from being back to normal		22					46				22	23
Do you think the COVID-19 pandemic is over?												
Yes		4									7	7
Mostly		9									15	15
Somewhat		18									22	22
No		70									56	56
Did any of your coworkers die of COVID-19?												
Yes		8										
No		70										
I don't know		22										
Currently, how seriously are the people around you taking COVID-19?												
Too seriously		8										
Not seriously enough		51										
Just right amount of seriousness		41										
Do you think these groups are currently taking the pandemic seriously?												
Coworkers			62	63								
Management			66	62								
Customers			26	24								
Are you concerned about new COVID-19 variants?			81				70					
Is your employer currently offering paid time off / sick leave for workers who:												
Test positive for COVID-19?			62									
Get vaccinated?			31									
Have vaccine side effects?			30									
Is your employer currently offering paid time off / sick leave for workers who have vaccine side effects?				37	36	34						
If your employer offered paid time off for getting vaccinated/vaccine side effects, my coworkers are:												
More likely to get vaccinated				41	44							
No Change				57	54							
Less likely to get vaccinated				3	2							
Do you think employers should require masks?			73	71								

Do you think employers should require COVID-19 vaccination of their workers?			66	58								
Does your workplace require you to be COVID-19 vaccinated?			12	14								
What kind of safety measures were added/required by your employer during the pandemic? (select any)												
Masks	99	98										
Social distancing	86	85										
Physical barriers between people	70	68										
Hand washing	83	81										
Is your employer enforcing safety measures against COVID-19?												
Yes								45	52	50		
No								42	37	40		
I don't know								13	12	11		
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any)												
Masks								93	94	71		
Social distancing								44	47	51		
Physical barriers between people								40	43	47		
Hand washing								60	61	67		
Vaccine requirement								24	23	24		
COVID-19 testing								17	20	20		
If you or your coworkers get sick, are they required to get tested for COVID-19?								48	50	52		
If you or your coworkers test positive for COVID-19, are they being required to stay home?								89	87	89		
Did your employer offer you something to encourage you to get vaccinated? (Examples might include time off, money, or a gift)	56	51										
Does your workplace provide COVID-19 testing?									31	39		
If you have children at home, are they vaccinated against COVID-19?												
I do not have children at home										72		
No, and I do not plan to										7		
No, they are younger than 5										2		
No, only those 5 or older										1		
Yes, all are vaccinated										17		
Are you concerned with how quickly the country is removing safety measures against COVID-19? ("Yes" responses)										56		

Is there anyone, including you, in your household who is at higher risk for severe COVID illness? (diabetes, cardiovascular disease, COPD or asthma, or a weakened immune system - see CDC website for more) (Yes responses)										52		
Rank what would you most like to have in place at your workplace if there is another surge of COVID-19 infections? [See Figure 6] **(Average Ranking; low number = higher priority)**												
Hazard pay												2.5
Additional paid sick leave												2.7
Enforce customer safety measures												3.7
Mask mandate												4.1
Booster mandate												4.7
Onsite testing												5.1
Social distancing												5.2
What are your concerns about safety with the busy holiday season coming up? (select all that apply)												
Not enough people being masked					49	42						
Not enough people being vaccinated					44	38						
Lack of social distancing					35	31						
Loosening of safety measures by employers					48	40						
Enforcing safety measures with customers & co-workers					48	40						
Being understaffed					73	71						
No concerns					9	9						
Now that the holiday season has begun, are you seeing any of the following in your workplace?												
Being understaffed							76					
Not enough people being masked							49					
Enforcing safety measures with customers & co-workers							25					
Lack of social distancing							54					
Not enough people being vaccinated							26					
Loosening of safety measures by employers							31					
None of these							6					
Have you gotten or plan on getting a flu shot this fall?					67	68						
Have you gotten or plan on getting a flu shot?							70	70				
The federal government recently made four test kits free per household. Have you signed up for yours yet? (https://www.covidtests.gov)												
Yes									61	67		
No									29	26		
No, but I plan to									11	7		

Did you fill out our June survey?		92										
UFCW wants to fight for better working conditions for you. Would you be willing to answer additional surveys to learn about how COVID-19 has changed your and your co-workers' lives?	94	94	95	94	93	94	94	93	94	92	92	91

Table 4. If responded ever positive for COVID-19 (June-August) or if positive for COVID-19 in the past month (September-end). All reported data are percentages of "Yes" responses unless otherwise indicated.

Question N	Jun 836	Jul 172	Aug 694	Sep 91	Oct 72	Nov 54	Dec 60	Jan 213	Feb 327	Mar 64	Apr 34	May 99
What symptoms did you have with COVID-19 illness? (check all that apply)												
Fever	54	61	60	63	60	59	50	54	53	47		
Cough	58	63	63	65	74	76	72	78	74	66		
Shortness of breath (trouble breathing)	48	50	50	52	52	52	33	31	38	41		
Loss of taste / smell	61	60	62	64	63	59	50	35	34	28		
Sore throat								60	60	63		
Nasal congestion/runny nose								72	77	69		
Fatigue								78	75	78		
Muscle or body aches								63	64	55		
Headaches								73	69	61		
None	8	9	8	7	3	4	10	3	3	3		
Fever, Cough, or shortness of breath combined	77	80	80	86	85	89	82	86	86	83		
When (approximately) did you have COVID-19? (Note: was asked as single response in June and July, multiple responses allowed in August – earliest August response reported here with an additional 1% not checking any boxes)												
Before March 2020	7	10	8									
March-May 2020	14	13	16									
June-Oct 2020	11	9	11									
Nov-Dec 2020	32	32	27									
Jan-Mar 2021	29	22	24									
April-June 2021	7	–	7									
April-July 2021		15	–									
July-Aug 2021	–	–	6									
Where do you think you got infected?												
Home	15	16	12									7
Work	53	46	61									60
In the community (not at work)	10	11	7									15
I don't know	22	24	20									18
Did you miss any work due to COVID illness?	95	94	93	98	96	96	90	94	96	94	74	90
If yes, about how many days? (Mean number of days reported)	19.6	20.0	19.9	14.0	13.6	16.9	15.6	9.2	9.9	9.0	13.4	6.7
Did you go to the Emergency Room when you had symptoms of COVID-19?	20	24	20									
Did you get admitted to a hospital when you had COVID-19 illness?	7	7	7	4	3	13	8	4	3	6	12	4

If yes: How many days were you in the hospital?												
Less than 1 week	56	58	50	75	100	71	20	71	50	75	50	50
1-2 weeks	32	17	35	25	0	14	20	29	38	25	25	25
2+ weeks	12	25	15	0	0	14	60	0	13	0	25	25
If yes: Were you on a breathing machine with a tube down your throat?	7	8	6	0	0	14	0	0	22	33	100	75
Think of your infection(s): where do you think you got infected? (select all that apply)												
Home												8
Work												59
In the community (not work and not at home)												18
I don't know												21
Are you fully recovered and back to your normal self after having COVID-19?	71	66	64	49	62	63	61	56	66	70	61	65
If No, what problems are you having? (check all that apply):												
Fatigue	69	73	73	83	71	80	80	76	78	74	74	77
Cough	20	42	25	57	22	30	31	42	49	40	35	34
Shortness of breath	45	50	42	43	40	52	46	37	39	40	41	43
Memory problems	46	44	47	33	36	48	44	29	39	44	47	44
Anxiety	36	42	48	48	42	46	42	36	42	38	47	42
Depression	25	37	36	28	31	30	26	25	29	24	30	29
Unable to return to work	4	8	7	13	6	3	5	10	6	5	1	4
If yes: How long did it take for you to feel fully recovered?												
Less than 1 week					–	23	23	22	30	26	23	22
1-4 weeks					–	36	38	48	49	45	44	46
Less than 1 month					55	–	–	–	–	–	–	–
1-2 months					26	17	16	12	10	14	17	15
2-4 months					8	10	10	7	5	6	9	9
4-6 months					5	9	9	4	3	3	2	4
6+ months					6	5	5	7	4	6	4	4
When you were sick with COVID-19, did you have health insurance?	92	91	93									

Table 5. Items asked for those who were vaccinated for COVID-19. All reported date are percentages of "Yes" responses unless otherwise indicated.

Question N	Jun 4670	Jul 1082	Aug 3802	Sep 2771	Oct 2776	Nov 2102	Dec 1937	Jan 2225	Feb 1968	Mar 1466	Apr 1495	May 3050
Where did you receive the COVID-19 vaccine?												
Worksite	49	51	49	49	49	50	49	47	46			
Community site (clinic, school, church, etc)	44	41	43	43	43	43	42	45	45			
Doctor's office	7	9	8	8	8	8	9	8	9			
Which vaccine did you receive?												
Pfizer	43	42										
Moderna	45	45										
Johnson & Johnson	11	11										
Novavax	0	0										
Don't know	1	2										
If NOT Johnson & Johnson: How many doses did you get?												
2 and done	98	95										
1 and planning for 2nd	2	5										
1 and choosing not to get 2nd	0	1										
If "1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any)												
I had side effects with the first dose	100	100										
I have no time or transportation	0	0										
I believe one dose is enough	0	0										
How many vaccine shots did you receive?												
3			1	2	9	27	42	54	59	63		
2			86	86	80	64	50	39	34	31		
1 and planning for more			2	2	1	1	2	1	1	0		
1 and choosing not to get more			0	1	1	1	0	0	1	1		
1 and it was Johnson & Johnson			11	10	10	7	6	6	5	5		
If "1 and choosing not to get more": I do not plan to get the second dose because (choose any)												
I had side effects with the first dose			27	27	35	23	50	20	29	50		
I have no time or transportation			0	0	0	0	0	0	0	0		
I believe one dose is enough			27	20	41	54	50	40	50	33		
Did you have any side effects?												
Muscle ache / arm soreness		87*	72	73	73	75	75	77	76	76		
Fatigue		70*	53	54	54	54	55	56	52	55		
Fever		39*	23	23	22	23	22	22	21	23		
Headache		56*	37	38	36	38	38	38	36	36		
Severe allergic reaction		4*	1	1	2	1	2	1	2	2		
None		30*	18	17	17	16	16	14	17	16		

If yes to any side effects: Did you miss a day or more of work due to side effects?		27	30	20	29	25	26	26	28	29		
If yes to any side effects: When did you start feeling side effects after vaccination?												
0-8 hours				–	43	45	45	48	49	49		
9-24 hours				–	47	46	45	43	44	43		
1-3 days				–	9	8	9	7	6	6		
3+ days				–	1	1	1	1	1	1		
If yes to any side effects: When you started experiencing side effects, how long did they last?												
0-8 hours				–	20	18	17	17	18	18		
9-24 hours				–	37	37	38	38	37	39		
1-3 days				–	35	38	38	37	39	35		
3+ days				–	8	–	–	–	–	–		
3-30 days				–	–	5	5	6	5	5		
More than one month				–	–	2	2	2	2	2		
What influenced you to get it?												
Reading or listening to a news story discussing the results of COVID-19 vaccines					45	49	49	50	48			
Having a conversation with a doctor about whether to get a vaccine					21	24	25	25	25			
A friend or family member receiving the COVID-19 vaccine					22	23	24	23	21			
A friend or family member being diagnosed with COVID-19					14	16	17	12	12			
Wanting to travel					14	16	16	12	14			
Seeing a celebrity or elected official get a vaccine					1	1	2	2	1			
Work requirement					9	9	11	11	11			
Will you be getting a booster vaccination shot if it becomes recommended for you and available?												
Yes			85	82	73	58	44	34	29	29		
Yes, and I have already received a booster			1	2	9	27	44	54	59	57		
No			14	16	18	15	13	12	13	15		
Have you received a booster shot?												
Yes											76	74
No											20	20
No, but I am planning on it											4	5
If Yes: Will you get an additional booster shot if/when it becomes recommended? (Yes responses)											85	85

*Asked by only 8% of those who indicated no to answering June survey.

Table 6. If they have never received a vaccine for COVID-19: All reported date are percentages of “Yes” responses unless otherwise indicated.

Question N	Jun 994	Jul* 0	Aug 305	Sep 440	Oct 356	Nov 320	Dec 252	Jan 254	Feb 220	Mar 174	Apr 169	May 372
Do you plan on getting the vaccine?	18		19	13	10	14	13	10	11	7	6	6
If no: Why will you NOT receive the vaccine?												
I don’t have time off from work	2		3	3	4	3	2	3	1	3		
I don’t have transportation to get to a vaccination location	0		0	1	0	0	0	0	0	1		
I’m waiting to see how it might affect other people	42		37	29	30	32	32	38	29	25		
Concerned about side effects	57		53	50	55	51	55	57	50	51		
Concerned about long term effects on my body	67		61	64	64	63	67	68	68	62		
I don't think I need it	23		24	20	22	24	23	21	19	30		
I don't trust the science / review process / government / drug companies	49		55	53	57	55	54	58	59	57		
My doctor recommended against it	8		10	14	13	13	12	12	13	12		
I read something on the internet that makes me concerned about the vaccine	13		13	13	11	8	10	12	10	10		
If no: What might lead to you getting vaccinated?												
Cash incentive					7	4	5	4	2	1		
My job requiring it					13	11	11	12	12	9		
Someone I trust recommending it					5	3	3	2	1	1		
Community pressure					1	0	0	0	1	0		
Nothing					73	76	79	81	82	86		

**In July we asked, "Did you fill out our June survey?" If they answered "no" and answered no to ever receiving the vaccine, they were to be asked this item, but we had 0 qualify.*

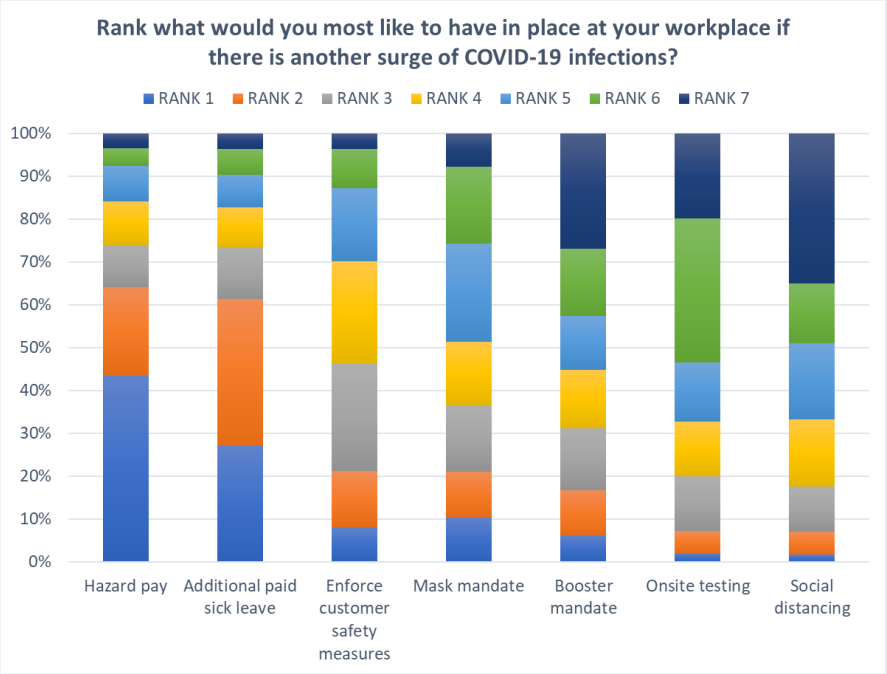

Figure 9. *May survey ranking of workplace response to future COVID-19 surge (N=3207.)*

❹ Discussion

Essential workers in a variety of occupations were required to work in-person during the COVID-19 pandemic, at increased risk to their health and well-being, as their employers were forced to keep businesses open for the communal benefit of Americans(8, 9). The societal disruptions related to the pandemic created a rapidly changing workplace environment for both workers and employers, with ongoing pressure for prioritizing both worker safety and business productivity, as well as the emerging and often confusing public health guidance, waves of new COVID variants, rising death rates, and politicization of the pandemic all leading to increased workplace stress. Furthermore, a significant proportion of the essential worker population includes immigrants who may have limited English language skills and/or people of color who are known to be at greater risk for severe COVID-19 illness(10, 11).

The EWHS represents a real-time measure of essential worker experiences and attitudes during the second year of the COVID-19 pandemic. Among nearly 17,000 respondents to the initial Hustle text invitation to UFCW membership, the prevalence of prior COVID-19 illness was 23%. Subsequent survey participants' monthly responses indicated that new COVID-19 infections increased over time, rising from 2% in June 2021 to 15% in February 2022—consistently higher than national incidence rates during the same period, but showing the same upward trend as Delta and then Omicron variant waves that swept through the U.S. population. Acute COVID-19 illness was relatively mild in most respondents, although ~6% of cases were hospitalized. This is much higher than the ~2% of hospitalized cases reported previously that were mostly driven by older infected population(12, 13).

COVID-related symptoms were often prolonged compared with other typical upper respiratory infections, with around a third noting resolution finally came more than a month after onset(14, 15). Consistent with prior reports in the

literature, less than half who had COVID illness reported being fully improved within a month(16). Fatigue was the most common lingering symptom, again consistent with prior medical reports. It is unclear if these workers have “long COVID” since that condition has not yet been fully defined, although it is worth noting that ~10% of respondents with COVID-19 indicated that it took more than four months before they felt back to normal. It is further notable that approximately 4% of all respondent workers who had COVID-19 illness were unable to return to work at all. These data underscore the impact of prolonged COVID-19 symptoms on the essential workforce and require follow-up evaluation.

Despite generally mild symptoms, COVID-19 illness had a significant impact on the ability to work, with 90% of survey respondents indicating they lost 20 days of work, on average, due to the infection acquired during summer 2021. While this lengthy absence was in part due to isolation requirements imposed by CDC recommendations, it also reflects the above-noted prolonged duration of symptomatic COVID-19 illness. The nearly three-week duration of absenteeism far exceeds the 2.76 (on average) days of missed work due to colds reported in a 2017 study of workers at a multinational manufacturing firm in Sri Lanka(17). A prospective study of Swiss health care workers during the 2016-17 influenza season revealed an average of 1.2 missed workdays due to respiratory illness(18). Comparatively, a very high prevalence of absenteeism can be inferred for the EWHS participants who developed COVID-19. This ongoing burden of work absence through fall and then winter months certainly contributed to the 2021 holiday season understaffing problem reported by most surveyed workers. The lengthy and prevalent worker COVID-related absences came at a time when employers were also struggling with issues of which safety measures to enforce and how to maintain business productivity.

The duration of COVID-related illness has had important and unprecedented impacts on the work lives of union members, but also on the maintenance of

business productivity for employers. Accordingly, considerations to mitigate that impact should be evaluated for future waves of this virus or others that may emerge in a pandemic fashion.

Implementation of preventative measures by employers was quite variable over the course of the survey period, with masking being the most common and persistent. Mask requirements were likely the most popular as they are simple and backed by a plethora of data indicating reduced transmission with widespread, appropriate use and individual protection depending on the type of mask and the fit(19). Overall, almost two-thirds of responding union members felt that their employers and co-workers were taking the pandemic seriously. However, three quarters felt that customers in their workplaces were not taking the pandemic with an adequate level of seriousness. The consistently high concern about dismissive customer attitudes may reflect the extreme politicization of the pandemic in the U.S., with essential workers in public-facing capacities feeling especially vulnerable as a result.

COVID-19 vaccination was reported by 73% of those initially enrolled and among those who responded to monthly surveys, the rate was approximately 89% consistently over time. This was significantly higher than the national vaccination rates during the same period which were at 54% with a single vaccination by July 2021(20). Booster vaccinations, which were recommended widely in fall 2021, rose progressively over the survey period and by May 2022 three quarters of respondents were fully vaccinated and boosted. Notably, those over age 50 were most likely to receive booster shots, likely due to the strong CDC recommendation for older age groups to be boosted. On the other hand, grocery workers were significantly less likely to get a booster compared to other UFCW workers even when age was considered.

Those who chose not to be vaccinated indicated that there was no incentive that would persuade them otherwise, apart from their job requiring vaccination. This

reflected the ongoing nationwide division in entrenched attitudes toward vaccination. People who are vaccinated were much more likely to want their co-workers to be vaccinated.

Those who reported getting COVID-19 before June 2021, and mostly in 2020, were at the highest risk of getting new COVID-19 infections during the 12 months, two times the risk relative to those who did not report an earlier infection. We are unable to precisely explain these findings, though this is likely related to exposure risk in the workplace. Those with COVID-19 infections earlier in the pandemic may have been less likely to get vaccinated due to perceived protection from prior infections or they may simply work in conditions where they have more exposure to the virus.

We found a consistent increased odds of new COVID-19 infections in women. There's not a clear connection between infection and sex, though other studies show higher rates in women in U.S. due to increased testing primarily due to larger roles in health care and education, while men were tested less often and have higher mortality rates from COVID-19, which would not appear in our findings(21). It is possible that women in our surveys had a more public-facing role in the workplace, most often grocery, and men are also less likely to seek health care with any symptoms or exposure. This difference due to public-facing roles may help explain how grocery workers were at higher risk in December, indicating the relaxation in preventative measures like masks, an increase in public facing, and overall weariness of the pandemic right when the Omicron variant was arriving.

Limitations

Our project has several limitations of note. All results were dependent upon participation, which was characterized by older and more English-reading participants than expected of the full UFCW membership. We could partly

account for these through our GEE analyses, and we did provide Spanish versions of each survey. We also depended upon the members with smartphones and phone numbers registered with the UFCW, which has a total U.S. membership of ~1 million. Our heatmaps showed differences in participation by gender, age, and location, and while we accounted for these differences in our analyses, the generalizability may improve in future work by focusing on those areas with less responses. We were unable to reliably link responses to the same member due to requiring each survey to have the participant re-enter their phone number for matching, which resulted in several entries not being matched to enrollees. Since the results were dependent upon individual survey responses, there was no way to capture deaths of participants or to have family members respond if the member was incapacitated, so that our results are expectedly biased toward survivorship and recovery.

Summary

This is one of the largest longitudinal surveys of non-professional essential workers and of union members covering the COVID-19 pandemic. We confirmed that UFCW members were more likely to be infected than the general population with an average of 20 days of work missed each time. Those who got infected in the first half of the pandemic were much more likely to get infected again in the second half, likely due to exposures in the workplace. Those who participated were much more likely to be vaccinated and get a booster vaccination compared to the general population, though the ~15% who declined vaccination did not change.

Appendices

- S1 Website
- S2 Data Dictionary
- S3 GEE analyses
- S4 Time to respond analysis

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ACTION

Essential Worker Health Survey

As we head into another year of working on the front lines of COVID-19, it is critical that we better understand how this pandemic has and will impact you and all our members.

For the sake of your health and safety, we believe essential workers must remain a priority when it comes to improving workplace safety, accessing life-saving vaccinations, and receiving critical resources that will save lives and stop the spread of this disease.

To better understand how we improve workplace safety, and the impact that the pandemic has and will have, the UFCW has partnered with the University of Nebraska Medical Center (UNMC) and FORWARD, the national databank for rheumatic diseases, to launch a long-term, national **Essential Worker Health Survey** .

The Essential Worker Health Survey will help us better understand the impact the COVID-19 pandemic has had on workers and on all our families. By learning more about how this disease impacts frontline workers like you, we can learn about what steps we must take to better protect you in the workplace.

Join the Essential Worker Health Survey today.

JOIN THE SURVEY

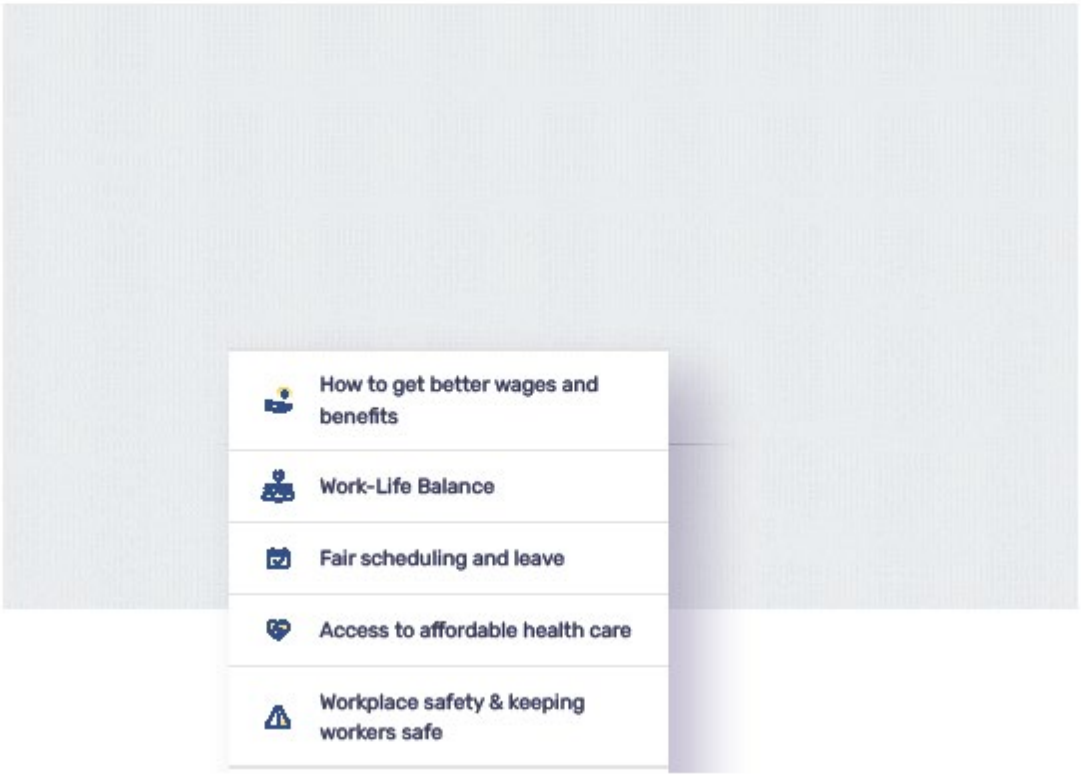
Essential Worker Health Survey Key

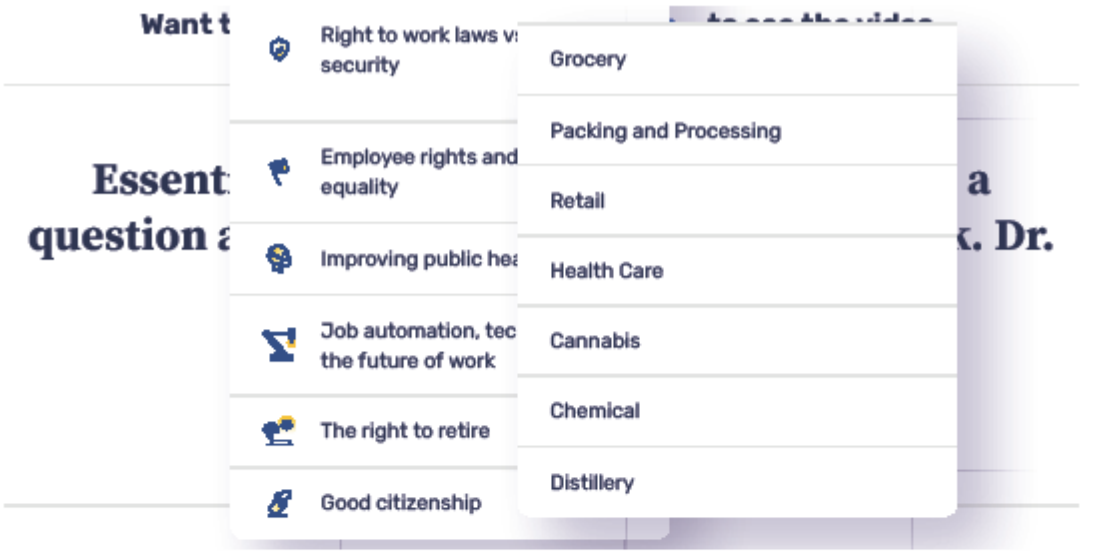
Findings

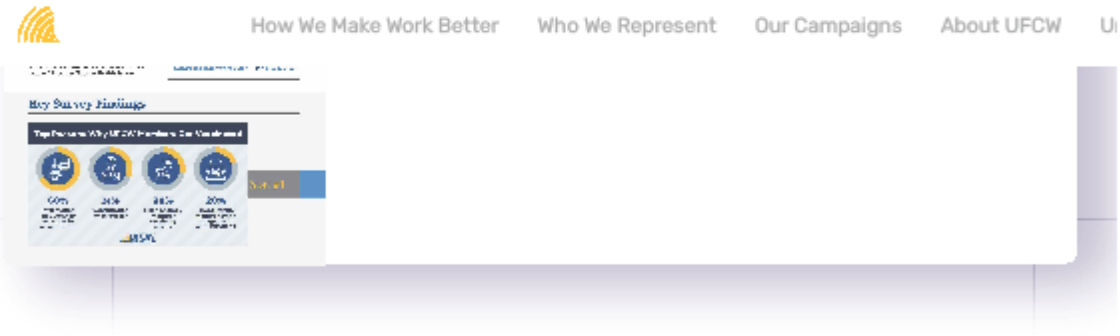
So far, over 5500 workers have participated in the Essential Worker Health Survey.

If you want to make sure your own COVID-19 experience is included in the survey, there's still time to sign up. Click here to sign up for the Essential Worker Health Survey. Your survey responses will be kept anonymous and your privacy will be protected.

Here are the latest key findings:







Thank you for doing your part by contributing to this health survey and for being a member of our union family.

Essential Worker Health Survey

Enter your information to sign up for this health survey:

Full Name *

Address *

Zip * city and state not required

Phone *

Email

Have you ever tested positive for, or been told you have, COVID-19: *

- ○ Yes
- ○ No

Have you ever received a COVID-19 vaccine: *

- ○ Yes
- ○ No

What is your work occupation: *

- ○ Grocery store
- ○ Meat packing and processing
- ○ Food packing and processing (non-meat)
- ○ Retail (non-grocery)
- ○ Distillery (wine, spirits, beer)
- ○ Healthcare
- ○ Cannabis
- ○ Chemical

○ Other

UFCW Local # (if you do not know, please put in 0):

*

How do you prefer to be contacted: *

○ Text message
○ Email
○ Phone Call

Age Category: *

○ 16 - 24
○ 25 - 49
○ 50 - 79
○ 80+

Sex assigned at birth: *

○ Male
○ Female

What language do you prefer for communication?

*

Do you have any questions or comments about this Essential Worker Study?

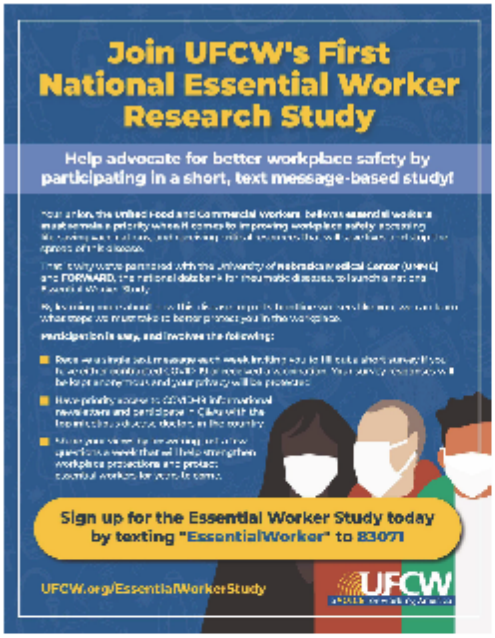
Submit →

☑ Send me emails about this campaign
☑ Send me text messages about this campaign

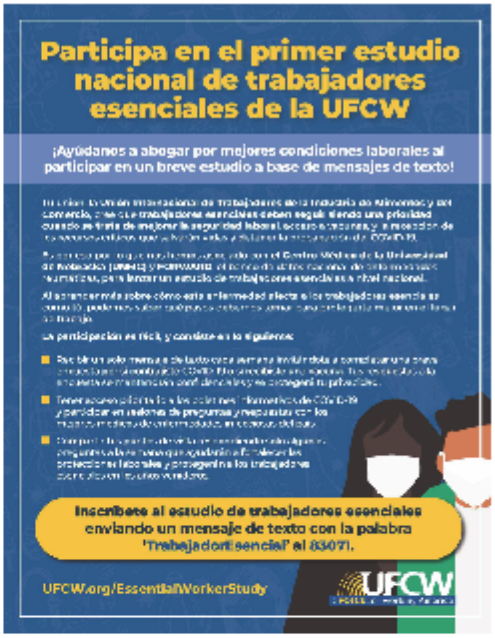
*By providing my cell phone number, I consent to receive blast text messages, other text messages, and robocalls on any topic from my local UFCW, International Union, and their affiliates. I reserve the right to opt-out at any time. We promise that we will not abuse your consent to text or call you.

Tell fellow UFCW members in your workplace about the Essential Worker Health Survey.

Download and post the Essential Worker Health Survey flyer (English or Spanish) on your bulletin board. Click on the image to download the PDF.



English



Spanish

University of Nebraska Medical Center

FORWARD
The National Databank for Rheumatic Diseases

In partnership with the University of Nebraska Medical Center (UNMC) and FORWARD.

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Find your Local Union

Each UFCW member belongs to a local union that serves their specific area.

Enter ZIP code:

SEARCH

Legal notice: Courts have enjoined non-Associate UFCW agents from entering Walmart property, except to shop, in AR, CO, FL, OH, TX, and MD and from doing non-shopping activity inside CA stores. Read orders here.

Appendix S2

EWHS Data dictionary – Table of all items asked and which monthly survey they were asked.

Yellow means that the question is in the pdf survey, but there's no data, red means that the question was not on the pdf survey, but there is data for this item, and blue means that the questions for July are technically there, but were not asked of the correct respondents because of the problems caused by the "Did you answer the June survey?" question.

Question	Jun FU1	Jul FU2	Aug FU3	Sep FU4	Oct FU5	Nov FU6	Dec FU7	Jan FU8
What is your phone number? (We ask each time because we do not track your device between surveys.)	X	X	X					
Please confirm your phone number. (Use the number we texted. We ask each time because we do not track your device between surveys.)				X	X	X	X	X
Did you fill out our June survey?		X						
Have you ever tested positive for, or been told you have, COVID-19?	X	X	X	X	X	X	X	X
Have you tested positive for, or been told you have, COVID-19 in the past month?		X	X	X	X	X	X	X
Have you ever received a COVID-19 vaccine?	X	X	X	X	X	X	X	X
Have you received any COVID-19 vaccine shots in the past month?		X	X	X	X	X	X	X
How normal is your day-to-day life compared to time before the COVID-19 pandemic began?		X	No				X	
Do you think the COVID-19 pandemic is over?		X	No					
Did any of your coworkers die of COVID-19?		X						
Currently, how seriously are the people around you taking COVID-19?		X	No					
Do you think these groups are currently taking the pandemic seriously? Coworkers			X	X				
Do you think these groups are currently taking the pandemic seriously? Management			X	X				
Do you think these groups are currently taking the pandemic seriously? Customers			X	X				
Are you concerned about new COVID-19 variants?			X				X	
Is your employer currently offering paid time off / sick leave for workers who: Test positive for COVID-19?			X					
Is your employer currently offering paid time off / sick leave for workers who: Get vaccinated?			X					

Is your employer currently offering paid time off / sick leave for workers who: Have vaccine side effects?			X					
Is your employer currently offering paid time off / sick leave for workers who have vaccine side effects?				X	X	X		
If your employer offered paid time off for getting vaccinated/vaccine side effects, my coworkers are: More/Less/No Change to get vaccinated				X	X			
Do you think employers should require masks?			X	X				
Do you think employers should require COVID-19 vaccination of their workers?			X	X				
Does your workplace require you to be COVID-19 vaccinated?			X	X				
What kind of safety measures were added/required by your employer during the pandemic? (select any) Masks	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Social distancing	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Physical barriers between people	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Hand washing	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Other (free text)	X	X						
Is your employer enforcing safety measures against COVID-19?								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Masks								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Social distancing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Physical barriers between people								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Hand washing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Vaccine requirement								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) COVID-19 testing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Other (free text)								X
If you or your coworkers get sick, are they required to get tested for COVID-19?								X

If you or your coworkers test positive for COVID-19, are they being required to stay home?								X
Did your employer offer you something to encourage you to get vaccinated? (Examples might include time off, money, or a gift)	X	X						
What symptoms did you have with COVID-19 illness? (check all that apply) Fever	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Cough	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Shortness of breath (trouble breathing)	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Loss of taste / smell	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Sore throat								X
What symptoms did you have with COVID-19 illness? (check all that apply) Nasal congestion/runny nose								X
What symptoms did you have with COVID-19 illness? (check all that apply) Fatigue								X
What symptoms did you have with COVID-19 illness? (check all that apply) Muscle or body aches								X
What symptoms did you have with COVID-19 illness? (check all that apply) Headaches								X
What symptoms did you have with COVID-19 illness? (check all that apply) None	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Other (free text)	X	X	X	X	X	X	X	X
When (approximately) did you have COVID-19? Note: was asked as single response in June and July, multiple responses allowed in August	X	X	X					
Where do you think you got infected?	X	X	X					
Did you miss any work due to COVID illness?	X	X	X	X	X	X	X	X
If yes, about how many days?	X	X	X	X	X	X	X	X
Did you go to the Emergency Room when you had symptoms of COVID-19?	X	X	X					
Did you get admitted to a hospital when you had COVID-19 illness?	X	X	X	X	X	X	X	X
If yes: How many days were you in the hospital?	X	X	X	X	X	X	X	X
If yes: Were you on a breathing machine with a tube down your throat?	X	X	X	X	X	X	X	X
Are you fully recovered and back to your normal self after having COVID-19?	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Fatigue	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Cough	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Shortness of breath	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Memory problems	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Anxiety	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Depression	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Other: (free text)	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Unable to return to work	X	X	X	X	X	X	X	X
If yes: How long did it take for you to feel fully recovered?					X	X	X	X

When you were sick with COVID-19, did you have health insurance?	X	X	X					
Was the vaccine offered at your worksite?	X	X	X	X	X	X	X	X
Where did you receive the COVID-19 vaccine?	X	X	X	X	X	X	X	X
Which vaccine did you receive?	X	X	No					
If NOT Johnson & Johnson: How many doses did you get?	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I had side effects with the first dose	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I have no time or transportation	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I believe one dose is enough	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) Other (free text)	X	X	No					
How many vaccine shots did you receive?			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I had side effects with the first dose			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I have no time or transportation			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I believe one dose is enough			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) Other (free text)			X	X	X	X	X	X
Did you have any side effects? Muscle ache / arm soreness		X	X	X	X	X	X	X
Did you have any side effects? Fatigue		X	X	X	X	X	X	X
Did you have any side effects? Fever		X	X	X	X	X	X	X
Did you have any side effects? Headache		X	X	X	X	X	X	X
Did you have any side effects? Severe allergic reaction		X	X	X	X	X	X	X
Did you have any side effects? None		X	X	X	X	X	X	X
Did you have any side effects? Other (free text)		X	X	X	X	X	X	X
If yes to any of the above: Did you miss a day or more of work due to side effects?		X	X	X	X	X	X	X
If yes to any of the above: When did you start feeling side effects after vaccination?				X	X	X	X	X
If yes to any of the above: When you started experiencing side effects, how long did they last?				X	X	X	X	X
What influenced you to get it? Reading or listening to a news story discussing the results of COVID-19 vaccines					X	X	X	X

What influenced you to get it? Having a conversation with a doctor about whether to get a vaccine					X	X	X	X
What influenced you to get it? A friend or family member receiving the COVID-19 vaccine					X	X	X	X
What influenced you to get it? A friend or family member being diagnosed with COVID-19					X	X	X	X
What influenced you to get it? Wanting to travel					X	X	X	X
What influenced you to get it? Seeing a celebrity or elected official get a vaccine					X	X	X	X
What influenced you to get it? Work requirement					X	X	X	X
What influenced you to get it? Other					X	X	X	X
Will you be getting a booster vaccination shot if it becomes recommended for you and available?			X	X	X	X	X	X
Do you plan on getting the vaccine? Not clear why, but these are missing for ALL July respondents. They only appeared in the July reports because we forward filled from June. July was the only month when this was attempted.	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't have time off from work	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't have transportation to get to a vaccination location	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I'm waiting to see how it might affect other people	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Concerned about side effects	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Concerned about long term effects on my body	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't think I need it	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't trust the science / review process / government / drug companies	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? My doctor recommended against it	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I read something on the internet that makes me concerned about the vaccine	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Other (free text)	X	No	X	X	X	X	X	X
You mentioned that you were concerned about side effects. Which ones are you concerned about?	X	No	X	X	X	X	X	X
You mentioned that you don't think you need it. What are the reasons you don't think you need it?	X	No	X	X	X	X	X	X
What might lead to you getting vaccinated? Cash incentive					X	X	X	X
What might lead to you getting vaccinated? My job requiring it					X	X	X	X
What might lead to you getting vaccinated? Someone I trust recommending it					X	X	X	X
What might lead to you getting vaccinated? Community pressure					X	X	X	X
What might lead to you getting vaccinated? Nothing					X	X	X	X
What might lead to you getting vaccinated? Other					X	X	X	X

What are your concerns about safety with the busy holiday season coming up? (select all that apply) Not enough people being masked					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Not enough people being vaccinated					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Lack of social distancing					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Loosening of safety measures by employers					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Enforcing safety measures with customers & co-workers					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Being understaffed					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) No concerns					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Other (free text response)					X	X		
Now that the holiday season has begun, are you seeing any of the following in your workplace? Being understaffed							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Not enough people being masked							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Enforcing safety measures with customers & co-workers							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Lack of social distancing							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Not enough people being vaccinated							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Loosening of safety measures by employers							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? None of these							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Other							X	
Have you gotten or plan on getting a flu shot this fall?					X	X		
Have you gotten or plan on getting a flu shot?							X	X
UFCW wants to fight for better working conditions for you. Would you be willing to answer additional surveys to learn about how COVID-19 has changed your and your co-workers' lives?	X	X	X	X	X	X	X	X

What is the best email address to contact you in the future?	X	X	X	X	X	X	X	X
Is there anything else you would like to add? Questions for us? Comments on this survey? (free text)	X	X	X	X	X	X	X	X

Appendix S3

Primary outcome – new vaccination

The GEE models examining association with incident COVID-19 infection are shown below. The first model contains 3-level age (25-49 as reference) male sex, grocery (vs. other), census region (Northeast as reference), survey month (Jan 2022 as reference), and ever vaccinated. The second is the same, but with dichotomized age (50+ indicator). The third model is the same as the second model but with interaction terms between survey month and age, male sex, grocery, and vaccination status. An attempt to add interactions between month and region led to problems with perfect prediction.

```
GEE population-averaged model                   Number of obs    = 22,057
Group variable: patkey                        Number of groups =  8,670
Family: Binomial                              Obs per group:
Link:   Logit                                               min =      1
Correlation: exchangeable                                   avg =    2.5
                                                            max =      8
                                              Wald chi2(15)    = 478.19
Scale parameter = 1                           Prob > chi2      = 0.0000

                          (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
--------------+---------------------------------------------------------------
    age_cat3 |
       16-24 |   .9970094   .2035337    -0.01   0.988     .6682384    1.487535
         50+ |   .8992713   .0859096    -1.11   0.266     .7457159    1.084446
             |
      1.male |   .7336408   .0787587    -2.89   0.004     .5944348    .9054463
             |
     grocery |
     Grocery |   .8733155    .090864    -1.30   0.193      .71221    1.070864
             |
      region |
       South |   1.201059   .1875951     1.17   0.241      .884329    1.631228
     Midwest |   1.078067   .1448811     0.56   0.576     .8284243    1.402938
        West |   1.046625    .13787     0.35   0.729     .8084697    1.354934
             |
      newenc |
 June (FU1) |   .1237911    .017894   -14.45   0.000     .0932499    .1643351
 July (FU2) |   .2197019   .0819125    -4.06   0.000     .1057977    .4562379
  Aug (FU3) |   .2399357   .0317314   -10.79   0.000     .1851501    .3109323
  Sep (FU4) |   .2972083    .037724    -9.56   0.000      .23175    .3811554
  Oct (FU5) |   .2595762    .035201    -9.95   0.000     .1989912    .3386071
  Nov (FU6) |   .2496139   .0366076    -9.46   0.000     .1872554    .3327387
  Dec (FU7) |   .3165056   .0440673    -8.26   0.000     .2409173    .4158099
```

```
             |
vaccinated_s2 |
         Yes |   .347245   .0372428    -9.86   0.000     .2814121    .4284787
       _cons |   .275659   .0494089    -7.19   0.000     .1940008    .3916885
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 22,057
Group variable: patkey                          Number of groups =  8,670
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.5
                                                             max =      8
                                                Wald chi2(14)    = 476.75
Scale parameter = 1                             Prob > chi2      = 0.0000

                          (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
--------------+---------------------------------------------------------------
     1.age50 |   .8995547    .083633    -1.14   0.255     .7497045    1.079357
      1.male |   .7335643   .0784296    -2.90   0.004     .5948827     .904576
             |
     grocery |
    Grocery  |    .87325   .0908595    -1.30   0.193     .7121527    1.070789
             |
      region |
       South |   1.201084   .1877261     1.17   0.241     .8841643    1.631601
     Midwest |   1.078057    .144834     0.56   0.576     .8284856    1.402808
        West |   1.046652   .1380526     0.35   0.730     .8082197    1.355424
             |
      newenc |
  June (FU1) |   .1237757   .0177729   -14.55   0.000     .0934139    .1640059
  July (FU2) |   .2196561   .0817764    -4.07   0.000     .1058881    .4556585
   Aug (FU3) |   .2399245   .0316324   -10.83   0.000     .1852889    .3106703
   Sep (FU4) |   .2972001   .0376897    -9.57   0.000     .2317944    .3810613
   Oct (FU5) |    .259575   .0351897    -9.95   0.000     .1990071    .3385768
   Nov (FU6) |   .2496175   .0366144    -9.46   0.000     .1872488     .33276
   Dec (FU7) |   .3165058   .0440673    -8.26   0.000     .2409175     .41581
             |
vaccinated_s2 |
       Yes   |   .3472527   .0372076    -9.87   0.000     .2814756     .428401
       _cons |   .2755926   .0493932    -7.19   0.000     .1939594    .3915835
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 22,057
Group variable: patkey                          Number of groups =  8,670
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.5
                                                             max =      8
                                                Wald chi2(42)    = 432.43
Scale parameter = 1                             Prob > chi2      = 0.0000

                          (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
--------------+---------------------------------------------------------------
     1.age50 |   .6663072   .1017705    -2.66   0.008      .493928    .8988462
             |
      newenc |
  June (FU1) |   .3780967    .144995    -2.54   0.011     .1783111    .8017284
  July (FU2) |   4.460856   3.274475     2.04   0.042     1.058271    18.80354
   Aug (FU3) |   .4857931   .2058703    -1.70   0.088     .2117033    1.114744
```

```
        Sep (FU4) |   .6989135   .2551711    -0.98   0.327    .3417059    1.429534
        Oct (FU5) |   .5626921   .2316868    -1.40   0.163    .2510679    1.261103
        Nov (FU6) |   .5031824    .22607    -1.53   0.126    .2085918    1.213818
        Dec (FU7) |   .2015108   .1016003    -3.18   0.001    .0750116    .5413375
                  |
       age50#newenc |
      1#June (FU1) |    1.44511    .446608     1.19   0.234    .7885673    2.648273
      1#July (FU2) |   .2035167   .2085446    -1.55   0.120     .027313    1.516459
       1#Aug (FU3) |   2.160792   .5857668     2.84   0.004    1.270169    3.675905
       1#Sep (FU4) |   1.289847   .3364847     0.98   0.329    .7735419    2.150764
       1#Oct (FU5) |    1.48097   .3995357     1.46   0.145     .872789    2.512946
       1#Nov (FU6) |   1.581494   .4863099     1.49   0.136    .8656109     2.88943
       1#Dec (FU7) |   1.677861   .5227596     1.66   0.097    .9110725    3.090004
                  |
           1.male |   .6822249   .1190788    -2.19   0.028    .4845681    .9605067
                  |
        male#newenc |
      1#June (FU1) |   1.123612   .3822067     0.34   0.732    .5768627    2.188569
      1#July (FU2) |   .3349015   .3770927    -0.97   0.331    .0368536    3.043363
       1#Aug (FU3) |   1.165482   .3619154     0.49   0.622    .6341375    2.142042
       1#Sep (FU4) |    1.01901   .3084706     0.06   0.950    .5629973    1.844381
       1#Oct (FU5) |   1.310901   .4053115     0.88   0.381    .7151397    2.402974
       1#Nov (FU6) |    1.39295   .4506164     1.02   0.306    .7388791    2.626016
       1#Dec (FU7) |   .9201473   .3119906    -0.25   0.806    .4734171    1.788425
                  |
           grocery |
         Grocery |   .7777508   .1294189    -1.51   0.131    .5613055     1.07766
                  |
      grocery#newenc |
  Grocery#June (FU1) |   1.176364   .3914049     0.49   0.625    .6128105    2.258173
  Grocery#July (FU2) |   1.135543   .9273353     0.16   0.876    .2291258    5.627726
   Grocery#Aug (FU3) |   1.327895   .4092585     0.92   0.357    .7258092    2.429432
   Grocery#Sep (FU4) |   .8321762    .229548    -0.67   0.505    .4846401    1.428931
   Grocery#Oct (FU5) |   1.104564   .3401922     0.32   0.747    .6039918    2.019996
   Grocery#Nov (FU6) |   1.236961   .4284253     0.61   0.539    .6273931    2.438778
   Grocery#Dec (FU7) |   2.515462   .9892716     2.35   0.019    1.163751    5.437198
                  |
           region |
            South |   1.211169   .1896233     1.22   0.221    .8911255    1.646155
          Midwest |   1.078639   .1450885     0.56   0.574    .8286678    1.404015
             West |   1.054289   .1387095     0.40   0.688    .8146476    1.364425
                  |
       vaccinated_s2 |
              Yes |   1.077746   .2667775     0.30   0.762    .6634616     1.75072
                  |
vaccinated_s2#newenc |
     Yes#June (FU1) |   .1160354   .0422565    -5.91   0.000    .0568341    .2369036
     Yes#July (FU2) |   .0138998   .0151325    -3.93   0.000    .0016456    .1174081
      Yes#Aug (FU3) |   .1798428   .0643111    -4.80   0.000    .0892291    .3624762
      Yes#Sep (FU4) |   .3568008   .1191426    -3.09   0.002    .1854357    .6865282
      Yes#Oct (FU5) |   .2458275   .0877372    -3.93   0.000    .1221326    .4947993
      Yes#Nov (FU6) |   .2177955   .0791795    -4.19   0.000    .1068059    .4441226
      Yes#Dec (FU7) |   .5089158   .2113717    -1.63   0.104    .2254811    1.148634
                  |
              _cons |   .1390088   .0396488    -6.92   0.000    .0794801    .2431231
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

The second set of three GEE models for new infection are shown below. The first model contains 3-level age (25-49 as reference) male sex, grocery (vs. other), census region (Northeast as reference), survey month (Jan 2022 as reference), ever vaccinated, and an indicator for whether the respondent reported having had COVID-19 during the baseline survey. The second is the same, but with dichotomized age (50+ indicator). The third model is the same as the second model but with interaction terms between survey month and age, male sex, grocery, and vaccination status. An attempt to add interactions between month and region led to problems with perfect prediction.

```
GEE population-averaged model                   Number of obs    = 21,609
Group variable: patkey                          Number of groups =  8,507
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.5
                                                             max =      8
                                                Wald chi2(16)    = 743.07
Scale parameter = 1                             Prob > chi2      = 0.0000

                            (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
 new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
---------------+--------------------------------------------------------------
      age_cat3 |
         16-24 |   .999926   .2035867    -0.00   1.000     .6709061    1.490301
           50+ |   .9099302   .0882146    -0.97   0.330     .7524662    1.100346
               |
       1.male |   .7367081   .0802251    -2.81   0.005     .5951171    .9119866
               |
      grocery |
      Grocery |   .8658201    .091202    -1.37   0.171     .7043128    1.064363
               |
       region |
        South |   1.160872   .1846069     0.94   0.348     .8500067    1.585426
      Midwest |   1.033632    .14043     0.24   0.808     .7919927    1.348997
         West |   1.047429   .1391995     0.35   0.727     .8072408    1.359084
               |
       newenc |
   June (FU1) |   .1370699   .0210565   -12.94   0.000     .1014335    .1852264
   July (FU2) |   .2394098   .0894261    -3.83   0.000     .1151317    .4978389
    Aug (FU3) |   .2177265   .0288984   -11.49   0.000     .1678545    .2824162
    Sep (FU4) |   .2878079   .0371891    -9.64   0.000     .2234162    .3707581
    Oct (FU5) |   .2524501   .0350287    -9.92   0.000     .1923389    .3313477
    Nov (FU6) |   .2368113   .0358627    -9.51   0.000     .1759934     .318646
    Dec (FU7) |   .3089241   .0441643    -8.22   0.000     .2334332    .4088282
               |
 vaccinated_s2 |
        Yes |   .3488126   .0377455    -9.73   0.000     .2821515     .431223
               |
covid19_survey1 |
        Yes |   2.857064   .2824961    10.62   0.000     2.353728    3.468037
       _cons |   .2112376   .0400096    -8.21   0.000      .14573    .3061919
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 21,609
Group variable: patkey                          Number of groups =  8,507
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.5
                                                             max =      8
                                                Wald chi2(15)    = 742.37
Scale parameter = 1                             Prob > chi2      = 0.0000

                              (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
  new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
---------------+--------------------------------------------------------------
       1.age50 |   .9099375   .0856772    -1.00   0.316     .7565972    1.094355
        1.male |   .7367062   .0798933    -2.82   0.005     .5956407    .9111803
               |
       grocery |
       Grocery |   .8658184   .0911755    -1.37   0.171     .7043533    1.064298
               |
        region |
         South |   1.160872   .1847736     0.94   0.349     .8497685    1.585873
       Midwest |   1.033632   .1404798     0.24   0.808      .791918    1.349124
          West |    1.04743   .1394425     0.35   0.728     .8068747    1.359703
               |
        newenc |
    June (FU1) |   .1370695   .0209302   -13.01   0.000     .1016164    .1848918
    July (FU2) |   .2394084   .0893074    -3.83   0.000     .1152425    .4973548
     Aug (FU3) |   .2177263   .0288056   -11.52   0.000     .1679946    .2821801
     Sep (FU4) |   .2878077    .037165    -9.64   0.000     .2234526    .3706972
     Oct (FU5) |   .2524501   .0350254    -9.92   0.000     .1923439    .3313392
     Nov (FU6) |   .2368114   .0358668    -9.51   0.000     .1759876    .3186569
     Dec (FU7) |   .3089241   .0441647    -8.22   0.000     .2334325    .4088294
               |
  vaccinated_s2 |
         Yes |   .3488126   .0377434    -9.73   0.000     .2821548     .431218
               |
covid19_survey1 |
         Yes |   2.857064   .2824956    10.62   0.000     2.353729    3.468036
       _cons |   .2112364   .0400375    -8.20   0.000     .1456911    .3062699
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 21,609
Group variable: patkey                          Number of groups =  8,507
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.5
                                                             max =      8
                                                Wald chi2(50)    = 604.43
Scale parameter = 1                             Prob > chi2      = 0.0000

                                  (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
                     |               Robust
        new_infection | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
----------------------+--------------------------------------------------------------
             1.age50 |   .6462903   .0997056    -2.83   0.005     .4776498    .8744715
                     |
                     |
              newenc |
          June (FU1) |   .1396108   .0702413    -3.91   0.000     .0520787    .3742636
          July (FU2) |   1.513576   1.899769     0.33   0.741     .1293053    17.71707
           Aug (FU3) |   .1881117   .0949841    -3.31   0.001     .0699221    .5060773
           Sep (FU4) |   .5009036   .2015134    -1.72   0.086     .2276753    1.102027
```

```
          Oct (FU5)  |   .5223374   .2262579    -1.50   0.134    .2234812    1.220847
          Nov (FU6)  |   .3943979   .1963382    -1.87   0.062    .1486591    1.046351
          Dec (FU7)  |   .1777724    .095452    -3.22   0.001    .062062    .5092175
                     |
       age50#newenc  |
      1#June (FU1)   |   1.813362   .6335432     1.70   0.088    .9143154    3.596441
      1#July (FU2)   |   .4280438    .459451    -0.79   0.429    .0522192    3.508696
       1#Aug (FU3)   |   2.318463   .6399225     3.05   0.002    1.349767     3.98237
       1#Sep (FU4)   |   1.324376   .3480934     1.07   0.285    .7911979    2.216856
       1#Oct (FU5)   |   1.533117   .4192473     1.56   0.118    .8970261    2.620266
       1#Nov (FU6)   |   1.691178   .5371645     1.65   0.098    .9074535    3.151768
       1#Dec (FU7)   |   1.758925   .5608987     1.77   0.077    .9414778    3.286129
                     |
           1.male    |   .6895992   .1218676    -2.10   0.035    .4877199    .9750414
                     |
        male#newenc  |
      1#June (FU1)   |   .9274749   .3608439    -0.19   0.847    .4326465    1.988251
      1#July (FU2)   |   .7002416   .8404609    -0.30   0.767    .066619     7.360334
       1#Aug (FU3)   |   1.215694    .381976     0.62   0.534    .6567092     2.25048
       1#Sep (FU4)   |   1.013376   .3109836     0.04   0.965    .5553344     1.84921
       1#Oct (FU5)   |   1.307408   .4099369     0.85   0.393    .7071595    2.417156
       1#Nov (FU6)   |   1.451458   .4850102     1.11   0.265    .7540018    2.794067
       1#Dec (FU7)   |    .917886   .3181271    -0.25   0.805    .4653434    1.810523
                     |
          grocery    |
         Grocery     |   .7847557   .1332573    -1.43   0.153    .5625928    1.094649
                     |
     grocery#newenc  |
  Grocery#June (FU1) |   1.030748   .4040961     0.08   0.938     .47802     2.222588
  Grocery#July (FU2) |   1.549473   1.801747     0.38   0.706    .1586337    15.13465
   Grocery#Aug (FU3) |   1.346002   .4247871     0.94   0.346    .7251264    2.498492
   Grocery#Sep (FU4) |   .8291809    .232775    -0.67   0.505    .4782913    1.437494
   Grocery#Oct (FU5) |   1.126656   .3542559     0.38   0.704    .6083412    2.086584
   Grocery#Nov (FU6) |   1.150983   .4084702     0.40   0.692    .5740997    2.307545
   Grocery#Dec (FU7) |   2.493602   1.007918     2.26   0.024    1.129198    5.506608
                     |
           region    |
           South     |   1.215479   .1967972     1.21   0.228    .8849734    1.669417
          Midwest    |   1.042777   .1432743     0.30   0.760    .7965972    1.365035
            West     |   1.096058   .1470371     0.68   0.494    .8426444    1.425683
                     |
      vaccinated_s2  |
             Yes     |   1.087622   .2744974     0.33   0.739    .6632069    1.783639
                     |
 vaccinated_s2#newenc |
     Yes#June (FU1)  |   .0320017    .014097    -7.81   0.000    .0134962    .0758812
     Yes#July (FU2)  |   3.15e-06   .0000153    -2.62   0.009    2.39e-10    .0415785
      Yes#Aug (FU3)  |   .2634508   .0997949    -3.52   0.000    .1253906    .5535207
      Yes#Sep (FU4)  |   .3634174   .1235214    -2.98   0.003    .1866776    .7074884
      Yes#Oct (FU5)  |   .2444693   .0886947    -3.88   0.000    .1200616    .4977882
      Yes#Nov (FU6)  |   .2169282   .0811572    -4.08   0.000    .1041992     .451614
      Yes#Dec (FU7)  |   .4956427   .2092998    -1.66   0.096    .2166325    1.134002
                     |
     covid19_survey1 |
             Yes     |    1.25254   .2233347     1.26   0.207    .8831155    1.776501
                     |
covid19_survey1#newenc |
     Yes#June (FU1)  |   69.48898   28.73978    10.25   0.000    30.89367    156.3012
     Yes#July (FU2)  |   55903.31   266860.3     2.29   0.022    4.83212    6.47e+08
      Yes#Aug (FU3)  |   3.646027   1.084904     4.35   0.000    2.034877    6.532834
      Yes#Sep (FU4)  |   2.547045   .7034221     3.39   0.001    1.482377    4.376375
      Yes#Oct (FU5)  |   1.205047   .3848408     0.58   0.559    .6444158    2.253417
      Yes#Nov (FU6)  |   2.061638   .6697988     2.23   0.026    1.090607    3.897234
      Yes#Dec (FU7)  |   1.558911    .498988     1.39   0.165    .832458     2.919311
                     |
             _cons   |   .1320255   .0388247    -6.89   0.000     .07419     .2349473
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

Secondary outcome – new vaccination

The first set of three GEE models for new vaccination are shown below. The first model contains 3-level age (25-49 as reference) male sex, grocery (vs. other), census region (Northeast as reference), and survey month (Jan 2022 as reference). The second is the same, but with dichotomized age (50+ indicator). The third model is the same as the second model but with interaction terms between survey month and age, male sex, grocery, and vaccination status. An attempt to add interactions between month and region led to problems with perfect prediction.

```
GEE population-averaged model                   Number of obs    = 16,953
Group variable: patkey                        Number of groups =  6,943
Family: Binomial                            Obs per group:
Link:   Logit                                       min =      1
Correlation: exchangeable                           avg =    2.4
                                                    max =      6
                                          Wald chi2(12)    = 745.98
Scale parameter = 1                       Prob > chi2      = 0.0000

                          (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_vaccin~n | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
    age_cat3 |
      16-24  |   .8941534   .1485477    -0.67   0.501     .6456542    1.238295
       50+   |   1.267097   .0692208     4.33   0.000     1.138437    1.410296
             |
     1.male  |   .9681002   .0511186    -0.61   0.539     .8729198    1.073659
             |
     grocery |
     Grocery |   .8710522   .0506005    -2.38   0.017     .7773146    .9760938
             |
      region |
       South |   1.012852   .0871456     0.15   0.882     .8556745    1.198901
     Midwest |    .966749   .0705108    -0.46   0.643      .837974    1.115314
        West |   1.087749   .0771696     1.19   0.236     .9465437    1.250018
             |
      newenc |
  Aug (FU3)  |   .2787713   .0229206   -15.54   0.000     .2372806    .3275171
  Sep (FU4)  |   .3162337   .0270517   -13.46   0.000     .2674197    .3739579
  Oct (FU5)  |   .5538641   .0422543    -7.74   0.000     .4769413    .6431931
  Nov (FU6)  |   1.268217   .0921062     3.27   0.001     1.099952    1.462222
  Dec (FU7)  |   1.564106    .108495     6.45   0.000     1.365282    1.791886
             |
       _cons |   .2343753   .0225264   -15.10   0.000     .1941335    .2829587
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 16,953
Group variable: patkey                        Number of groups =  6,943
Family: Binomial                            Obs per group:
Link:   Logit                                       min =      1
```

```
Correlation: exchangeable                                   avg =    2.4
                                                            max =      6
                                                  Wald chi2(11)    = 745.94
Scale parameter = 1                               Prob > chi2      = 0.0000

                              (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_vaccin~n | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
-------------+----------------------------------------------------------------
    1.age50 |   1.279505   .0679477     4.64   0.000     1.153026    1.419857
     1.male |   .9656685   .0510468    -0.66   0.509     .8706271    1.071085
            |
    grocery |
    Grocery |   .8693668   .0504716    -2.41   0.016     .7758648    .9741369
            |
     region |
      South |   1.013746   .0873162     0.16   0.874     .8562747    1.200176
    Midwest |   .9668102    .070503    -0.46   0.643     .8380478    1.115356
       West |   1.088615   .0772903     1.20   0.232     .9471968    1.251148
            |
     newenc |
  Aug (FU3) |   .2784051   .0229002   -15.55   0.000     .2369527    .3271092
  Sep (FU4) |   .3160515   .0270406   -13.46   0.000     .2672582    .3737529
  Oct (FU5) |   .5538347   .0422565    -7.74   0.000     .4769086    .6431692
  Nov (FU6) |   1.268976   .0921772     3.28   0.001     1.100583    1.463133
  Dec (FU7) |   1.564596   .1085587     6.45   0.000     1.365658    1.792514
            |
      _cons |    .232501    .02233   -15.19   0.000     .1926076    .2806574
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).



GEE population-averaged model                     Number of obs    = 16,953
Group variable: patkey                          Number of groups =  6,943
Family: Binomial                               Obs per group:
Link:   Logit                                             min =      1
Correlation: exchangeable                                 avg =    2.4
                                                          max =      6
                                                Wald chi2(26)    = 794.27
Scale parameter = 1                             Prob > chi2      = 0.0000

                              (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
               |               Robust
  new_vaccination | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
-----------------+----------------------------------------------------------------
        1.age50 |   1.113785   .1222156     0.98   0.326     .8982538    1.381032
                |
         newenc |
      Aug (FU3) |   .4057725   .0813722    -4.50   0.000      .273896    .6011454
      Sep (FU4) |   .6164232   .1220098    -2.44   0.015     .4182145     .908571
      Oct (FU5) |   .6801829   .1315429    -1.99   0.046     .4655957    .9936707
      Nov (FU6) |   .7596432   .1445909    -1.44   0.149     .5231082    1.103133
      Dec (FU7) |   1.324928    .241235     1.55   0.122     .9272797    1.893102
                |
    age50#newenc |
    1#Aug (FU3) |   .7871242   .1330678    -1.42   0.157     .5651229    1.096336
    1#Sep (FU4) |   .8223969   .1458135    -1.10   0.270     .5809795    1.164132
    1#Oct (FU5) |    1.44785   .2377746     2.25   0.024     1.049384    1.997621
    1#Nov (FU6) |   1.774707   .2777816     3.66   0.000     1.305854    2.411898
    1#Dec (FU7) |   1.078419   .1592005     0.51   0.609     .8074762    1.440274
                |
          1.male |   .9727459   .1123755    -0.24   0.811     .7756489    1.219926
                |
     male#newenc |
    1#Aug (FU3) |    .94521   .1723778    -0.31   0.757     .6611422    1.351331
    1#Sep (FU4) |   .9450438   .1807406    -0.30   0.768      .649619    1.374818
```

```
     1#Oct (FU5)  |   .6459457   .1148398    -2.46   0.014     .4558948    .9152239
     1#Nov (FU6)  |   1.263816   .2032102     1.46   0.145     .9221859    1.732006
     1#Dec (FU7)  |   1.046253    .158911     0.30   0.766     .7768748    1.409036
                  |
         grocery |
         Grocery  |   1.024554   .1282609     0.19   0.846     .8016325    1.309466
                  |
    grocery#newenc |
Grocery#Aug (FU3)  |   .7453898   .1410851    -1.55   0.121     .5143641     1.08018
Grocery#Sep (FU4)  |   .4614452   .0874603    -4.08   0.000     .3182637    .6690415
Grocery#Oct (FU5)  |   .6299779    .110795    -2.63   0.009     .4462964    .8892568
Grocery#Nov (FU6)  |   1.059736   .1842968     0.33   0.739      .753645    1.490146
Grocery#Dec (FU7)  |   1.135715   .1884096     0.77   0.443     .8204629    1.572097
                  |
          region |
          South  |   1.008814   .0871217     0.10   0.919     .8517281    1.194872
        Midwest  |   .9649226   .0706021    -0.49   0.626     .8360095    1.113714
           West  |   1.079915   .0769211     1.08   0.280     .9392029    1.241708
                  |
          _cons |    .224744   .0333941   -10.05   0.000     .1679618    .3007224
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

The second set of three models for new vaccination are shown below. The first model contains 3-level age (25-49 as reference) male sex, grocery (vs. other), census region (Northeast as reference), survey month (Jan 2022 as reference), and an indicator for whether the respondent reported having had COVID-19 during the baseline survey. The second is the same, but with dichotomized age (50+ indicator). The third model is the same as the second model but with interaction terms between survey month and age, male sex, grocery, and vaccination status. An attempt to add interactions between month and region led to problems with perfect prediction.

```
GEE population-averaged model                   Number of obs    = 16,599
Group variable: patkey                          Number of groups =  6,805
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.4
                                                             max =      6
                                                Wald chi2(13)    = 741.91
Scale parameter = 1                             Prob > chi2      = 0.0000

                            (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_vaccination | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
----------------+-------------------------------------------------------------
      age_cat3 |
        16-24  |    .889233   .1490518    -0.70   0.484     .6402337    1.235073
          50+  |   1.292581   .0714756     4.64   0.000     1.159816    1.440544
               |
        1.male |    .977621   .0522952    -0.42   0.672     .8803144    1.085684
               |
       grocery |
       Grocery |   .8645538    .050733    -2.48   0.013      .770624    .9699325
               |
```

```
       region |
        South |   1.016866   .0887081     0.19   0.848     .8570524    1.206479
      Midwest |     .96423   .0709105    -0.50   0.620     .8347999    1.113727
         West |   1.095134   .0785396     1.27   0.205     .9515286    1.260413
              |
       newenc |
  Aug (FU3) |   .2782174   .0231472   -15.38   0.000     .2363555    .3274937
  Sep (FU4) |   .3143137   .0271942   -13.38   0.000     .2652882    .3723991
  Oct (FU5) |   .5531759   .0425615    -7.70   0.000     .4757421    .6432132
  Nov (FU6) |   1.254324   .0920698     3.09   0.002      1.08625    1.448403
  Dec (FU7) |   1.555936   .1089952     6.31   0.000     1.356325    1.784922
              |
covid19_survey1 |
          Yes |   .9033297   .0549403    -1.67   0.095     .8018192    1.017691
        _cons |   .2372307   .0231772   -14.73   0.000     .1958887    .2872979
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 16,599
Group variable: patkey                          Number of groups =  6,805
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.4
                                                             max =      6
                                                Wald chi2(12)    = 742.16
Scale parameter = 1                             Prob > chi2      = 0.0000

                              (Std. err. adjusted for clustering on patkey)
------------------------------------------------------------------------------
             |               Robust
new_vaccination | Odds ratio   std. err.      z    P>|z|     [95% conf. interval]
----------------+-------------------------------------------------------------
      1.age50 |   1.306025   .0702208     4.97   0.000     1.175398    1.451168
       1.male |   .9750799   .0522045    -0.47   0.637     .8779463     1.08296
              |
      grocery |
      Grocery |   .8627894   .0505899    -2.52   0.012     .7691205     .967866
              |
       region |
        South |   1.017725   .0888726     0.20   0.841     .8576288    1.207706
      Midwest |   .9642595   .0708932    -0.50   0.621     .8348584    1.113717
         West |   1.096009   .0786627     1.28   0.201     .9521861    1.261556
              |
       newenc |
  Aug (FU3) |   .2778437   .0231242   -15.39   0.000     .2360246    .3270722
  Sep (FU4) |   .3141219   .0271827   -13.38   0.000     .2651179    .3721836
  Oct (FU5) |   .5531327   .0425627    -7.70   0.000     .4756974    .6431732
  Nov (FU6) |   1.255095   .0921423     3.09   0.002     1.086891    1.449329
  Dec (FU7) |   1.556448   .1090614     6.31   0.000      1.35672    1.785578
              |
covid19_survey1 |
          Yes |   .9031351    .054916    -1.68   0.094     .8016681    1.017445
        _cons |   .2352292   .0229897   -14.81   0.000     .1942229    .2848931
------------------------------------------------------------------------------
Note: _cons estimates baseline odds (conditional on zero random effects).
```

```
GEE population-averaged model                   Number of obs    = 16,599
Group variable: patkey                          Number of groups =  6,805
Family: Binomial                                Obs per group:
Link:   Logit                                                min =      1
Correlation: exchangeable                                    avg =    2.4
                                                             max =      6
                                                Wald chi2(32)    = 790.67
Scale parameter = 1                             Prob > chi2      = 0.0000
```

(Std. err. adjusted for clustering on patkey)

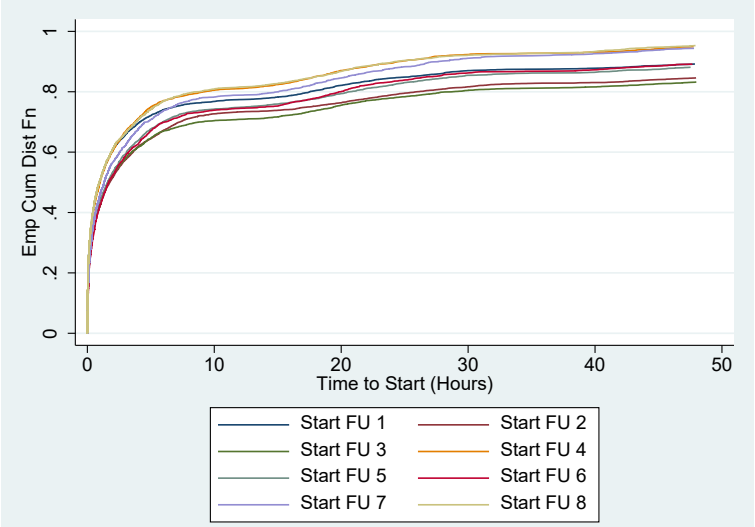
new_vaccination	Odds ratio	Robust std. err.	z	P>|z|	[95% conf. interval]	
1.age50	1.130842	.1251933	1.11	0.267	.9102631	1.404872
newenc						
Aug (FU3)	.4142582	.0865174	-4.22	0.000	.2751051	.6237976
Sep (FU4)	.6424613	.1313713	-2.16	0.030	.4303207	.9591837
Oct (FU5)	.7043493	.1411004	-1.75	0.080	.4756299	1.043055
Nov (FU6)	.7348324	.1444605	-1.57	0.117	.4998629	1.080254
Dec (FU7)	1.307813	.2437246	1.44	0.150	.9076432	1.884412
age50#newenc						
1#Aug (FU3)	.7758949	.1326747	-1.48	0.138	.5549464	1.084813
1#Sep (FU4)	.8280649	.1489452	-1.05	0.294	.5820463	1.17807
1#Oct (FU5)	1.437638	.2384616	2.19	0.029	1.038629	1.989934
1#Nov (FU6)	1.826748	.29049	3.79	0.000	1.337582	2.494807
1#Dec (FU7)	1.096685	.1639579	0.62	0.537	.8181343	1.470074
1.male	.9692505	.1126794	-0.27	0.788	.7717565	1.217283
male#newenc						
1#Aug (FU3)	.9194628	.1699027	-0.45	0.650	.6400959	1.320758
1#Sep (FU4)	.9779321	.1888944	-0.12	0.908	.6697199	1.427987
1#Oct (FU5)	.662975	.1187419	-2.29	0.022	.4667056	.941784
1#Nov (FU6)	1.301112	.2115082	1.62	0.105	.9461147	1.78931
1#Dec (FU7)	1.06529	.1628729	0.41	0.679	.7894542	1.437502
grocery						
Grocery	1.006917	.1265679	0.05	0.956	.7870435	1.288215
grocery#newenc						
Grocery#Aug (FU3)	.7791347	.1494308	-1.30	0.193	.5350077	1.134658
Grocery#Sep (FU4)	.4656393	.0891853	-3.99	0.000	.3199016	.6777709
Grocery#Oct (FU5)	.6306923	.1115811	-2.61	0.009	.4458864	.8920944
Grocery#Nov (FU6)	1.080774	.1898038	0.44	0.658	.7660348	1.524831
Grocery#Dec (FU7)	1.129867	.1889448	0.73	0.465	.8141102	1.568093
region						
South	1.009849	.0884411	0.11	0.911	.8505683	1.198956
Midwest	.9603121	.0708707	-0.55	0.583	.8309866	1.109764
West	1.085462	.0782079	1.14	0.255	.9425081	1.250097
covid19_survey1						
Yes	1.026093	.1357121	0.19	0.846	.7917822	1.329742
covid19_survey1#newenc						
Yes#Aug (FU3)	.8173379	.1723075	-0.96	0.339	.5406985	1.235515
Yes#Sep (FU4)	.7007755	.1598504	-1.56	0.119	.4481419	1.095828
Yes#Oct (FU5)	.808256	.1585549	-1.09	0.278	.5502619	1.187212
Yes#Nov (FU6)	.8827564	.1649611	-0.67	0.505	.6120352	1.273225
Yes#Dec (FU7)	.9676714	.1686845	-0.19	0.850	.6876167	1.361788
_cons	.2257347	.0344865	-9.74	0.000	.1673233	.3045371

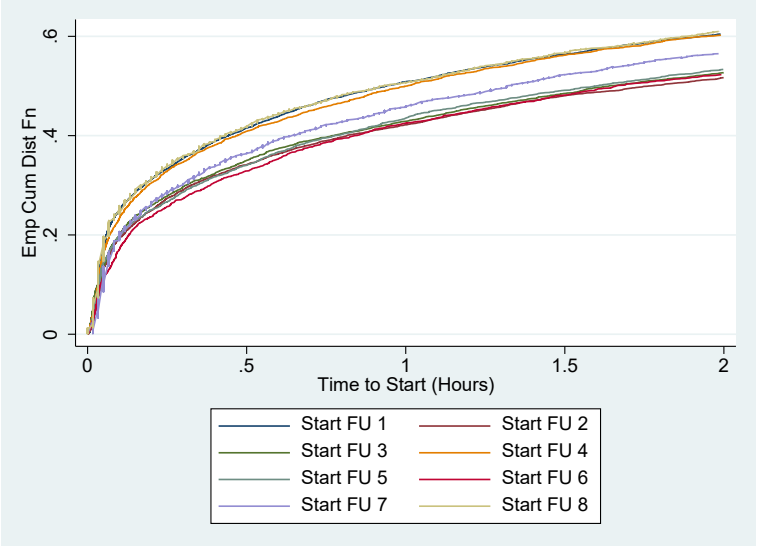
Note: _cons estimates baseline odds (conditional on zero random effects).

Appendix S4

Time to Respond to Survey

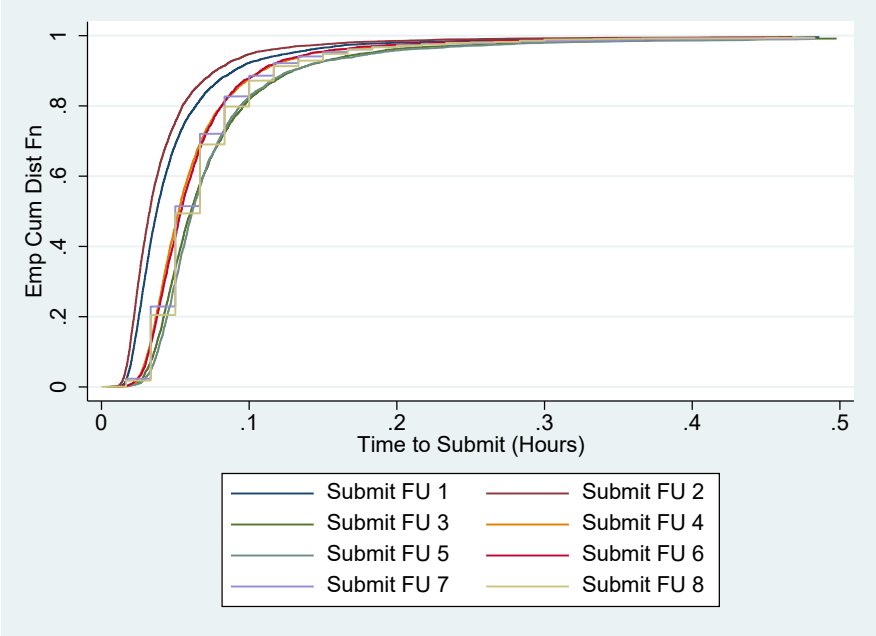
The two plots below (the second is the same as the first but zoomed in) show the empirical cumulative distributions of response times for each survey month measured as the start time of the first respondent (defined as response time 0) to each person's individual start time. Note that these essentially show the proportion of respondents who will respond to a given survey who have responded up to a given time.

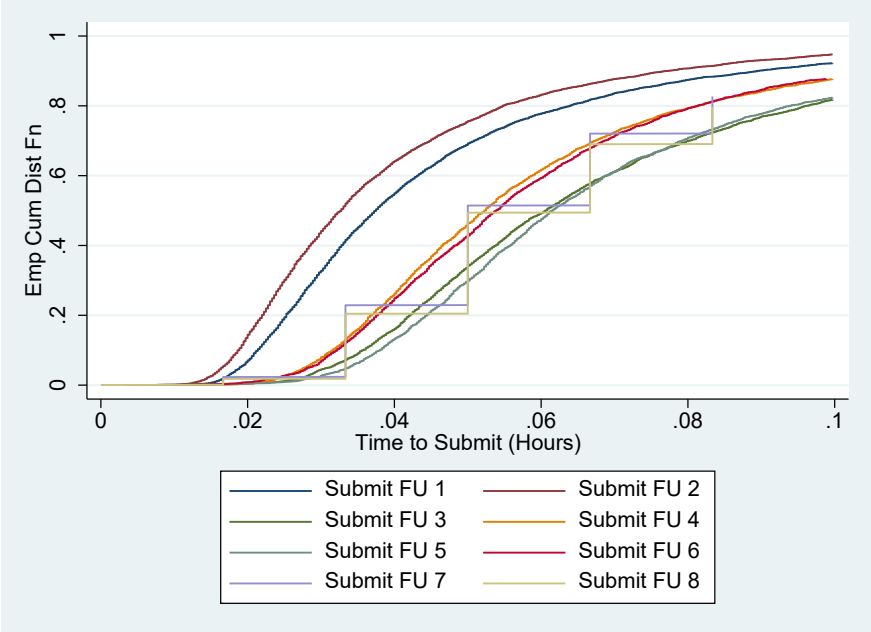




Time to Submit Survey

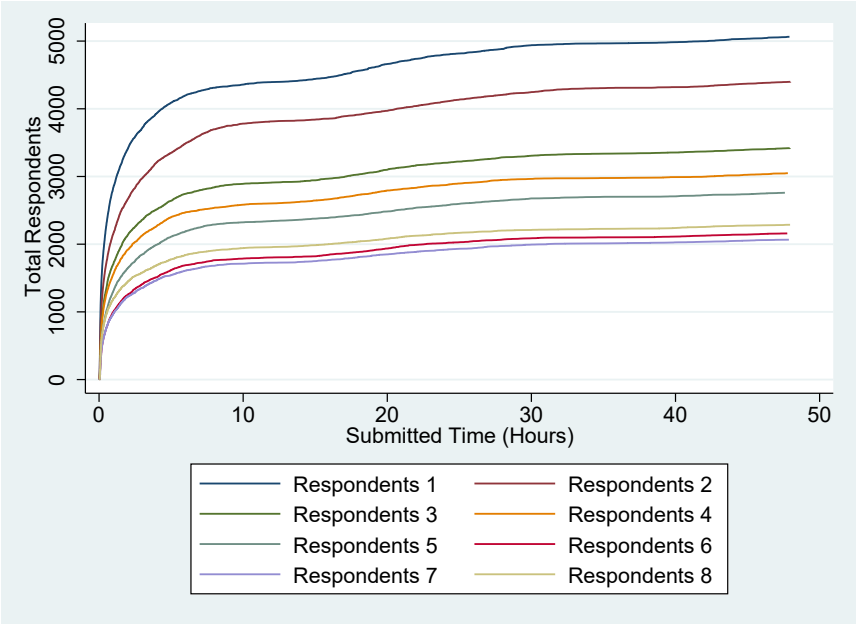
The two plots below (the second is the same as the first but zoomed in) show the empirical cumulative distributions of submission times for each survey month measured as difference between the start time and submission time for each person. The coarse measurement of the last two surveys is a result of a switch from measuring time in seconds to minutes.

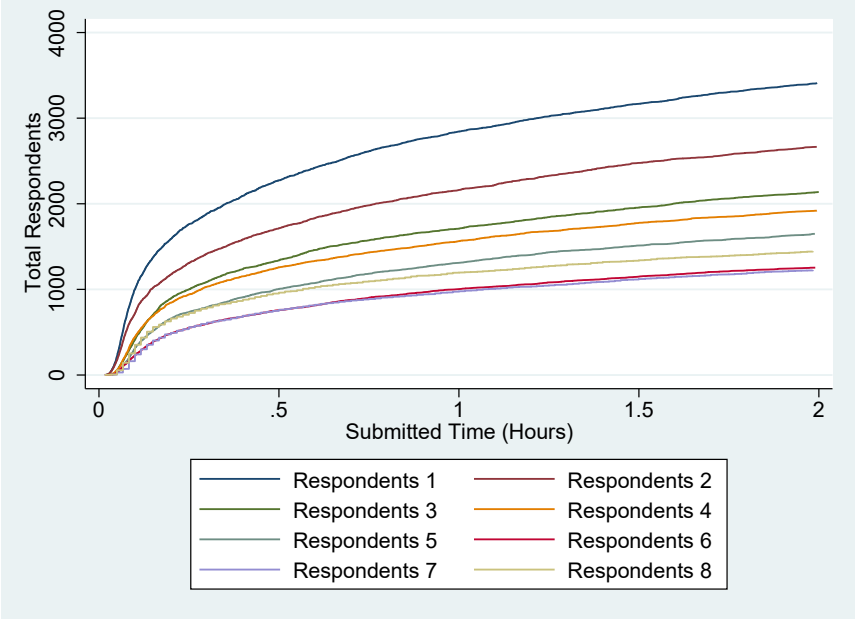




Time to Submit

The two plots below (the second is the same as the first but zoomed in) show the total number of respondents over time for each survey month measured as submission time for each person minus the start time of the first respondent. The coarse measurement of the last two surveys is a result of a switch from measuring time in seconds to minutes.





Data Dictionary – what questions were asked on each monthly survey.

Yellow means that the question is in the pdf survey, but there's no data, red means that the question was not on the pdf survey, but there is data for this item, and blue means that the questions for July are technically there, but were not asked of the correct respondents because of the problems caused by the "Did you answer the June survey?" question.

Question	Jun FU1	Jul FU2	Aug FU3	Sep FU4	Oct FU5	Nov FU6	Dec FU7	Jan FU8
What is your phone number? (We ask each time because we do not track your device between surveys.)	X	X	X					
Please confirm your phone number. (Use the number we texted. We ask each time because we do not track your device between surveys.)				X	X	X	X	X
Did you fill out our June survey?		X						
Have you ever tested positive for, or been told you have, COVID-19?	X	X	X	X	X	X	X	X
Have you tested positive for, or been told you have, COVID-19 in the past month?		X	X	X	X	X	X	X
Have you ever received a COVID-19 vaccine?	X	X	X	X	X	X	X	X
Have you received any COVID-19 vaccine shots in the past month?		X	X	X	X	X	X	X
How normal is your day-to-day life compared to time before the COVID-19 pandemic began?		X	No				X	
Do you think the COVID-19 pandemic is over?		X	No					
Did any of your coworkers die of COVID-19?		X						
Currently, how seriously are the people around you taking COVID-19?		X	No					
Do you think these groups are currently taking the pandemic seriously? Coworkers			X	X				
Do you think these groups are currently taking the pandemic seriously? Management			X	X				
Do you think these groups are currently taking the pandemic seriously? Customers			X	X				
Are you concerned about new COVID-19 variants?			X				X	
Is your employer currently offering paid time off / sick leave for workers who: Test positive for COVID-19?			X					
Is your employer currently offering paid time off / sick leave for workers who: Get vaccinated?			X					
Is your employer currently offering paid time off / sick leave for workers who: Have vaccine side effects?			X					
Is your employer currently offering paid time off / sick leave for workers who have vaccine side effects?				X	X	X		

If your employer offered paid time off for getting vaccinated/vaccine side effects, my coworkers are: More/Less/No Change to get vaccinated				X	X			
Do you think employers should require masks?			X	X				
Do you think employers should require COVID-19 vaccination of their workers?			X	X				
Does your workplace require you to be COVID-19 vaccinated?			X	X				
What kind of safety measures were added/required by your employer during the pandemic? (select any) Masks	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Social distancing	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Physical barriers between people	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Hand washing	X	X						
What kind of safety measures were added/required by your employer during the pandemic? (select any) Other (free text)	X	X						
Is your employer enforcing safety measures against COVID-19?								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Masks								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Social distancing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Physical barriers between people								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Hand washing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Vaccine requirement								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) COVID-19 testing								X
If Yes or I don't know: What kind of safety measures are currently being enforced by your employer during the pandemic? (select any) Other (free text)								X
If you or your coworkers get sick, are they required to get tested for COVID-19?								X
If you or your coworkers test positive for COVID-19, are they being required to stay home?								X
Did your employer offer you something to encourage you to get vaccinated? (Examples might include time off, money, or a gift)	X	X						

What symptoms did you have with COVID-19 illness? (check all that apply) Fever	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Cough	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Shortness of breath (trouble breathing)	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Loss of taste / smell	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Sore throat								X
What symptoms did you have with COVID-19 illness? (check all that apply) Nasal congestion/runny nose								X
What symptoms did you have with COVID-19 illness? (check all that apply) Fatigue								X
What symptoms did you have with COVID-19 illness? (check all that apply) Muscle or body aches								X
What symptoms did you have with COVID-19 illness? (check all that apply) Headaches								X
What symptoms did you have with COVID-19 illness? (check all that apply) None	X	X	X	X	X	X	X	X
What symptoms did you have with COVID-19 illness? (check all that apply) Other (free text)	X	X	X	X	X	X	X	X
When (approximately) did you have COVID-19? Note: was asked as single response in June and July, multiple responses allowed in August	X	X	X					
Where do you think you got infected?	X	X	X					
Did you miss any work due to COVID illness?	X	X	X	X	X	X	X	X
If yes, about how many days?	X	X	X	X	X	X	X	X
Did you go to the Emergency Room when you had symptoms of COVID-19?	X	X	X					
Did you get admitted to a hospital when you had COVID-19 illness?	X	X	X	X	X	X	X	X
If yes: How many days were you in the hospital?	X	X	X	X	X	X	X	X
If yes: Were you on a breathing machine with a tube down your throat?	X	X	X	X	X	X	X	X
Are you fully recovered and back to your normal self after having COVID-19?	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Fatigue	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Cough	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Shortness of breath	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Memory problems	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Anxiety	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Depression	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Other: (free text)	X	X	X	X	X	X	X	X
If No, what problems are you having? (check all that apply): Unable to return to work	X	X	X	X	X	X	X	X
If yes: How long did it take for you to feel fully recovered?					X	X	X	X
When you were sick with COVID-19, did you have health insurance?	X	X	X					
Was the vaccine offered at your worksite?	X	X	X	X	X	X	X	X
Where did you receive the COVID-19 vaccine?	X	X	X	X	X	X	X	X
Which vaccine did you receive?	X	X	No					

If NOT Johnson & Johnson: How many doses did you get?	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I had side effects with the first dose	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I have no time or transportation	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) I believe one dose is enough	X	X	No					
If “1 and choosing not to get 2nd": I do not plan to get the second dose because (choose any) Other (free text)	X	X	No					
How many vaccine shots did you receive?			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I had side effects with the first dose			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I have no time or transportation			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) I believe one dose is enough			X	X	X	X	X	X
If “1 and choosing not to get more”: I do not plan to get the second dose because (choose any) Other (free text)			X	X	X	X	X	X
Did you have any side effects? Muscle ache / arm soreness		X	X	X	X	X	X	X
Did you have any side effects? Fatigue		X	X	X	X	X	X	X
Did you have any side effects? Fever		X	X	X	X	X	X	X
Did you have any side effects? Headache		X	X	X	X	X	X	X
Did you have any side effects? Severe allergic reaction		X	X	X	X	X	X	X
Did you have any side effects? None		X	X	X	X	X	X	X
Did you have any side effects? Other (free text)		X	X	X	X	X	X	X
If yes to any of the above: Did you miss a day or more of work due to side effects?		X	X	X	X	X	X	X
If yes to any of the above: When did you start feeling side effects after vaccination?				X	X	X	X	X
If yes to any of the above: When you started experiencing side effects, how long did they last?				X	X	X	X	X
What influenced you to get it? Reading or listening to a news story discussing the results of COVID-19 vaccines					X	X	X	X
What influenced you to get it? Having a conversation with a doctor about whether to get a vaccine					X	X	X	X
What influenced you to get it? A friend or family member receiving the COVID-19 vaccine					X	X	X	X
What influenced you to get it? A friend or family member being diagnosed with COVID-19					X	X	X	X
What influenced you to get it? Wanting to travel					X	X	X	X

What influenced you to get it? Seeing a celebrity or elected official get a vaccine					X	X	X	X
What influenced you to get it? Work requirement					X	X	X	X
What influenced you to get it? Other					X	X	X	X
Will you be getting a booster vaccination shot if it becomes recommended for you and available?			X	X	X	X	X	X
Do you plan on getting the vaccine? Not clear why, but these are missing for ALL July respondents. They only appeared in the July reports because we forward filled from June. July was the only month when this was attempted.	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't have time off from work	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't have transportation to get to a vaccination location	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I'm waiting to see how it might affect other people	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Concerned about side effects	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Concerned about long term effects on my body	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't think I need it	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I don't trust the science / review process / government / drug companies	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? My doctor recommended against it	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? I read something on the internet that makes me concerned about the vaccine	X	No	X	X	X	X	X	X
Why will you NOT receive the vaccine? Other (free text)	X	No	X	X	X	X	X	X
You mentioned that you were concerned about side effects. Which ones are you concerned about?	X	No	X	X	X	X	X	X
You mentioned that you don't think you need it. What are the reasons you don't think you need it?	X	No	X	X	X	X	X	X
What might lead to you getting vaccinated? Cash incentive					X	X	X	X
What might lead to you getting vaccinated? My job requiring it					X	X	X	X
What might lead to you getting vaccinated? Someone I trust recommending it					X	X	X	X
What might lead to you getting vaccinated? Community pressure					X	X	X	X
What might lead to you getting vaccinated? Nothing					X	X	X	X
What might lead to you getting vaccinated? Other					X	X	X	X
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Not enough people being masked					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Not enough people being vaccinated					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Lack of social distancing					X	X		

What are your concerns about safety with the busy holiday season coming up? (select all that apply) Loosening of safety measures by employers					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Enforcing safety measures with customers & co-workers					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Being understaffed					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) No concerns					X	X		
What are your concerns about safety with the busy holiday season coming up? (select all that apply) Other (free text response)					X	X		
Now that the holiday season has begun, are you seeing any of the following in your workplace? Being understaffed							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Not enough people being masked							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Enforcing safety measures with customers & co-workers							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Lack of social distancing							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Not enough people being vaccinated							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Loosening of safety measures by employers							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? None of these							X	
Now that the holiday season has begun, are you seeing any of the following in your workplace? Other							X	
Have you gotten or plan on getting a flu shot this fall?					X	X		
Have you gotten or plan on getting a flu shot?							X	X
UFCW wants to fight for better working conditions for you. Would you be willing to answer additional surveys to learn about how COVID-19 has changed your and your co-workers' lives?	X	X	X	X	X	X	X	X
What is the best email address to contact you in the future?	X	X	X	X	X	X	X	X
Is there anything else you would like to add? Questions for us? Comments on this survey? (free text)	X	X	X	X	X	X	X	X