



COVID-19 and Agricultural Workers: A Descriptive Study

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Abstract

Agricultural workers, designated as “essential” at the start of the COVID-19 pandemic, work in harsh labor conditions, and now have the added challenge of continuing to work during the COVID-19 pandemic. The aim of this study was to assess agricultural workers’ COVID-19 related history, employer-based safety measures, individual preventive practices, and COVID-19 vaccination uptake. A questionnaire study was conducted among agricultural workers in Central Florida about COVID-19 during the month of June 2020 and again in July 2021. Among 92 agricultural workers in June 2020, 47% were obese; 11% had had a COVID-19 nasal test; 87% were able to social distance at work and 34% reported employer provided face masks; 15% reported not willing to get the COVID-19 vaccine and 25% were unsure. 40% could self-isolate if they contracted COVID-19. In a follow-up visit in July 2021, 53% of participants reported receiving a COVID-19 vaccine. Agricultural workers are particularly vulnerable to COVID-19 due to existing health risk factors and lack of essential protective resources. Occupational health protections social safety net programs are urgently needed to prevent infections in vulnerable workers, and reduce community spread, and increase COVID-19 vaccination rates.

Keywords COVID-19 · Agricultural workers · Health behavior · Prevention and control

Introduction

The rapid spread of severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2), the virus that causes coronavirus disease 2019 (COVID-19), has become a global public health crisis. In response to the highly contagious

virus, shelter-in-place mandates and social distancing guidelines were issued throughout the United States beginning in March 2020. However, even with these guidelines, agricultural workers, designated as “essential” at the start of the pandemic [1], continue to work and are at increased risk for contracting COVID-19. Agricultural workers are primarily (75%) composed of Hispanic immigrants from Mexico and Central America [2]. In the United States, Hispanics have been disproportionately affected by COVID-19, experiencing higher rates and more severe infection and increased mortality compared to non-Hispanics [3–5]. To date, there is no systematic tracking of positive COVID-19 cases by occupational sectors [6]; however, as of August 10, 2021, it is estimated that more than 620,000 agricultural workers have tested positive for COVID-19 nationwide, and over 22,000 have tested positive in Florida [7].

The nature of agricultural jobs puts workers at higher risk for infection as they work in close proximity to each other, for example while harvesting plants, working in packing plants, or riding in buses or vans to picking sites. While individuals may wear scarves or bandanas over their noses and mouths, their supervisors rarely offer personal protective equipment (PPE) [8, 9]. The work is often physically

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demanding, and as a result, may induce heavy breathing, increasing the ease of transmission of respiratory viruses like COVID-19. Workers have limited access to water, soap, and utensils to help them maintain hand hygiene, and almost universally lack paid sick leave and health insurance [10, 11]. Adding to the risks that agricultural workers face because of their occupation are such structural vulnerabilities as language barriers, foreign-born non-citizen status, poverty, low education [2, 12], and living in crowded, substandard housing conditions and multi-generational households [13, 14]. Agricultural workers are often hesitant to seek medical care due to the chilling effect of the 2019 Public Charge Rule that denies adjustment of immigration status to immigrants if they are deemed likely to receive public benefits [15] and ineligibility for the federal stimulus money sent to families through the coronavirus aid, relief, and economic security (CARES) Act [16]. Furthermore, agricultural workers have a high prevalence of chronic underlying medical conditions such as hypertension, diabetes, and overweight/obesity, which increase the risk for severe illness from COVID-19 [17]. The myriad of barriers has made it challenging for agricultural workers to protect themselves and their families from exposure to COVID-19 and has further exacerbated social inequities in an already marginalized group.

Our aim in this study was to assess agricultural workers' COVID-19-related history, employer-based safety measures implemented at the workplace, individual preventive practices, and COVID-19 vaccine uptake. Such information may inform interventions to mitigate the spread of COVID-19 among vulnerable populations such as agricultural workers and increase uptake of the COVID-19 vaccines.

Methods

In collaboration with the Farmworker Association of Florida (FWAF), in June 2020 we enrolled 92 participants from our longitudinal R01 study (OHEaRD—1R01OH011782-01) that is examining heat stress and kidney injury in Florida agricultural workers. Participants were 18–49 years of age and working in the agricultural sector for a minimum of 4 weeks prior to parent study enrollment. Parent study exclusion criteria included being pregnant or self-report of previous diagnosis with hypertension, diabetes mellitus type 1 or 2, glomerulonephritis, pyelonephritis, renal calculi, or snake bite. The Institutional Review Board at Emory University provided approval (IRB00112681) for this study.

FWAF staff contacted OHEaRD study participants, renewed consent, and administered an oral questionnaire. Data was recorded in Emory University's Research Electronic Data Capture (REDCap) [18, 19] system. Risk of COVID-19 exposure was reduced by providing face masks, hand sanitizers, marked walking paths, staggered

appointments, and by maintaining physical distancing. Research staff wore appropriate PPE and sanitized the area before and after every participant.

The questionnaire included queries on diagnosis and testing for COVID-19, acceptability of vaccines, economic impact of COVID-19, employer-based COVID-19 safety measures implemented at the workplace, risk perception of COVID-19, and individual preventive actions taken to reduce COVID-19 exposure. We added additional questions midway through the study to assess emerging issues including reasons for not getting a COVID-19 test, concerns about a potential COVID-19 vaccine, history of getting the flu vaccine previously, and ability to stop work or to quarantine if exposed to or ill with COVID-19 ($n=39$). Demographic and health information was obtained during a previous study visit (Jan-Feb, 2020). Body Mass Index (BMI) was calculated from measured height and weight. Hemoglobin A1c (HbA1c) was measured by the portable HbA1c detection instrument A1CNow +® (Bayer Diabetes Care, Sunnyvale, CA), and categorized as normal ($<5.7\%$), pre-diabetic ($5.7\text{--}6.4\%$), diabetic ($\geq 6.5\%$). Systolic and diastolic blood pressure (SBP, DBP) were measured once after the participant had been seated for a minimum of five minutes using a digital system (Omron BP760N, Omron Healthcare Inc, Bannockburn, IL) and categorized as normal (SBP <120 and DBP <80), elevated (SBP 120–139 or DBP 80–89), and high (SBP ≥ 140 or DBP ≥ 90). Since the parent study is a longitudinal study, HbA1c and blood pressure were measured to monitor changes over the workday and over 2 years.

In a follow-up parent study visit in July 2021, participants were asked if they had received the COVID-19 vaccine. Participants who reported they had not received the COVID-19 vaccine were asked the reason for not getting the vaccine.

The data is summarized using medians and quartiles and frequencies and percentages. All analyses used SAS v 9.4 software (SAS Institute, Cary, NC, USA).

Results

We enrolled 92 Hispanic agricultural workers with a median age of 40 (first and third quartile [Q1Q3]: 35, 45) (Table 1). The majority were female (77%), and three-quarters were in a domestic partnership. Median years of education was 9 (Q1Q3: 6, 11), and all the participants identified as Hispanic, primarily from Mexico. Ninety-one percent reported they were currently working, with 36% working in ferneries and 50% in nurseries. The majority of the workers were either overweight (36%) or obese (47%); 11% had prediabetes HbA1c levels, and 3% had a diabetes HbA1c level. Half of the participants had either elevated (37%) or high (13%) blood pressure measurements.

Table 1 Socio-demographic and health characteristics of agricultural workers in the COVID-19 Study; Apopka and Pierson, Florida

Characteristics	Overall (n=92) Median [q1, q3], or %, (n)
Socio-demographic^a	
Age (years)	40 [35, 45]
Female	77% (71)
Marital status, coupled	74% (67)
Education (years)	9 [6, 10]
Hispanic ^b	100% (91)
Nationality	
Mexico	77% (71)
Central American	16% (15)
United States	3% (3)
Other	3% (3)
Health^a	
Body mass index categories^b	
Normal (18.5–<25)	18% (16)
Overweight (25–<30)	36% (32)
Obese (≥30)	47% (42)
A1c^b	
Normal	85% (76)
Pre-diabetic	11% (10)
Diabetic	3% (3)
Blood pressure	
Normal	50% (46)
Elevated	37% (34)
High	13% (12)
Work^c	
Currently employed	91% (84)
Work type, if employed	
Fernery	36% (30)
Nursery	50% (42)
Yard work	7% (6)
Other	7% (6)

^aCollected in January 2020 at OHEARD study initiation

^bMissingness: Hispanic = 1, A1c = 3, BMI = 2

^cCollected in June 2020 at special COVID-19 visit

When queried in June 2020, one agricultural worker out of 92 reported having had COVID-19, which was diagnosed with a COVID-19 nasal swab test (Table 2). Ten workers reported having a COVID-19 nasal swab test; half of these reported COVID-19 related symptoms. The primary reason given for not testing for COVID-19 was that they did not have COVID-19 symptoms (62%, 24/39). Among all participants, 23% reported 1 or more symptoms that occur with COVID-19 infection: congestion or runny nose (17%), fatigue (15%), body aches (11%), fever (7%), cough (7%), difficulty breathing (7%), loss of taste or smell (7%), sore throat (7%), chills (7%), and chest congestion (5%). Only

Table 2 COVID-19 health characteristics and preventive practices of agricultural workers

Characteristic	%, (n)
Personal	
History Of COVID-19	
Yes	1% (1)
Don't know/not sure	14% (13)
Had A COVID-19 nasal test	
Yes	11% (10)
If Yes, positive Covid-19 nasal test	10% (1)
Reasons for not getting COVID-19 test^a	
No Covid-19 symptoms	62% (24)
Do not think exposed to COVID-19	8% (3)
Cannot miss work	8% (3)
Willing to get COVID-19 vaccine	
Yes	60% (55)
No	15% (14)
Don't know/not sure	25% (23)
COVID-19 vaccine concerns^b	
Does not trust COVID-19 vaccines	35% (13)
Usually get the flu vaccine ^a	59% (23)
Individual Covid-19 preventive practices	
Wash or disinfect hands frequently	98% (90)
Avoid large crowds	98% (90)
Adhered to local Government guidelines	96% (88)
Maintain 6 feet distance from others	95% (87)
Disinfecting surfaces	93% (86)
Wears facemasks	84% (77)
Stop going to work	39% (36)
Eligible for the CARES act relief funds	18% (17)
Workplace	
Employer provided relief funds	17% (16)
Workplace Covid-19 preventive practices	
Maintain social distancing (2 m between workers)	87% (79)
Employer provides facemasks	34% (31)
Carpool to work	16% (15)
Employer takes temperature at start of shift	12% (11)
Perceived COVID-19 risk at workplace	
High risk	2% (2)
Medium risk	32% (29)
Low risk	36% (33)
No risk	26% (24)
Don't know/not sure	4% (4)
Lost work during COVID-19 outbreak	75% (69)

Apopka and Pierson, Florida; June 2020. N = 92

^aAsked only at one study location, n = 39

^bConcerns among those who said "no/don't know/not sure"

40% said they would be able to self-isolate if they had COVID-19.

Asked if they would be willing to get a COVID-19 vaccine when it becomes available, 60% answered yes, 15% answered no, and 25% were unsure. Positive attitudes about getting the vaccine for COVID-19 paralleled attitudes about getting the flu vaccine, with 59% reporting that they do usually get the flu vaccine. Seventy percent of those usually getting the flu vaccine said they would be willing to vaccinate against COVID-19, compared with 57% saying unsure or no. The main concern for those who were unsure or unwilling to get the COVID-19 vaccine when available was that they would not trust COVID-19 vaccines (33%).

We also assessed preventive actions participants were taking to reduce exposure to COVID-19. Outside of the workplace, over 90% frequently washed their hands or used hand sanitizer, avoided large social gatherings, or eating at restaurants, and disinfected surfaces. Eighty-four percent used facemasks.

While 91% of participants reported they were currently working, 75% had lost work hours or were furloughed. Only 18% reported eligibility for the CARES Act relief funds, and 17% reported receiving employer-provided relief funds.

Employer-enabled COVID-19 safety measures included maintaining at least 6 feet between workers (87%), provision of facemasks (34%), and pre-shift temperature checks (12%). Sixteen percent carpooled to work. When asked about their perceived risk of contracting COVID-19 at work, 74% felt there was some risk (2% high, 32% medium, 36% low, and 26% no risk). There was no significant association between perceived workplace risk and employer-initiated safety measures (masking, social distancing, temperature taking).

In July 2021, we followed-up with 81 of the 92 COVID-19 sub-study participants. Forty-eight percent reported complete and 5% reported partial COVID-19 vaccination (Table 3). Of those in June 2020 willing to get the COVID-19 vaccine once it became available, 52% reported receiving at least one dose. Among the originally unwilling, 67% received at least one dose, compared to 56% unsure, and 53% of the willing. Fifteen percent would not get the vaccine because “you get sick after getting the shot.” Mistrust in the COVID-19 vaccine was reported by 11%, and 5% reported they did not have time to be vaccinated. The Moderna vaccine was the most common (43%), followed by Johnson & Johnson’s (31%) and Pfizer-BioNTech’s (26%).

Discussion

We evaluated COVID-19-related practices and its impact on 92 Hispanic agricultural workers in Central Florida and found major health and work risk factors were common among these workers. Workers took personal preventive

Table 3 Uptake of COVID-19 vaccine by agricultural workers

COVID-19 vaccine query	%, (n)
Received COVID-19 vaccine	
Yes	53%, (42)
No	48% (38)
If yes, COVID-19 vaccine type and completion status	
Johnson & Johnson single-dose vaccine	31% (13)
Moderna, two doses	38% (16)
Pfizer-BioNTech, two doses	21% (9)
1 dose of Moderna or Pfizer-BioNTech	10% (4)
Reason for not getting COVID-19 vaccine	
Side effects: “you get sick after getting the shot”	32% (12)
Mistrust in COVID-19 vaccine	26% (10)
No time to get the COVID-19 vaccine	11% (4)
Not necessary	11% (4)
Other	21% (8)

Apopka and Pierson, Florida; July 2021. N = 81

precautions seriously, but workplace preventions were uncommon. This is congruent with reports of disproportionately greater impact of COVID-19 among Hispanics [3], and news media reports of large outbreaks among agricultural workers in Florida [20–22].

Obesity (body mass index (BMI) ≥ 30), elevated blood pressure, and prediabetes are risk factors for contracting COVID-19 and are associated with severe COVID-19 illness and mortality [23–26]. Sixty-nine percent of our participants had at least one of those risk factors, and 37% had multiple risk factors. This suggests that if agricultural workers do contract COVID-19, they might be more likely to experience adverse outcomes than the general population.

Despite the many infection risks faced by agricultural workers, only 11% reported getting COVID-19 testing, and one participant tested positive. One confirmed case among 92 similar adults is much lower than expected in a vulnerable, unprotected workforce. For comparison, in Florida in June 2020, the highest daily positive rate for COVID-19 was 17% [27]. Although participants reported symptoms that occur with COVID-19 infection, the main reason for not getting a COVID-19 nasal test was not having COVID-19 symptoms. Anecdotally, participants considered the symptoms they experienced to be related to other factors. For instance, fatigue and body aches were attributed to the number of hours worked, and stuffy nose and sore throat to seasonal allergies. Thus, the number of workers who had COVID-19 is likely to be higher than 1 out of 92 because of lack of testing as well as asymptomatic infection.

Although the participants overwhelmingly reported individual practices of COVID-19 preventive measures such as using a face mask and social distancing, there was a lack of employer-based COVID-19 safety measures implemented

at the workplaces. Only a third of the participants reported that their employer provided face masks, and an even a lower percentage reported having their temperature checked at the start of the work shift. All of the workers in our study were settled agricultural workers who lived in independent housing, often with family members. A growing proportion of the agricultural worker population in the U.S., however, are entering the country on H-2A visas. These workers, primarily young males, live in communal housing provided by their employers with shared sleeping environments, baths, and kitchens [13, 28]. A recent article discussed the COVID-19 hazards associated with agricultural worker housing along with the inability to change the regulations in recognition of the pandemic [14]. Alarming, neither the agricultural industry nor the federal government have established a protection standard for occupational exposure to COVID-19 for essential workers, such as those in agriculture [6, 8, 9]. More than half of the workers in this study perceived no risk or low risk of COVID-19 exposure at the workplace; this perception may be attributed in part to the lack of enforced workplace protective measures by both the industry and government occupational agencies, such as the occupational safety and health administration (OSHA), CDC, and the United States Department of Agriculture (USDA). The practices needed to reduce infection risk among agricultural workers have been detailed, including the need for widespread testing of this population [29].

The labor markets have been disrupted by the COVID-19-pandemic, leading to massive lay-offs, furloughs, and decreases in work hours, to the point that the United States government on March 27, 2020 passed the CARES Act to support families with relief funds. Despite categorization of agricultural workers as “essential workers,” 75% of participants reported losing work (furlough or reduced work hours) since the start of the pandemic, and only 18% were eligible for CARES Act relief funds. About the same number of workers reported receiving employer-based relief funds.

Sixty percent of participants reported a willingness to get the COVID-19 vaccine, a quarter were unsure, and 15% were unwilling. COVID-19 vaccination in our cohort (53%) was lower than in Florida’s overall population (59%) but higher than Florida’s overall Hispanic population (33%) [30]. In contrast, during the 2009 H1N1 pandemic, a random sample drawn from the Knowledge Networks assessed the public willingness to take the H1N1 vaccine and found that 17% of Hispanics reported “yes,” 47% “no,” and 36% “don’t know” [31]. The uptake of the H1N1 vaccine was lowest in foreign-born Hispanics (15%) living in the U.S. compared to U.S. born Hispanics (18%) and White non-Hispanics (21%) [32]. The higher vaccine uptake in our cohort may be due to the devastating socio-economic impact (lockdowns, school becoming virtual, jobs lost, etc.) that COVID-19 has had and the disproportionately higher COVID-19

cases, hospitalizations, and deaths among Hispanics [3–5]. However, the relatively low vaccination rate among our farmworkers is concerning, especially considering the rising COVID-19 variant cases [33] and the sharp decline in COVID-19 vaccination rates nationwide since mid-April 2021 [34]. In addition, a study using death records from the California Department of Public Health found that food/agriculture workers had a 39% mortality increase (risk ratio RR = 1.39; 95% CI 1.32–1.48) relative to the pre-pandemic period [35].

Concern about side effects was the primary reason for not getting the COVID-19 vaccine. COVID-19 vaccines may produce side effects such as tiredness, muscle pain, fever, and headaches which can affect daily activities for a few days [36]. This could interfere with agricultural workers’ ability to perform the physically demanding tasks that their occupation requires. Additionally, most agricultural workers have low wages and no paid sick leave or paid vacation [37]; thus, agricultural workers may be avoiding the risk of taking leave to recover from the vaccine. Exposure to misinformation may also be distorting perceptions of post-vaccine side effects. The second most common reason for not getting the COVID-19 vaccine was mistrust in the vaccine. While mistrust may be due to the novelty of COVID-19 and its treatments and the rapidity of vaccine development, it could also suggest that the politicization of the COVID-19 outbreak response and vaccine development is contributing to a mistrust of public health information in this vulnerable population [38].

Limitations of this study include that it was a convenience sample of Florida agricultural workers that may not be generalizable to the wider Florida or U.S. population of agricultural workers. Additionally, all data were self-reported and dependent on the participants’ honesty and memory. While the COVID-19 questionnaire was developed with our community partner, the FWF, to ensure it was culturally appropriate and applicable to the agricultural population, it has not been validated. Despite these limitations, our findings provide valuable information about the health and work risk factors for COVID-19 in agricultural workers.

Recommendations

During this study, few participants had been tested, with most of them citing absence of symptoms as their primary reason for not doing so. Information about transmission of the virus by asymptomatic individuals needs to be repeatedly made in public health messages targeted to the farmworker population. The spread of the variant strains by vaccinated persons with little or no symptoms has demonstrated the importance of this communication. Worksite testing or employer partnership with local clinics or community

organizations to conduct regularly scheduled COVID-19 rapid antigen diagnostic immunoassay (RAD) tests may identify workers early enough to contain and stop further transmission of COVID-19 amongst co-workers and communities. A field-based study showed that RAD performed well as a point-of-care test [39].

Increasing the COVID-19 vaccination rate in the agricultural population is critical to reducing the transmission of SARS-CoV-2 and resuming pre-COVID-19 activities. Community campaigns targeted to agricultural workers should include education on normal COVID-19 vaccine side effects and their relationship to building immunity, as well as addressing misinformation about adverse side effects. The availability of worksite vaccination would address vaccine hesitancy due to lack of time, transportation, or fear of contact with public officials. Furthermore, agricultural workers generally have low wages and no paid sick time if they have post-vaccine symptoms that interfere with their ability to work; thus, a social safety net program, such as providing a financial incentive for the uptake of COVID-19 vaccines is necessary to protect against lost wages from post-COVID-19 vaccine side effects.

Conclusion

During the COVID-19 pandemic, “essential workers” such as agricultural workers are at increased risk for contracting COVID-19. Agricultural workers are particularly vulnerable to COVID-19 due to existing health risk factors and lack of essential protective resources. Federal worksite prevention and control standards are needed to protect agricultural workers and reduce community spread of COVID-19. These standards should include provision of PPE, regular access to COVID-19 testing, as well as educational material about community spread and the need to take preventive measures regardless of the presence of symptoms or vaccination status. Targeted community campaigns to increase COVID-19 vaccine rates are essential. Such measures are critical to protect the workers, their families, and the communities in which they live and to ensure availability of workers in an essential industry.

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