

Evaluation of “Agricultural Pass” Program and Farmworkers’ Experiences Working During Wildfires in Sonoma County, California

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ABSTRACT

Objectives: Farmworkers are disproportionately exposed to and impacted by wildfire smoke, which will continue to worsen with climate change. Sonoma County is a winegrowing region in northern California that experienced record-breaking wildfires from 2017 to 2020; in 2022 the County passed an “Ag Pass” program that allows farm owners and full-time agricultural employees potential access to evacuated areas during disasters such as a wildfire. The goals of this study were to: 1) evaluate farmworkers’ experiences working during wildfires, 2) examine implications of the Ag Pass program for farmworker health and safety, and 3) develop policy recommendations to safeguard farmworkers’ health during wildfires.

Methods: We worked with a local community engagement team to administer surveys and conduct open-ended interviews with farmworkers in Sonoma County to examine their: 1) understanding of the Ag Pass program; 2) previous experiences working in agriculture during wildfires; 3) desired resources and training about wildfire health and safety; 4) organizations they would feel most comfortable interacting to receive this training; and 5) other concerns related to working during wildfires.



Results: Of the 1,011 survey participants, 763 (75.5%) had worked in agriculture during a wildfire in Sonoma County since 2017; of these, 507 (66.5%) reported experiencing health impacts such as a headache (74.9%), sore throat (76.0%), and eye irritation (83.1%). Over 50% of participants who reported adverse health did not have health insurance, and many reported continuing to work while feeling ill to avoid losing income or their jobs. The most consistent theme throughout the surveys and interviews was that farmworkers believed it necessary to work in hazardous conditions (e.g. during active wildfires and poor air quality) to be able to pay for basic needs such as housing and groceries.

Conclusion: Our analysis identified gaps in the protection of farmworkers during wildfires in Sonoma County and areas for improvement in the Ag Pass program, including consideration of air quality and heat levels when the Ag Pass may be activated; health training requirements for program applicants; increased collaborations with trusted organizations to deliver health and safety information; and improved communication with workers about evacuation routes and wildfire notifications at the workplace.

Introduction

Wildfires have been increasing in frequency, intensity, and duration in recent years and will continue to worsen with climate change.^{1,2} In California, the number of fires increased from 2,413 in 1979–1988 to 3,356 in 2009–2018, and the number of acres burned increased from 3.37 million to 7.08 million over the same time period.³ Increased wildfires have resulted in greater short- and long-term exposure to fine particulate matter (PM_{2.5}) and other air pollutants that are associated with a range of adverse health

outcomes, including respiratory and cardiovascular diseases,⁴ pre-term birth,^{5,6} and premature death.^{7,8} These findings are underscored by recent data suggesting wildfire PM may be more toxic than equivalent ambient exposures.⁹ Wildfire-related PM_{2.5} also disproportionately impacts disadvantaged communities, exacerbating existing racial and socioeconomic health inequities.^{10–12} For example, a recent study reported positive correlations of wildfire-related PM_{2.5} exposures with indicators of environmental justice vulnerability from CalEnviroScreen, including poverty,

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cardiovascular emergency department visits (ED), and housing inequities during the 2020 wildfire season in the San Francisco Bay Area and Los Angeles County.¹³

Farmworkers are disproportionately impacted by increasing climate-induced wildfire smoke due to a combination of occupational, environmental, and structural factors. First, agricultural work is physically demanding occupation that is often outdoors with limited implementation of engineering or administrative controls to minimize exposures during wildfire events. Further, many farmworkers have little control over workplace health and safety factors¹⁴ and may not have access to Personal Protective Equipment (PPE) such as N95 respirators. The effects of these exposure are also amplified by structural inequities that impact farmworkers' ability to access medical treatment, including lack of access to health insurance and limited English proficiency,^{15–17} as well as other factors that may dissuade interactions with health systems such as structural racism¹⁸ and fear of sanctions among non-citizens for using public programs (often referred to as “public charge”).¹⁹ Despite likely having higher levels of exposure and heightened susceptibility from wildfire-associated air pollution and PM, few studies have examined exposure to wildfire smoke and associated health impacts specifically among farmworkers. One recent study estimated a 190% increase in farmworkers' smoke exposure days of PM_{2.5} deemed “Unhealthy for Sensitive Groups” from 2004–2009 to 2046–2051,²⁰ underscoring the need for additional research examining farmworkers' experiences working during wildfires, including access to training, PPE, and medical services.

Following continued record-breaking wildfire seasons, California passed Assembly Bill (AB) 1103 in 2021, referred to as the “Livestock Pass”. This bill authorizes County Boards of Supervisors to designate an agricultural commissioner and/or other designated agencies to develop county programs allowing approved livestock producers or managerial employees access to ranch properties during emergencies such as a flood, earthquake, or fire to shelter, transport, feed, water, or provide care to livestock.²¹ Notably, the language in this bill specifically allowed potential access to a “ranch property” for a “qualifying livestock producer[s]”

or a “managerial employee [...] of the qualifying livestock producer”.²¹ Based on AB1103 and authority under the California Emergency Services Act, the Sonoma County Board of Supervisors passed the Agriculture Access Verification Card Program, often referred to as the “Ag Pass”, in 2022.²² The Sonoma Ag Pass program expands potential access to areas inside mandatory fire evacuation zones to: 1) commercial agricultural operations, rather than just ranches/livestock operations, and 2) full-time employees of that operation, rather than just owners/operators and managerial employees.²² When this program was originally passed in 2022 it facilitated access to agricultural operations inside mandatory evacuation zones for Ag Pass holders to conduct what the Board of Supervisors deemed “essential activities”, such as irrigating crops.²² The Ag Pass was modified in 2023, without having ever been activated, to explicitly include harvest as an allowed activity.²³ The current Ag Pass application asks individuals to specify the “critical and essential activities to be performed”, including harvesting and related activities, irrigation, refueling, livestock care, support to first responders, and other activities.²³ There are no specific criteria regarding which “other” activities may be approved or denied.

The Sonoma County Board of Supervisors delegated authority to lead the administration of the Ag Pass program to the County Sheriff's Office.²² Under the current program, the Sonoma Department of Agriculture/Weights and Measures is responsible for administering the application process and reviewing applications. Approved applications are then sent to the Sheriff's Office for the final photo registration requirement and distribution of physical passes. The Sheriff is solely responsible for activating and deactivating the program when an evacuation is in effect. According to the program's administrative document, access will not be granted outside of daylight hours and those working inside an evacuation zone must exit the area prior to sunset through the same route they entered.²³

Any individual applying for an Ag Card must complete an Agriculture Access Verification Card fire and worker safety training. The Sheriff's Office is tasked with establishing minimum training

standards for this course in consultation with fire professionals, and these standards “may be modified from time to time”.²³ Individuals or organizations that would like to provide this training may submit their request, including the proposed curriculum and the identity and qualifications of proposed trainers, to the Sheriff’s Office, who is tasked with establishing the minimum training standards for this course in consultation with fire professionals. The only requirements for approval of this course specified in the Sonoma County Agricultural Access Verification Card Administrative Program document are that the course be a minimum of 4 hours, and the training must be provided in-person, in the attendees’ requested language, and in an accessible format and venue; there are no criteria for specific topics that must be covered in the curriculum.²³

Other counties within California have also developed Ag Pass programs, including in Napa, Ventura, and Santa Barbara. We chose to focus our analysis on Sonoma, because at the time this research started it was one of the most expansive pass programs, and among the first explicitly based on the state legislation AB1103, which remains the only state-level standard for evacuation pass programs to date. Sonoma County was also the first to explicitly designate harvesting as an essential activity allowed under the Ag Pass, and as of our last review in December 2024, Napa County was the only other program to allow harvesting. As other counties continue to look to Sonoma’s program as a gold standard, we urge the county to be a leader in protecting farmworker health and safety.

This analysis is part of a larger project led by UC Berkeley’s Human Rights Center evaluating Sonoma County’s Ag Pass and implications for farmworkers’ health, physical safety, economic security, and data privacy through interviews with key stakeholders, a review of existing research on the Ag Pass and relevant health and disaster law scholarship, and extensive policy and legal research, including analysis of relevant state law and agency practices, local ordinances and public policies, legislative history, and case law. The goal of the current paper is to examine Sonoma County farmworkers’ experiences working during in agriculture during previous wildfires, including

resulting health impacts, and the potential implications of these experiences on farmworker health and safety under the Ag Pass program. We present our legal analysis of the Ag Pass program, as well as findings and policy recommendations for all four areas in an accompanying white paper.

Methods

We developed a Community Engagement Team of seven local Community Health Workers (CHWs)/ *promotoras*, farmworker advocates, and individuals working with farmworker-facing organizations that represented the target study population (e.g., Mexican American, native Spanish speaker, currently living in Sonoma County). We partnered with the Community Engagement Team for all stages of the project, including the design of study materials, participant recruitment, and administration of the survey and open-ended interview. We administered a survey and conducted open-ended interviews with full-time farmworkers in Sonoma County that aimed to understand their familiarity with the Ag Pass program, previous experiences working in agriculture during wildfires, and desired training and resources if they were to work during a wildfire in the future. All study procedures were approved by the UC Berkeley Human Subjects Review Board.

Participant recruitment and enrollment

We developed a recruitment flyer in English and Spanish that included information about the study, eligibility information, and a phone number for a local bilingual study member that individuals could contact if they had questions. The Community Engagement Team recruited individuals primarily through the distribution of this flyer at locations frequented by farmworkers, word-of-mouth, and snowball sampling. We enrolled participants and administered the survey/interview through 1) data collection events at locations convenient and comfortable for farmworkers (e.g., farmworker apartments, local churches), and 2) individual meetings with a member of the Community Engagement Team (e.g., at a participant’s house or library) at a time

that was convenient for the participant. All study procedures took place in English or Spanish, depending on the preference of the participant and were conducted with a member of the study team (i.e., a member of the Community Engagement Team or a UC Berkeley Public Health student).

Prior to enrollment, study staff explained the purpose of the study to potential participants and confirmed their interest and eligibility. Individuals were eligible if they were: 1) at least 18 years of age, 2) had worked full-time in crop agriculture in Sonoma County at any point since 2017, and 3) spoke English or Spanish. If the individual was eligible and agreed to participate, the study staff read a consent form aloud to the individual and answered any questions they may have. To protect the confidentiality and anonymity of participants, we did not collect any identifying or personal information, such as the participant's name or their signature, and asked individuals to provide verbal informed consent.

Survey administration

We administered surveys to participants in English or Spanish from March 2–June 7, 2024. The survey assessed participants': 1) familiarity with the Ag Pass program; 2) experiences working in agriculture during wildfires, including health impacts and barriers to accessing medical treatment; 3) desired resources and training if they were to work during wildfires in the future; 4) individuals/organizations they would feel most comfortable interacting with to obtain information about the Ag Pass or training regarding wildfire smoke and health; and 5) any other concerns they had. Individuals received a \$50 Visa prepaid gift card for participating in the survey.

Notably, due to low fire activity in recent years, the current version of the Ag Pass (i.e., the program formally approved by the Board in 2022 and amended in 2023) had never been activated by the time we completed data collection in June 2024, and thus far has only been activated one time, on June 18, 2024. Hence, the survey was not able to directly address participants' experiences working

in evacuated areas under the current Ag Pass program, but focused more broadly on their previous experiences working in agriculture during wildfires to assess whether the current program may adequately address farmworkers' health, physical safety, economic security, and data privacy.

Open-ended interviews

We recruited a subset of 10 participants from the larger study for open-ended interviews to supplement the survey findings. All interviews were conducted with a member of the Sonoma Community Engagement Team at a time and location convenient for the study participant. The interview guide had similar topics to the survey, including questions regarding participants' awareness of the Ag Pass program, experiences working in agriculture during wildfires, access to PPE and health trainings, desired resources and protections, and concerns about lost income if they are not able to work due to a wildfire.

Data analysis

We examined descriptive statistics of survey responses using STATA Version 14. The open-ended interviews were recorded, and the audio was transcribed in Spanish and then translated to English. While we did not begin with a formal hypothesis or theory, the preliminary analysis of the survey data informed our ideas on key issues participants would raise in the open-ended interviews. Guided by the survey results and insights, we drew on the principles of grounded theory to allow themes to emerge from the data, while also being informed by the prior findings.²⁴ Through this iterative process, we read all the transcripts and used the interview themes to develop a broad codebook based on both deductive themes from the survey results and inductive themes emerging from the interviews. Two researchers co-coded an initial transcript to identify themes, then used Rapid Qualitative Analysis to code the remaining transcripts.²⁵ The codes were refined in this process leading to a set of themes (Table 4) that were used for the analysis of both the survey responses and open-ended interviews.

Results

We administered surveys to 1,011 farmworkers in Sonoma County from March 2 to June 7, 2024. Of the participants, 60% identified as male, and 42.3% were employed through a farm labor contractor (FLC). Participants had a mean age of 41 years and had worked in agriculture in the United States for an average of 12.7 years (Table 1). Figure 1 shows the areas of Sonoma County in which participants reported working. We were not able to enroll any

individuals working under an H2A Visa due to reported concerns such as fear of retaliation from their employer. We did not collect demographic information that could be associated with immigration status such as participants' country of birth or the number of years they have lived/worked in the United States to minimize potential fear. In a 2015 study by the Sonoma County Department of Health Services, 95% of participants identified as Latino.²⁶

Table 1. Sociodemographic information and understanding of Ag Pass program ($n = 1,011$).

Variable	N (%) or Mean (SD)
Gender	
Man	609 (60.2)
Woman	395 (39.1)
Other/Missing	7 (0.7)
Age (years)	41 (12.5)
Number of years working in agriculture in U.S.^a	12.7 (10.1)
Employed through farm labor contractor	
No	575 (56.9)
Yes	428 (42.3)
Missing	8 (0.8)
Heard of Ag Pass program	
No	921 (95.1)
Yes	86 (8.5)
Missing	4 (0.4)
Signed up for Ag Pass program^b	
No	62 (72.1)
Yes	22 (25.6)
Missing	2 (2.3)
Source of information about Ag Pass program^{c,d}	
The owner of the field where I work	16 (72.7)
My crew leader	10 (45.5)
Other coworkers	5 (22.8)
Agricultural Commissioner's office	0 (0.0)
Department of Emergency Management	1 (4.6)
Sheriff's office	1 (4.6)
Don't remember	1 (4.6)
Other – family	1 (4.6)
Challenges when signing up for Ag Pass^{c,d}	
Difficult to find information about the program	11 (52.4)
I found information about the program but couldn't understand it/it wasn't in my language	16 (76.2)
I didn't understand what it meant to be enrolled in the program, or what would be asked of me if I enrolled	7 (33.3)
I was hesitant to interact with the Agricultural Commissioner to enroll	6 (28.6)
I was hesitant to interact with the Sheriff to enroll	10 (47.6)
I was hesitant to get my picture taken to enroll	10 (47.6)
I was hesitant provide my contact information	9 (42.9)
Reasons participants haven't signed up for Ag Pass^e	
I heard about this program but didn't know where to get more information to sign up	42 (67.7)
I couldn't find information about the program because it wasn't in my preferred language	14 (22.6)
I didn't understand what would be asked of me if I signed up	20 (32.3)
I didn't want to interact with the Agricultural Commissioner's office to enroll	9 (14.5)
I didn't want to interact with the Sheriff's office to enroll	22 (35.5)
I didn't want to provide my personal contact information to enroll	27 (43.6)

^aResponse from 996 participants.

^bResponses from the 86 individuals who reported having heard of the Ag Pass program.

^cResponses from the 22 individuals who reported having signed up for the Ag Pass program.

^dParticipants could select all that apply.

^eResponses from the 62 individuals who reported having heard of the Ag Pass program but did not sign up.

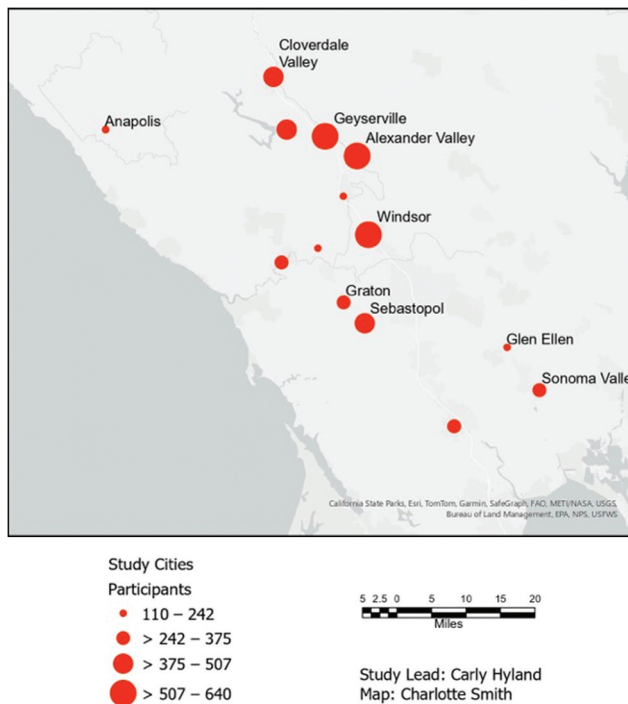


Figure 1. Work location of study participants (participants could select multiple options).

Understanding of Ag Pass program

Of the 1,011 survey participants, 86 (8.5%) had previously heard of the Ag Pass program; among those, 22 (25.6%) had signed up for the program (Table 1). When we asked individuals who had signed up for the Ag Pass about challenges they experienced when enrolling, the most common responses were that they could not find information about the Ag Pass (52.4%), they could not understand the information about the Ag Pass/it was not in their language (76.2%), and hesitancy to interact with the Sheriff's office to enroll (47.6%), get their picture taken (47.6%), or provide their contact information (42.9%). We observed similar responses among individuals who had heard of the Ag Pass but had not signed up (Table 1). None of the interview participants had heard of the Ag Pass. When probed, two participants thought maybe the Ag Pass was a program designed to protect farmworkers from wildfire smoke; the other eight had did not venture a guess about the intent or function of the program.

Participants largely indicated they would feel most comfortable interacting with community organizations (71.5%), local health clinics (59.6%), or a farmworker resource center (59.0%) if they were to obtain information about the Ag Pass (Table 2).

The organizations or individuals they would feel the least comfortable interacting with to get information about the Ag Pass include the Sheriff's office (25.3%), the Department of Emergency Management (29.9%), the Department of Health (34.0%), and the Agricultural Commissioner's Office (38.6%). Individuals overwhelmingly indicated they would like to receive information about the Ag Pass in Spanish (95.6%) from CHWs (74.0%) or trainings from their employers (50.9%). The majority of interview participants indicated they would like to receive training on the health impacts of wildfire smoke and how to protect themselves in-person or via videos from knowledgeable experts, and that pamphlets would not be an effective way to receive wildfire health training.

Previous experiences working in agriculture during wildfire

Just over 75% of survey respondents ($n = 763$) indicated they had previously worked in agriculture during a wildfire; of these, 66.5% reported short-term health effects, including eye irritation (83.1%), a sore throat (76.0%), headache (74.9%), and persistent cough (59.3%) (Table 3). The most common long-term health impact was persistent cough (14.2%). Barriers these participants reported in addressing their health symptoms included not having health insurance (50.7%), not having time to go to a clinic (40.2%), and not being able to get an appointment at the clinic (38.7%). Other impacts individuals experienced during wildfires included feeling sick but continuing to work because they could not afford to lose income (59.9%) and feeling sick but continuing to work because they were afraid of losing their job (53.9%). All interview participants reported similar health impacts from working during a wildfire, including coughing, eye irritation, headaches, and developing asthma.

I have worked during the wildfires. I think that it was a really bad time because I got asthma and also because I got COVID. I was in bed for a whole week ... I remember that in one occasion, I told my employer that I was not able to go to work because I was sick but he said that I had to go, essentially he was forcing me to go. So then I had

Table 2. Desired source and format of information about Ag Pass program.

Variable	N (%)
Organizations participants would feel safe interacting with to obtain formation about Ag Pass¹	
My local health clinic	603 (59.6)
Farmworker resource center	596 (59.0)
Community organization	723 (71.5)
Catholic charity	502 (49.7)
Food bank	421 (41.6)
Sheriff's office	256 (25.3)
Department of Health	344 (34.0)
Department of Emergency Management	302 (29.9)
Agricultural Commissioner's office	390 (38.6)
Other (e.g., agricultural apartments, schools, health fair, community events)	23 (2.3)
Preferred language for information about Ag Pass	
English	21 (2.1)
Spanish	966 (95.6)
Indigenous language ²	14 (1.4)
English and Spanish	3 (0.3)
Spanish and Indigenous Language	3 (0.3)
Preferred format for information about Ag Pass¹	
Radio	433 (42.8)
Pamphlets from a community health worker	738 (74.0)
Training from employer	515 (50.9)
Other (e.g., Text messages, Phone calls, WhatsApp, Facebook, Social media, Direct contact/in person, Mail)	110 (10.9)

^aParticipants could select all that apply.

^b10 participants specified language, including Mixteco (7), Triqui (2), and Zapataceo (1).

to go work and I was really close to where the wildfires were at, and to be completely honest with you, I did get very sick. I came back with a fever and headaches ... To be honest, it is very hard to stop work and even if we were in danger because of the wildfires or the smoke or bad quality of air, we still have to work. We do not have any other form of income.

Participants also reported barriers to accessing medical treatment such as not having medical insurance, having to pay for medical services out-of-pocket, losing wages from missed work, fear of losing their job if they do not ask for permission to go to the doctor, and having to just “toughen up” (See Table 4 for additional representative quotes).

The truth is that, when we go to the doctor's, we have to miss work and our employers do not agree because we miss too many hours or days of work. Or we go to the doctor and they charge us too much money, and we do not have enough money to pay expensive medical bills. Well with our current wages, I prefer to stay at home and make home remedies, and care for myself. At the end of the day, I do not have a lot of money to pay a doctor.

Of the survey respondents who had previously worked in agriculture during a wildfire, 583

(76.4%) had received a notification from a supervisor or employer that a wildfire was nearby, and 479 (63.8%) indicated they received PPE from their employer, including an N95 mask/respirator (75.8%), another type of mask (22.8%), and eye protection (17.5%) (Table 3). Nearly one-third of participants who had worked during a wildfire indicated they had to purchase PPE themselves. Because participants may have worked during wildfires before and/or after California's wildfire smoke standard passed in 2019, we simply asked participants if they had received PPE from their employer; our intent was not to examine employers' adherence to requirements in the smoke standard.

Interview participants largely indicated they did not receive PPE from their employers, and some purchased their own masks, made masks out of cloth, or used a handkerchief/bandana. Some interview participants indicated they did receive PPE from their employer, but they did not always receive an N95 respirator, which is needed to filter small particulate matter, or they did not receive fresh PPE throughout the fire. One participant said they received a mask, but said “*the masks are hard to use, and we received only one day and I do not think that was enough to protect us.*” Most interview participants did not receive wildfire notifications

Table 3. Experiences working in agriculture during a wildfire.

Variable	N (%) or Mean (SD)
Previously worked in agriculture during wildfire	
No	246 (24.3)
Yes	763 (75.5)
Missing	2 (0.2)
Received warnings from supervisor or someone that there was a wildfire nearby^a	
No	158 (20.7)
Yes	583 (76.4)
I don't remember	17 (2.2)
Missing	5 (0.7)
Received Personal Protective Equipment from employer^a	
No	280 (36.7)
Yes	479 (63.8)
Missing	4 (0.5)
Type of PPE employer provided^{a,b}	
N95 mask/respirator	363 (75.8)
Other type of mask	109 (22.8)
Bandana	41 (8.6)
Eye protection	84 (17.5)
Needed to reuse PPE employer provided^b	
	147 (30.7)
Needed to purchase PPE to protect themselves from wildfire/smoke^a	
	238 (31.2)
Health impacted from working in agriculture during wildfire^a	
	507 (66.5)
Health symptoms experienced^{a,c}	
Headache	381 (74.9)
Sore throat	387 (76.0)
Persistent cough	302 (59.3)
Asthma	69 (13.6)
Shortness of breath	229 (45.0)
Eye irritation	423 (83.1)
Burn on skin	14 (2.8)
Persistence of health symptoms^{c,d}	
Headache	69 (13.6)
Sore throat	55 (10.9)
Persistent cough	72 (14.2)
Asthma	39 (7.7)
Shortness of breath	32 (6.3)
Eye irritation	49 (9.7)
Burn on skin	0 (0.0)
Barriers in addressing health symptoms^{c,d}	
I didn't have health insurance	257 (50.7)
I didn't have transportation to the clinic	71 (14.0)
I didn't have time to go to the clinic	204 (40.2)
I was in an evacuation zone and didn't have access to health services	34 (6.7)
It was difficult to get an appointment at the clinic	196 (38.7)
I didn't think it was important	148 (29.2)
Other major impacts from working during wildfire^{1,3}	
I was hospitalized	7 (0.9)
I had to go to the emergency department	14 (1.8)
I lost my house from the fire	7 (0.9)
I lost personal belongings from the fire	13 (1.7)
I missed work	380 (49.8)
I felt sick but continued to work because I couldn't afford to lose income	435 (59.9)
I felt sick but continued to work because I was afraid of losing my job	391 (53.9)

^aResponses from the 763 individuals who reported having worked in agriculture during a wildfire.

^bResponses from the 479 individuals who reported receiving PPE from their employer.

^cParticipants could select all that apply.

^dResponses from the 507 individuals who reported experiencing health effects from working in agriculture during a wildfire.

Table 4. Themes and representative quotes from interviews.

Theme	Quantitative Findings (Survey)	Qualitative Findings (Representative Quotes from Interview)	Integrated Interpretation
Experiences working in agriculture during wildfires	75.5% had worked in agriculture during a wildfire; of these 66.5% reported short-term health effects.	<p>"Yes, I had a lot of eye irritation, I coughed, my head hurt...I got asthma because of the smoke."</p> <p>"I have worked during the wildfires. I think that it was a really bad time because I got asthma and also because I got COVID. I was in bed for a whole week...I remember that in one occasion, I told my employer that I was not able to go to work because I was sick but he said that I had to go, essentially he was forcing me to go. So then I had to go work and I was really close to where the wildfires were at, and to be completely honest with you, I did get very sick."</p>	<p>The majority of participants had experience working in agriculture during wildfires and experienced adverse health effects.</p>
Access to medical treatment after working during wildfire	Over 50% did not have health insurance. Other barriers to accessing medical treatment included not having time to go to the clinic (40.2%) and not being able to get an appointment at the clinic (38.7%).	<p>"No, because they often do not give us insurance. Sometimes we just have to toughen up, because we do not have enough money for the medicine. Even if we feel sick and go to the doctor's, they [the mayordomos] get mad because we do not ask for permission and we even fear getting fired."</p> <p>"...when we go to the doctor's, we have to miss work and our employers do not agree because we miss too many hours or days of work. Or we go to the doctor and they charge us too much money, and we do not have enough money to pay expensive medical bills. Well with our current wages, I prefer to stay at home and make home remedies, and care for myself. At the end of the day, I do not have a lot of money to pay a doctor."</p>	<p>Participants experienced barriers to accessing medical treatment after working during wildfires, including lack of health insurance, high medical costs, and fear of retaliation from their employer for asking for time off to seek medical attention.</p>
Notifications of wildfires	Of the respondents that had previously worked in agriculture during a wildfire, 76.4% had received a notification about a wildfire. 63.8% of participants who had worked in agriculture during a wildfire received PPE from their employer; 31% had to purchase PPE themselves.	<p>"No, we didn't get notified, we got informed mainly from social media but the bosses never told us that there is a fire nearby, the air quality was bad..."</p> <p>"No, we ended up having to buy masks, we couldn't find any, it was very difficult to find masks, but we bought some. We even had to make some out of cloth to cover ourselves but our bosses didn't give us any. We also had to find glasses to protect us from the smoke, to protect our eyes."</p>	<p>Not all participants were notified that there was a wildfire while they were working.</p>
Employer's response/Access to resources and trainings	31% who had received PPE (e.g., masks) from their employer had to reuse it. 34.9% reported ever having received information on the health impacts of wildfire smoke and how to protect themselves.	<p>"Yes, we did receive the protection. But the masks are hard to use, and we received only one day but I do not think that was enough to protect us. I had to buy my own things to be able to protect myself because the masks did not protect me at all. They were not good at all."</p> <p>"No, no we did not receive any protection. As farmworkers we always try to protect ourselves with masks or with handkerchiefs in our faces so that we are not smelling the smoke because it's something very uncomfortable and most importantly it affects our health."</p>	<p>Some participants received PPE from their employer, but nearly one third had to purchase their own. Some participants indicated that they did not always receive an N95 respirator or fresh PPE throughout the fire. Many participants did not receive training or information on how to protect themselves during a wildfire.</p>

(Continued)

Table 4. (Continued).

Theme	Quantitative Findings (Survey)	Qualitative Findings (Representative Quotes from Interview)	Integrated Interpretation
Economic need	<p>Over 50% of survey respondents indicated that they felt sick but continued to work because they couldn't afford to lose income.</p> <p>Almost all participants (96.8%) said they would be 'very worried' about lost income if there were a wildfire and they couldn't work and that it would be difficult to pay for basic living expenses.</p>	<p>"What happens is if we don't continue to work, we don't have money to pay rent, food and other necessary essentials including gasoline so that we can transport ourselves, so we see it as a necessity."</p> <p>"We bring in the money for the household to pay for the bills. We have to work to be able to pay for the rent or else we get evicted."</p> <p>"To be honest, it is very hard to stop work and even if we were in danger because of the wildfires or the smoke or bad quality of air, we still have to work. We do not have any other form of income."</p>	<p>There is an overwhelming concern about lost income due to wildfire-related work disruptions. Participants work out of necessity despite the hazardous health conditions because missing work and income threatens their ability to pay for basic needs.</p>
Fear of retaliation	<p>53.9% who had worked during a wildfire indicated that they felt sick but continued to work because they were afraid to lose their job.</p>	<p>"People are afraid to report anything or complain, out of fear of getting fired. Even as coworkers, we go complain, but sometimes, we get scared of getting fired. We are also scared of even reporting when people get injured, instead, people just toughen up."</p>	<p>Participants reported continuing to work during wildfires, even when they experienced or were concerned about potential adverse health impacts, due to fear of retaliation or losing their job.</p>
Solutions and desired resources if working during a wildfire	<p>Participants reported the following desired services if they were to work during a wildfire: hazard pay (86.0%), safe shelter (68.6%), PPE (60.3%), and training (62.0%).</p>	<p>"I would like a fixed pay for us as farm workers and protection equipment because truly a lot of us are being affected in our health as we are being placed to work in conditions like that and they aren't giving us protection equipment and they aren't telling us that the fire is close by."</p> <p>"Well that they all should think about agricultural workers because I have seen how everyone celebrates that we are in the wine country, and they celebrate the earnings. But I have not seen that they celebrate the workers for all the hard work they do, and they do not even recognize that there is not a fair wage. I would like for that to happen and for them to value our work, and for them to see what the farmworkers suffer through."</p>	<p>Workers are kept uninformed about the risks of working during wildfires and in some cases denied PPE. The participants highlighted an urgent need to address the health risks of working during a wildfire and receiving adequate training and PPE.</p>

from their employers or supervisors, and largely found out from social media, co-workers, or being able to see or smell the fire once they arrived at work (See Table 4 for representative quotes).

No, no we did not receive any protection. As farmworkers we always try to protect ourselves with masks or with handkerchiefs in our faces so that we are not smelling the smoke because it's something very uncomfortable and most importantly it affects our health.

Desired resources if working in agriculture during a wildfire in the future

We asked participants about their current and desired training and resources regarding working in agriculture during a wildfire (Table 5). These responses highlighted clear tensions between participants' health experiences and concerns regarding the impacts of wildfire smoke versus the great economic need if they choose not to or were not able to work during an event such as a wildfire. Overall, 90.7% indicated they are concerned about the long-term health impacts of wildfire smoke. However, 96.8% said they would be "very worried" about lost income if there were a wildfire and they could not work, and that it would be difficult to pay for items such as rent (99.2%), groceries (83.6%), and gas (77.5%). Participants spent an average of 59.2% of their monthly income on rent, with nearly 75% of respondents reporting this figure was 50%–75%. These findings were further underscored during the interviews, in which participants discussed the health impacts of wildfires, but consistently indicated they need to continue working regardless of the conditions. When asked about their concern over the health impacts of working during a wildfire, one participant said, *"it's a grave damage to our organs, and the smoke is toxic, and plastic material could be burning and that affects us."* Yet nearly all participants discussed the need to continue working "even if we were in danger because of the wildfires or bad quality of air" to be able to pay for rent, food, gasoline, and other necessities.

What happens is if we don't continue to work, we don't have money to pay rent, food and other necessary essentials including gasoline so that we can transport ourselves, so we see it as a necessity.

The last time this occurred, we were left many days without work, the hours decreased. We were in a lot of debt, and it was even more difficult to sustain ourselves.

Only 34.9% of survey participants reported having ever received information on the health impacts of wildfire smoke and how to protect themselves. The most common sources among those who had received training were farm owners (40.2%), FLCs (31.2%) and crew leaders (31.4%). Further, 35.1% indicated they are "never" informed about safe evacuation routes by an employer/FLC where they work, with 25.7% indicating they are "sometimes informed," and 35.4% indicating they are "always" informed.

Participants reported many desired services if they were to work in agriculture during a wildfire in the future, including hazard pay (86.0%), safe shelter (68.6%) and housing for their family outside of the wildfire zone (60.1%), PPE (60.3%), and training about how to protect themselves when working during a wildfire (62.0%). Interview participants highlighted they would like safe shelter, higher wages, and greater appreciation for the hard work they do, with one participant noting these catastrophes are not farmworkers' faults, but they need extra support when these events occur (See Table 4 for representative quotes).

Discussion

This study aimed to examine the experiences of farmworkers during wildfires in Sonoma County and evaluate the implications of the County's "Ag Pass" program on their health, physical safety, economic security, and data privacy. Here, we focus primarily on findings for health; we will present additional findings and recommendations from our larger policy analysis and interviews with local and state officials in an accompanying white paper. Our research highlights gaps in the protection of farmworkers who may be re-entering wildfire evacuation zones under Sonoma County's Ag Pass program, including lack of consideration of health in the activation of the Ag Pass and farmworkers' insufficient access to PPE, health and safety training, notifications regarding nearby wildfires and evacuation routes at their workplace, and medical treatment to address resulting health

Table 5. Current and desired training/resources if working in agriculture during a wildfire.

Variable	N (%) or Mean (SD)
Approximate proportion of monthly income spent on rent^a	
0- < 25%	8 (0.8)
25- < 50%	54 (5.5)
50- < 75%	730 (74.3)
75-100%	190 (19.4)
Concerned about the risk wildfire/smoke exposure poses to long-term health	
Agree	921 (91.1)
Neutral	39 (3.9)
Disagree	47 (4.7)
Missing	4 (0.4)
Has received information on the health impacts of wildfire smoke and how to protect themselves	
No	648 (64.1)
Yes	353 (34.9)
Missing	10 (1.0)
Current sources of information regarding health impacts of wildfire smoke and how to protect themselves^{b,c}	
Owner of the farm where I work	142 (40.2)
Farm labor contractor	110 (31.2)
Crew leader	111 (31.4)
Coworker	24 (6.8)
Local clinic	51 (14.5)
Agricultural Commissioner's office	19 (5.4)
Public Health department	51 (14.5)
Farmworker advocate	25 (7.1)
Employer/farm labor contractor informs participant about safe evacuation routes where they work^d	
No, never	355 (35.1)
Sometimes	260 (25.7)
Always	358 (35.4)
Missing	38 (3.8)
Desired services when working in agriculture during a wildfire^b	
Extra pay (e.g., hazard pay)	869 (86.0)
Access to PPE	610 (60.3)
Education about the health impacts of working during a wildfire	603 (59.6)
Training about how to protect myself while working during a wildfire	627 (62.0)
Access to clinics to address health symptoms developed while working during a wildfire	460 (45.5)
Housing for my family outside of the wildfire zone	608 (60.1)
Childcare outside of the wildfire zone	383 (37.9)
Safe shelter	694 (68.6)
Level of concern over lost income if there were a wildfire and participant couldn't work	
Not concerned at all	5 (0.5)
Neutral	18 (1.8)
Very worried	981 (97.0)
Missing	7 (0.7)
Concern regarding paying for basic needs if there were a wildfire and participant couldn't work^{b,d}	
Rent	991 (99.2)
Groceries	835 (83.6)
Medicine	614 (61.5)
Healthcare	564 (56.5)
Gas	774 (77.5)

^aResponses from 982 participants.

^bParticipants could select all that apply.

^cResponses from the 353 individuals who reported having received any information on the health impacts of wildfire smoke.

^dResponses from 999 participants who responded "neutral" or "very worried" to level of concern regarding impacts of lost income due to a wildfire.

impacts. The most consistent theme that emerged from the surveys and interviews was that participants would feel pressure to continue working during a wildfire despite widespread concerns

over the potential health impacts due to severe economic need and fear of retaliation from their employers. We also found very few workers had heard of the Ag Pass and even fewer had enrolled

in the program, despite many discussing the likelihood of needing to work during wildfires in the future, potentially including inside evacuation zones, to meet economic needs.

While farmworkers are disproportionately impacted by wildfire smoke, relatively little research has examined their specific exposures and experiences. It is particularly important to understand the experiences of farmworkers during times of poor air quality, including wildfires, as many health recommendations advise limiting prolonged outdoor activity when the Air Quality Index (AQI) is above 150, which is infeasible for those who work outdoors. Our findings regarding farmworkers' lack of access to PPE, gaps in wildfire smoke health and safety information, and feeling pressured to continue working even when they feel sick are in line with a previous study that conducted focus groups with farmworkers across California to examine workplace safety practices related to wildfire smoke.²⁷ Notably, this study concluded that employer and supervisors' attitudes would have the greatest impact on the implementation of workplace safety measures, as current regulations are often poorly enforced and farmworkers widely cited mistrust of regulatory entities such as Cal/OSHA.²⁷ This underscores our findings that farmworkers often have limited control over workplace health and safety factors, and that employers, supervisors, and FLCs play an essential role in ensuring the health and safety of farmworkers during wildfires.

Prior to the Board approving the current version of the Ag Pass, Sonoma County had ad-hoc programs from 2017 to 2022 in which temporary permits were issued to farm owners/operators for groups of people, including agricultural employees, to re-enter mandatory fire evacuation zones.^{23,28} A recent analysis using AirNow and PurpleAir data showed AQI levels were often above 150, corresponding to the "Unhealthy" health hazard level according to the U.S. Environmental Protection Agency (EPA), when farmworkers were working under the ad-hoc Ag Pass during the Glass Fire and LNU Lightning Complex Fires in 2020.²⁸ Specifically, researchers found that PM_{2.5} values exceeded EPA thresholds for "Unhealthy for Sensitive Groups" and were "Unhealthy" on 21 and 13 calendar days,

respectively, using the Air Now Data, and 27 and 16 calendar days, respectively, using county-wide average PurpleAir data.²⁸ These researchers also reported at least 115 workers were allowed within the LNU Fire perimeter and at least 178 workers allowed within the Glass Fire perimeter under this ad-hoc program.²⁹ These findings raise concerns for individuals working in potentially hazardous conditions under the Ag Pass in the future, particularly with the expansion of harvest as an allowed activity, which may lead to greater numbers of workers laboring in wildfire evacuation zones for longer periods of time during peak wildfire season.

In addition to gaps in access to PPE, training, and evacuation notices during wildfires, our analysis highlighted gaps in the protection of farmworkers' health in the Ag Pass program itself. Notably, the Sheriff has the sole discretion to decide whether to activate the Ag Pass in an evacuation zone, and there are currently no considerations of the potential short- or long-term health impacts of working in that area. While the Sheriff may consult with the County's Emergency Operation Command or CalFire when considering activating the Ag Pass, they are being advised primarily on factors such as the position of the fire itself, the potential for the fire to spread, and implications for the immediate physical safety of individuals re-entering the area. Currently, there are no requirements to consider factors such as AQI or heat levels inside or near the evacuation zone, and no stated criteria under which it would be considered too dangerous for employees to work in the area, particularly for longer activities such as harvest, which also coincides with peak wildfire season. Further, while Ag Pass applicants must show they have taken a fire safety course prior to being approved for a pass, there are no systems to confirm they have received and understand health training on wildfire smoke, including potential health impacts and protect themselves. The Sonoma County Ag Pass administrative document also indicates that the Sheriff's Office is tasked with establishing minimum training standards for the fire safety course in consultation with fire professionals, and these standards "may be modified from time to time".²³

We believe these current procedures are not sufficiently protective of the health of farmworkers

re-entering fire evacuation zones to conduct physically demanding tasks for extended periods of time. Further, our research indicates the Sheriff's Department does not have the expertise or cultural competency to set the standards for health or safety training, or to be the entity farmworkers interact with to obtain an Ag Pass. For example, the most common challenges participants cited in signing up for an Ag Pass included not being able to understand the information available and hesitancy to interact with the Sheriff's office or get their picture taken to enroll in the program. Similarly, participants indicated they would feel the least comfortable getting information about the Ag Pass from the Sheriff, and instead overwhelmingly indicated they would prefer to interact with local community organizations, health clinics, or a potential farmworker resource center. Notably, our research was conducted prior to the 2024 election, and previous research in California and elsewhere has demonstrated that anti-immigrant rhetoric and policies from President Trump increase farmworkers' fear in interacting with government agencies, particularly law enforcement.^{30,31} At the Sonoma Board of Supervisors Meeting on June 3, 2025, the County Sheriff acknowledged farmworkers were increasingly hesitant to apply for or renew an Ag Pass with his office, underscoring the importance of reconsidering the Sheriff's role in activities directly interfacing with farmworkers under this program.³² At this same meeting, a County Supervisor noted there was also increased sensitivity in the county around data collection of undocumented workers, and that has raised additional concerns around this program.³²

Our work also highlights the need to expand health training and resources from trusted organizations to all farmworkers living and working in this wildfire prone region, including those who do not have an Ag Pass. Less than 10% of survey participants had heard of the Ag Pass, and less than 3% of had enrolled; these findings are representative of the number of Ag Pass holders in the county per recent updates at the Board of Supervisors meetings. We found participants in our study had very little awareness of the Ag Pass program, and when probed, two interview participants thought perhaps it was a program

designed to protect workers and ensure they were not at risk during wildfires. Combined with survey data, interviews, and conversations with farmworkers and local community-based organizations (CBOs) highlight that very few farmworkers in the region receive evacuation notices. These findings underscore concerns that farmworkers may continue to live and work inside evacuated zones in the future, regardless of whether they have applied for or received an Ag Pass. The 2024 election has led to increased immigration enforcement practices, which are historically linked to reduced engagement with government administered programs by immigrant communities. Prior studies have linked increased immigration enforcement with a "chilling effect" on immigrant households signing up for program such as Medicaid and the Supplemental Nutrition Assistance Program (SNAP).^{33,34} Reduced engagement with these programs may exacerbate the risks associated with the Ag Pass program for farmworkers asked to work during a wildfire without alternative economic assistance and healthcare.

Specific sub-populations such as H2A workers and those who primarily speak an Indigenous language may also face additional challenges in receiving and following evacuation notices due to barriers such as language inaccessibility of notices, not owning a smartphone, and being reliant on employers' transportation to evacuate.^{35,36} Our analysis also highlights the importance of this training being delivered by local trusted organizations, who may be best positioned to provide this critical information in a culturally appropriate manner. These recommendations are underscored by our analysis that the wildfire smoke standard may not be sufficiently protective of the health of outdoor workers, particularly when engineering and administrative controls are infeasible. The current wildfire smoke standard requires employers to provide particulate respirators (e.g., N95s) for voluntary use when the AQI is at least 151 and for mandatory use when the AQI is at least 500, but it does not set any thresholds under which outdoor work cannot be performed.³⁷

This research did not specifically aim to assess employers' compliance with regulations; however, our surveys and interviews with farmworkers as well as interviews with other key County

stakeholders suggest lack of oversight and enforcement of measures such as the wildfire smoke standard and anti-retaliatory measures. Farmworkers also reported widespread confusion and hesitancy regarding the process to file a complaint. This is particularly important in the context of the Ag Pass, as enforcement of key regulations aimed at protecting farmworkers' health and safety and preventing retaliation would likely be even more difficult for work occurring inside evacuation zones. Our work also highlighted consistent gaps in wildfire preparedness, underscoring the importance of having resources and protocols in place well in advance of fire season.

One of the most consistent themes in both the surveys and interviews with farmworkers was the tension between economic security and health from working during wildfires. While participants overwhelmingly reported both having experienced and being concerned about the health impacts of wildfire smoke, interviews and conversations with participants indicated that many would feel pressured to continue working regardless of the conditions, both because of the inability to pay for basic needs such as housing and groceries if they did not work, as well as fear of retaliation from their employer. This highlights the clear need for increased enforcement of anti-retaliatory regulations, as well as economic models such as comprehensive disaster pay and unemployment insurance for both citizens and non-citizens.

Our work has some limitations and highlights areas for additional research. First, our survey asked participants broadly about their experiences working during wildfires since 2017, and some who indicated they had not received PPE from their employer may have worked only during fires prior to the implementation of the wildfire smoke standard in 2019. Similarly, the current version of the Ag Pass that was formally approved by the Board of Supervisors in 2022 had not yet been activated by the time we completed data collection in June 2024. Nevertheless, our analysis still highlights multiple areas where protections for farmworkers in this wildfire prone region should be improved, both for workers who currently do and do not hold an Ag Pass.

Despite taking numerous measures to protect the confidentiality and ensure comfort of study participants, including employing trusted community members to administer surveys, not collecting any identifying or personal information (including in the consent stage), and meeting participants at a time and location of their choosing, we were not able to enroll any H2A workers in the study. When approached, H2A workers were not comfortable participating due to fear of retaliation from their employers. While H2A workers are not explicitly eligible for an Ag Pass, interviews with key stakeholders consistently highlighted that these individuals have not always received evacuation notifications or transportation outside evacuation zones during previous wildfires, highlighting the importance of understanding the unique experiences and potential implications of a program that provides work authorization inside evacuation zones in this population. Our study also had lower representation of individuals speaking Indigenous languages, who may face additional challenges in receiving and understanding wildfire health and safety information.

This study also has several strengths, notably the development of an academic-community partnership with trusted leaders and community members from Sonoma County that allowed us to recruit over 1,000 participants, approximately 10% of the full-time agricultural workforce in the County, from this this hard-to-reach population. This study is also the first to directly examine farmworkers' experiences and perceptions of an Ag Pass program in California. Our findings highlight areas to improve protections for farmworkers both within Sonoma County and in other regions that currently have or may develop similar pass programs.

Our research found farmworkers in this wildfire prone region often lack access to appropriate resources and training during wildfires, including PPE, evacuation notifications, safe evacuation routes and wildfire updates at the workplace, and medical treatment. Furthermore, many workers face significant economic pressure to continue working in hazardous conditions. We also identified gaps in the development and implementation of Sonoma County's Ag Pass that have implications for the health of individuals that may work

in mandatory fire evacuation zones under this program. These findings are underscored by the lack of any health expertise informing decisions to activate the Ag Pass, and Sonoma County's expansion of evacuation access authorized by AB1103 to allow potential entry to fire evacuation zones to non-managerial employees for extended periods of time to conduct physically demanding labor (e.g., harvesting crops). It is imperative to consider the health implications to farmworkers under this program given evidence of individuals working in potentially hazardous conditions under previous iterations of the Ag Pass,^{28,29} and forecasts that farmworkers' smoke exposure days will increase drastically in the coming years.²⁰

While we were not able to directly evaluate participants' experiences working under the current version of the Ag Pass, as it had not been activated by the time data collection was completed, our findings still have important implications for farmworkers' health and safety under this program. Notably, our findings highlight that many participants who had previously worked in agriculture during wildfires experienced adverse health impacts, felt pressured to continue working in potentially hazardous conditions due to fear of lost income or being fired, and struggled to access resources and services to address these concerns. The County of Sonoma subsequently approved a program that expands work opportunities inside wildfire evacuation zones, which have been deemed too unsafe for the general public to remain, without any evaluation of farmworkers' previous experiences working during wildfires or plans to mitigate or address adverse health that will inevitably arise among workers under the Ag Pass. We recognize this is a complex issue with many perspectives and priorities, including owner/operators' needs to access to their properties during natural disasters, which is critical to their livelihood and prosperity; county departments' hesitancy to accept additional roles and responsibilities in this program without the appropriate allocation of resources; and some farmworkers' desire for continued work opportunities during wildfires in the absence of comprehensive disaster pay and unemployment insurance. We also assert that in the absence of state Ag Pass legislation, county governments that have expanded upon

AB1103 to allow non-managerial employees to enter fire evacuation zones for agricultural activities should ensure these programs consider and address the short- and long-term health and safety of these workers. The Sonoma County Board of Supervisors expanded upon AB1103 to facilitate evacuation zone access for any worker approved with an Ag Pass and therefore has an obligation to ensure that the program addresses the specific experiences and needs of farmworkers, which are often unique from those of their managers or employers.

To begin to address gaps in the Ag Pass and farmworkers' health during wildfires, we recommend the Sonoma County Board of Supervisors engage the expertise from relevant county departments (e.g., Department of Health and Human Services, Department of Emergency Management, Office of Equity), local CBOs, health clinics, and non-profits and consider potential modifications to the program to increase protections for farmworkers' health and safety, such as:

- (1) Include health professionals (e.g., representatives from Sonoma County Department of Health, Health Officer) monitoring AQI and heat levels in and near evacuation zones in decisions of when and where to activate the Ag Pass.
- (2) Reassign the oversight of the Ag Pass safety training (e.g., establishing minimum training requirements), with appropriate resources and funding, to organizations with expertise in public health, wildfire safety, and competency interacting with a predominantly immigrant workforce.
- (3) Remove the role of the law enforcement agencies in the Ag Pass application process.
- (4) Consider developing more stringent criteria (e.g., a combination of AQI thresholds and/or time limitations) under which full time non-managerial employees (such as farmworkers) could work inside fire evacuation zones, that may be separate from criteria for owners/operators and managerial employees re-entering fire evacuation zones for

time-limited activities (e.g., feeding livestock, turning on irrigation).

- (5) Confirm that all Ag Pass applicants have received and understand required wildfire smoke protection training (i.e., at a minimum, the information contained in Appendix B of the California Code of Regulations, title 8, section 5141.1³⁷ and establish requirements for wildfire health training (e.g., health effects of wildfire smoke and who to contact if experiencing symptoms) in their preferred language and in an accessible format.
- (6) Provide resources to local CBOs, health clinics, and Sonoma County Community Organizations Active in Disaster (COAD) to develop and distribute resources (e.g., PPE, information about where to go during an evacuation, know your rights information) and wildfire health and safety training to farmworkers.
- (7) Develop a task force of relevant county departments and farmworker-serving organizations to identify current resources, gaps, and potential solutions to expand health monitoring and services during and after wildfires (e.g., through mobile health clinics and/or expanded hours at existing clinics).
- (8) Develop additional notification systems to alert farmworkers of local air quality levels and when the Ag Pass is activated or deactivated. Alert systems could follow models such as Ventura County's system that provides text and audio alerts in English, Spanish, and Indigenous languages.
- (9) Increase efforts to assist farmworkers in signing up for existing and new emergency wildfire alerts.
- (10) Increase air monitors throughout the county to monitor real-time AQI levels.
- (11) Conduct additional research to examine the specific needs of populations such as H2A workers and Indigenous language speakers, who were underrepresented in our study and face additional barriers to receiving wildfire evacuation notifications and transportation out of the area.

We further state-level recommendations, including:

- (1) Cal/OSHA include greater health protective measures in the forthcoming updates to the wildfire smoke standard, such as specific criteria (e.g., AQI thresholds) in which prolonged outdoor agricultural work without engineering or administrative controls should be restricted. Per AB-2243, Cal/OSHA is required to submit to the standards board a rulemaking proposal to consider revising the wildfire smoke standard by December 1, 2025.³⁸
- (2) The California State Legislature pass and Governor sign legislation to provide wage replacement for farmworkers and outdoor workers regardless of immigration status when it is unhealthy to conduct prolonged physical activity outside (e.g., disaster pay, unemployment insurance, and expanded government benefits to undocumented workers).
- (3) The Department of Industrial Relations (DIR) update the farm labor contractor licensing exam to ensure contractors understand legal requirements under the labor code and health and safety code regarding workers' rights during wildfires.
- (4) Relevant departments within the Labor and Workforce Development Agency partner with regional Sonoma County CBOs to deliver training on laws relevant to work performed during a wildfire and inside of an evacuation zone.

Conclusion

We developed an academic-community partnership to examine the experiences of farmworkers during wildfires and evaluate Sonoma County's "Ag Pass" program. We identified various gaps in the development and implementation of the Ag Pass that have implications for the health of farmworkers who may work inside fire evacuation zones under this program. This research also highlights the severe economic pressure many farmworkers face to continue working in potentially hazardous conditions due to fear of

retaliation and the inability to pay for basic needs without wage replacement, underscoring the need for economic models such as comprehensive disaster pay and unemployment insurance, including for noncitizens. We present additional legal analysis, findings, and recommendations for farmworkers' health, physical safety, economic security, and data privacy in an accompanying white paper.

Acknowledgments

We are incredibly grateful to the Community Engagement Team led by Zeke Guzman, without whom this work would not have been possible. We thank all the farmworkers who participated in this study for their time and sharing their experiences with us. We also acknowledge the many community-based organizations and Sonoma County staff who participated in conversations and interviews with us throughout the course of our research. This work was supported by Dr. Hyland's start-up funding from UC Agriculture and Natural Resources and the UC Berkeley School of Public Health.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by start-up support to Dr. Hyland by the University of California Agriculture and Natural Resources.

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