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ESSENTIAL AND IN CRISIS:

A REVIEW OF THE PUBLIC
HEALTH THREATS FACING
FARMWORKERS IN THE US

 **JOHNS HOPKINS**
CENTER for A LIVABLE FUTURE

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**CENTER FOR
AGRICULTURE &
FOOD SYSTEMS**



The opinions expressed herein are our own and do not necessarily reflect the views of the Johns Hopkins University.



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COVER ART:

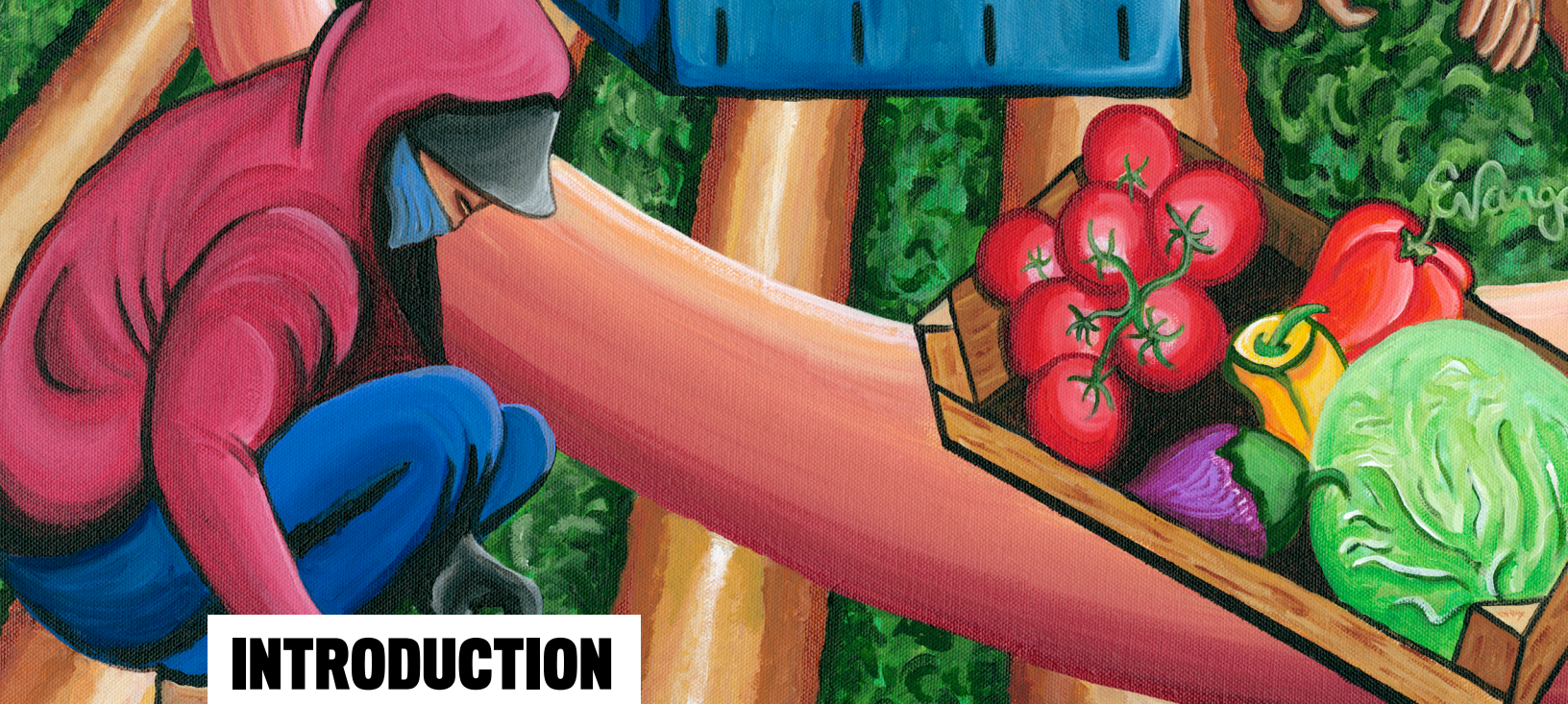
Johns Hopkins Center for a Livable Future and **Elias Vargas**, Elias Vargas Art, original artwork.

ABOUT CLF

As an interdisciplinary academic center based within the Johns Hopkins Bloomberg School of Public Health, The Center for a Livable Future (CLF) applies a public health lens to questions of food system reform. Since 1996, CLF has been addressing—and proposing solutions to—some of the most pressing issues in the food system. CLF is a leader in public health research, education, policy and advocacy, dedicated to building a healthier, more equitable and resilient food system. Since its founding, a primary focus of the Center has been understanding and addressing the public health and environmental problems caused by large food animal production operations, often referred to as industrial animal agriculture facilities or CAFOs (concentrated animal feeding operations). Visit www.clf.jhsph.edu to learn more.

ABOUT CAFS

Vermont Law School's Center for Agriculture and Food Systems (CAFS) uses law and policy to build a more sustainable and just food system. In partnership with local, regional, national, and international partners, CAFS addresses food system challenges related to food justice, food security, farmland access, animal welfare, worker protections, the environment, and public health, among others. CAFS works closely with its partners to provide legal services that respond to their needs and develop resources that empower the communities they serve. Through CAFS' Food and Agriculture Clinic and Research Assistant program, students work directly on projects alongside partners nationwide, engaging in innovative work that spans the food system. Visit www.vermontlaw.edu/cafs to learn more.



INTRODUCTION

On March 19, 2020, in the midst of a global pandemic, the federal government declared farmworkers “essential workers.”¹ From California to New York, the same communities called upon to keep Americans fed during an unprecedented period of sickness and uncertainty also suffered some of the most horrific Covid-19 infection and fatality rates.

While individuals across the country grappled with the devastating impacts of the Covid-19 pandemic, farmworkers throughout the United States (US) were among those the US government called upon to risk their health and the health of their communities in order to keep groceries on the shelves for millions of Americans.¹ Despite the government’s public acknowledgement of the essential role that farmworkers fill in our food system, farmworkers were denied the most basic public health protections.

This incongruity was nothing new. Americans have long relied on the skilled and arduous labor of farmworkers to fuel our food system, while the US government and agricultural employers fail to provide protection or address systemic problems that make workers vulnerable to sickness. Moreover, Covid-19 has only exacerbated existing inequities in our food system. Any future shocks to the US food system could leave farmworkers further exposed to exploitation and health risks.

In this report, which is an update to the Center’s 2017 report, “Public Health, Immigration Reform, and Food System Change,” we review available research on a variety of public health threats that farmworkers face. We demonstrate how these health burdens are, in part, the result of laws, policies and practices that are intentionally designed to limit this workforce’s resources and recourse to fight against unsafe working conditions. We assert that the skills, knowledge, and contributions of people in the agricul-

tural workforce must be adequately compensated and their rights to safety and health honored. Throughout this report, the voices of farmworkers and farmworker advocates are included to highlight the strength, ingenuity, and knowledge of these skilled professionals.

This report focuses on farmworkers in production agriculture. We review literature on this topic that has been published since 2016, when we conducted research for the first iteration of this report. The first half of the report provides policy-related background information and considers the social contexts of unsafe working conditions that are often associated with negative health impacts for farmworkers. The second half of the report summarizes the public health threats that farmworkers face. Each section describes how farmworkers are exposed to these health hazards and provides information about the short and long-term effects on farmworker health. The sections conclude with a description of individual and systemic interventions, opportunities and challenges to reducing these health impacts. Each section is structured so that it can serve as a stand-alone resource.

While the Covid-19 pandemic has displayed decision makers' unwillingness to address farmworkers' exploitation, it simultaneously provides a wake-up call to millions of Americans across the country. When workers receive the rights, protections, and compensation they have fought for and deserve, our food system, our agricultural communities, and our collective wellbeing will become stronger.

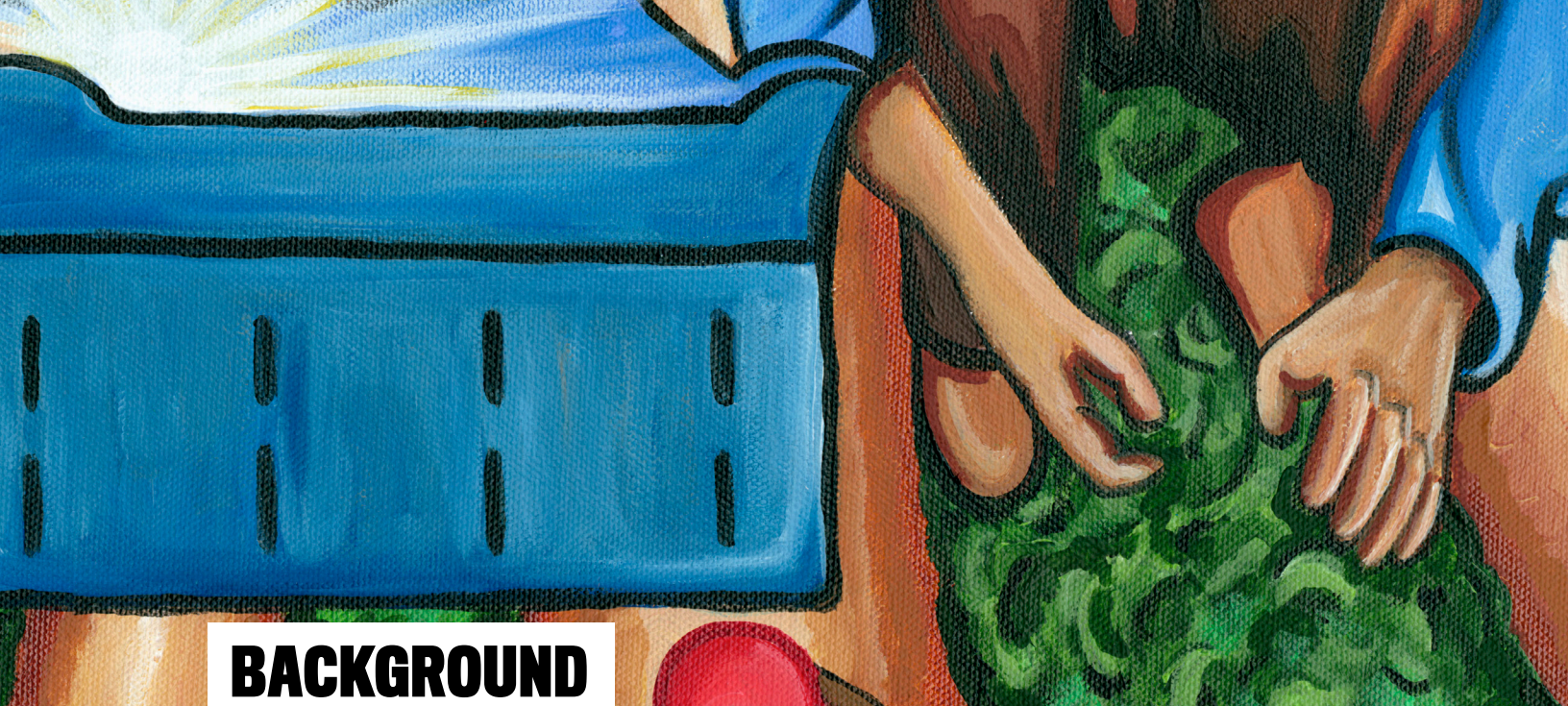


METHODS

For this report, we conducted a literature review compiling peer-reviewed papers published between January 2016 and January 2020 in four databases: Pubmed, PubAg, CABDirect, and SCOPUS. These results supplement and update the research highlighted in our 2017 report, “Public Health, Immigration Reform, and Food System Change.” For this report, we searched databases for key terms related to agricultural workers in the US, occupational health concerns, and public health policy. This search yielded nearly 14,000 results. The authors independently reviewed the abstracts and full-text reports successively using the software package Covidence. The exclusion criteria for selecting non-relevant references included: population of interest were not farmworkers, geographic region outside the US, non-English language, and time period focus pre-1940. Of these results, a total of 273 relevant peer-reviewed articles matched the selection criteria and scope of this report and were extracted for analysis. The 273 relevant articles were then organized by topic. The authors reviewed results and methods by topic in order to compare conclusions and findings. It is important to note that the literature search period up to January 2020 means that peer-reviewed research on Covid-19 risks for farmworkers had yet to be published. Furthermore, our peer-reviewed literature search excludes meat-processing workers, though they are briefly mentioned in the Covid-19 section of the report. We have also incorporated non-peer reviewed grey literature as well as some studies outside of the search period and databases listed to supplement peer-reviewed sources.

The literature reviewed includes both quantitative and qualitative studies. The quantitative research reviewed here provides insights on the burdens of disease, occupational health hazards, levels of risk, and health disparities farmworkers experience compared to non-farmworkers. The qualitative

analyses we reviewed highlight how a group of individuals experience and express these risks, health impacts, and policies within specific contexts. Qualitative research usually provides rich narrative descriptions to supplement quantitative findings, but tends to be context-specific and less generalizable. Throughout the research process, we also worked with farm-worker advocates, organizers, and experts to help frame the research and inform our analysis. We have also included perspectives from these individuals and organizations throughout the report in order to help connect the research to personal stories and the community of the individuals working as agricultural laborers.



BACKGROUND

TERMINOLOGY

For the purposes of this report we define the terms below as follows:

Immigrant: A person living in a country other than that of their birth

Migrant: A person working temporarily or seasonally

(Im)migrant: Pertaining to both migrants and immigrants

Undocumented: Lacking authorized immigration status under current US laws

Latinx: A person(s) of Latin American origin or descentⁱ

Hispanic: A person(s) from a Spanish speaking background (including from Spain). We only use the term Hispanic when research studies refer to their subjects as Hispanic

Farmworker: A person employed to work on a farm, typically one who is paid an hourly or piece rate wage, who is not the farm owner

Indigenous (Im)migrant Farmworker: Indigenous farmworkers from Mexico or Central America, many of whom speak an Indigenous (non-Spanish) language as their primary language

ⁱ Another common gender-neutral term used predominantly by Spanish speakers is “Latine.” We use the term “Latinx” in this report as it is more commonly used in peer-reviewed literature.

FARMWORKERS IN THE US*



THERE ARE AN ESTIMATED
2.4 MILLION
FARMWORKERS
IN THE U.S.

APPROXIMATELY
75% OF FARMWORKERS
ARE IMMIGRANTS

THE AVERAGE FARMWORKER MAKES
\$20,000-\$24,499

33% HAD FAMILY INCOMES
BELOW POVERTY**

THE AVERAGE FARMWORKER HAS
WORKED 16 YEARS
IN THE INDUSTRY AND IS **HIGHLY SKILLED**


55% OF FARMWORKERS
HAVE CHILDREN

40% OF FARMWORKERS WERE LIVING APART
FROM ALL NUCLEAR FAMILY MEMBERS AT
THE TIME OF THEIR INTERVIEW

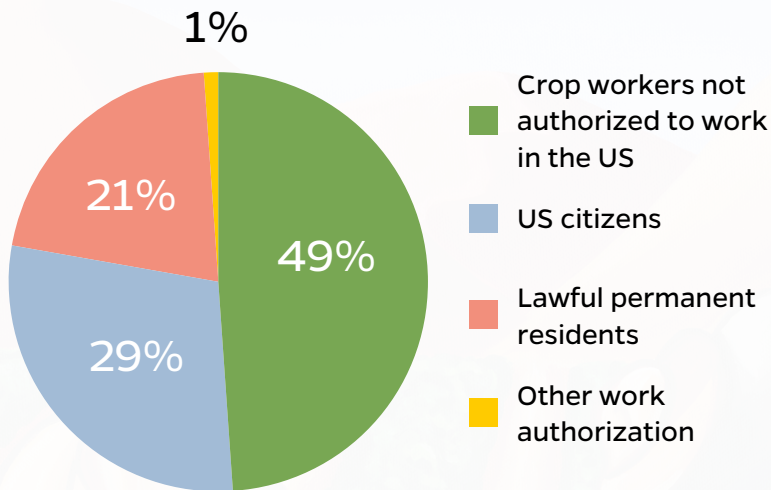
IN THE 12 MONTHS PRIOR TO BEING INTERVIEWED, RESPONDENTS
SPENT AN AVERAGE OF **33 WEEKS** EMPLOYED IN FARM WORK AND
PERFORMED AN AVERAGE OF **192 DAYS OF FARM WORK**.

*The National Agricultural Workers Survey does not count the total number of crop workers or other farmworkers in the United States.³ It only includes numbers from growers participating in the survey. Data from the National Agricultural Workers Survey 2015-2016.²

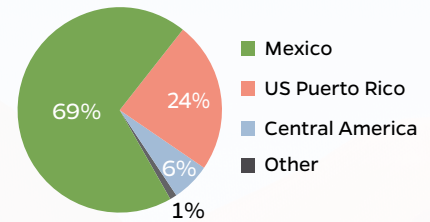
**The federal poverty level for a family of four in the US is \$26,500⁴



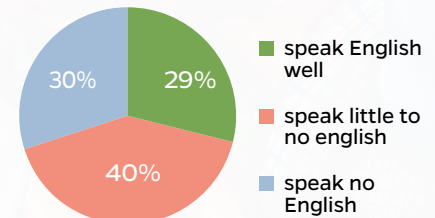
CROP WORKERS IN THE US



HOME COUNTRIES



ENGLISH PROFICIENCY



“Farmworkers are mostly immigrant men and women from Mexico and Central America. Among Farmworker Association of Florida members there are also Haitian and African American workers. Many farmworkers are undocumented, but not all, nor are they all immigrants. They are hard-working individuals who want a better future for their children. That is why they have risked it all for them. Many were also driven to migrate due to economic and political policies negotiated between Washington D.C. and governments of their home countries that for the sake of profits put the economic sustainability of their countries in jeopardy. All most farmworkers want is that that their work be respected, that they are afforded workplace protections, and that their children do not have to work the fields as they do.”

– Nezahualcoyotl Xiuhtecutli, Farmworker Association of Florida

POLITICAL HISTORY OF IMMIGRATION & US FARM LABOR SINCE WWII

Farmworkers are in a relatively distinctive situation among the US workforce due to a number of policy factors; these policies were created with diverse aims, but rarely, if ever, with the intent of addressing workforce well-being or attending to the long-term needs of the US agriculture system. The food system in the US could be said to be built on the foundations of racial capitalismⁱⁱ, operating to produce wealth for a small group, at the expense of public health, the environment, and rural communities. The legacy of racism, enslavement of African peoples, genocide of Indigenous peoples, and stolen Indigenous lands is also evident in our farm labor policies and practices which deny many workers basic protections while relying on their skills to feed and sustain the US population. Modern immigration policies that govern the agriculture sector also build on exploitative terms that were widely adopted almost a century ago under the Bracero Program, modified under the Immigration and Nationality Act and H-2 Visa Program and the Immigration Reform and Control Act. Today, immigrant workers work in the US in multiple capacities that will affect the level and type of protections afforded to them via policy.

BRACERO PROGRAM

Due to anticipated labor shortages that many Americans believed would occur as a result of World War I and subsequently in World War II, the US created a guestworker program, the Bracero Program, in 1917 and again in 1942. The first Bracero Program for unskilled Mexican workers was initiated during WWI and ended in 1922. Although sometimes referred to as unskilled labor, farmworker jobs require skill and often previous experience, and farmers benefit from the skills that workers bring to their fields.

The second Bracero program was the largest guestworker program in US history, and employed more than four million Mexican workers over its 22-year history, including the first documented movements of Indigenous Mexicans to the US.^{10,11} The second Bracero Program allowed temporary entry for laborers from Mexico to work in the fields and on railroads in the US. However, amid growing opposition and reports of abuse that workers sustained through the second Bracero Program, including wage theft and

ii Racial capitalism is defined as “the process of deriving social and economic value from the racial identity of another person,” often referring to a non-white person.⁵ This term was coined by Cedric J. Robinson in his book *Black Marxism: The Making of the Black Radical Tradition*, published in 1983. The framework of racial capitalism has been expanded by scholars⁶⁻⁸ to “highlight how racial difference is produced and how that relative valuation gets operationalized,”⁸ such that racialized devalued bodies (for example, agricultural workers) are rendered disposable.⁹

inadequate working and living conditions, the federal government ended the program in 1964.

IMMIGRATION AND NATIONALITY ACT AND THE H-2 VISA PROGRAM

While the Bracero Program was still operating, the Immigration and Nationality Act (INA) was enacted in 1952, creating the H-2 visa program. The H-2 Temporary Agricultural Workers Visa allows foreign workers to come to the US if an employer can offer a job that is temporary or seasonal, and demonstrate that there are no US workers who are able to take the job. The program is intended to fill jobs in the US in areas and occupations experiencing labor shortages. The minimum hourly wageⁱⁱⁱ for people with H-2A visas is calculated to prevent any negative impacts on the wages or working conditions of similarly employed domestic workers. Investigations have found that the program suppresses farmworker wages and has led to human rights violations.¹³ One fundamental limitation of the program is that it restricts guestworkers from changing employers once they arrive, forcing some workers to remain in substandard working and living conditions in order to keep their visas. While both the Bracero Program and H-2 visa programs co-existed in the 1950s, the H-2 program employed guestworkers on a much smaller scale, allowing the program to escape some of the criticism leveled at the Bracero Program even though workers often experienced similar abuse. Given these abuses against guestworkers, many advocates considered the H-2 program to be a new iteration of the Bracero Program.

IMMIGRATION REFORM AND CONTROL ACT AND CHANGES TO H-2 VISA

In 1986, the Immigration Reform and Control Act was passed under the Reagan administration. This Act split the H-2 visa into two separate temporary visas—the H-2A for agricultural workers, and the H-2B for non-agricultural workers. This bill also offered amnesty to undocumented immigrants who had been living in the country before 1982. About 2.7 million undocumented immigrants became lawful permanent Residents through the Act. However, in 1994 after the North American Free Trade Agreement (NAFTA) came into effect, there was an increase in migration to the US.¹⁴ This increase was fueled, in part, by flooded agricultural markets as trade barriers were phased out, which in turn resulted in many Mexican smallholder

iii Hourly wages for H-2A workers are calculated based on “a mandated wage standard that varies by region—known as the Adverse Effect Wage Rate (AEWR)—aiming to prevent temporary migrant farmworkers from being underpaid according to local standards and to prevent downward pressure on the wages of farmworkers in the [US].”¹²

farmers losing their ability to make a living from agriculture.¹⁴ In addition, continuous US agricultural subsidies to American producers augmented US labor demand, creating a new flow of farmworkers without documentation as many rural farmers in Mexico moved to the US in order to make a living.¹⁴

STATE OF CURRENT IMMIGRATION POLICY

H-2A workers only supply about twelve to eighteen percent of the US hired labor force¹⁵, and undocumented workers still comprise about fifty percent of the farm labor workforce.² Today, many farms have experienced labor shortages across the country.^{16,17} But many immigration policy proposals supported by the Trump administration proposed tightening restrictions on immigration and immigrant labor, which many argue only exacerbated this labor shortage.^{17,18} As one study by Escalante et al 2019¹⁵ notes, “undocumented workers have been evicted through immigration control policies and domestic workers have not shown considerable interest in taking on vacated positions,” leaving the H-2A program as one of the only legitimate options for hiring needed workers. The Biden administration has expressed support for legislation that would create a path to immigration status and citizenship for farmworkers and their families.^{19,20}

Border and immigration policies most often serve growers by creating an unprotected workforce²¹, yet many growers critique the H-2A program for being “bureaucratically cumbersome.”²² Farmers often have to work with multiple federal and state agencies to navigate the H-2A hiring process.²² Worker advocates highlight that the H-2A program exploits workers who cannot change employers, and workers are often taken advantage of by corrupt third-party recruiters.²³ While the H-2A visa program has offered an opportunity for migrant farmworkers to enter the US legally, is also has created an agricultural workforce without access to citizenship and with restrictions on workers’ ability to freely access the labor market, contributing in large part to workers’ vulnerability.²⁴

OCCUPATIONAL HEALTH & SAFETY AND LABOR POLICY

LABOR LAWS AND HEALTH AND SAFETY REGULATIONS

Agricultural labor is not subject to the same regulations and protections as the labor in other industries, a condition referred to as “agricultural exceptionalism.” The initial exclusion of farmworkers from US labor protections in the 1930s was driven by agricultural interests’ desire to maintain the Southern plantation economy that depended on the exploitation of Black work-

ers,²⁵ and the legacy of such exploitation is evident in current labor policies. Under the Fair Labor Standards Act originally enacted in 1938, most farmworkers are exempt from overtime pay regardless of farm size; small farms, farms that employ fewer than roughly seven workers in a calendar quarter, are also not required to pay minimum wage; and child agricultural workers are permitted in agriculture.²⁶ Farmworkers are also not covered by the National Labor Relations Act, effectively eliminating their rights to collectively bargain.^{vv} In many states, farmworkers are also ineligible for workers' compensation benefits in the case of injury or illness on the job.²⁷ The following laws and regulations are the federal standards that govern occupational health policy in the United States, although they also contain many provisions that purposefully exclude farmworkers from protections granted to workers in other industries.

THE MIGRANT AND SEASONAL AGRICULTURAL WORKER PROTECTION ACT (MSPA)

The Migrant and Seasonal Agricultural Worker Protection Act requires that agricultural employers “must disclose terms of employment at the time of recruitment and comply with those terms; employers, when using farm labor contractors to recruit, supervise or transport farmworkers, must confirm that the contractors are registered with and licensed by the US Department of Labor; providers of housing to farmworkers must meet local and federal housing standards; and transporters of farmworkers must use vehicles that meet basic federal safety standards and are insured.”²⁶ MSPA is significant because it establishes clear employment standards related to farm labor contractor practices, compensation, housing, and transportation. However, this Act does not apply to small farms (or any farm that employs fewer than roughly seven workers in a calendar quarter).

OCCUPATIONAL SAFETY & HEALTH ACT (OSH ACT):

The Occupational Safety & Health Administration (OSHA) within the US Department of Labor is responsible for enforcing the Occupational Act of 1970 (OSH Act),²⁸ which aimed to improve workplace health and safety. OSHA establishes minimum workplace health and safety standards for certain occupations, and state laws can build upon these regulatory frameworks. The OSH Act is enforced through occupational safety and health standards (specific duty standards) and the general duty clause. Specific duty standards require employers to adopt specific practices to ensure employee safety and safe workplaces and can be enforced by OSHA or the responsible state agency when violated.²⁹ The General Duty Clause requires

employers to ensure workplaces are free of recognized hazards that are likely to cause serious injury or death to employees.³⁰ While in practice the use of the general duty clause is limited (making up just 1.5% of the agency's citations issued in 2018) and can be difficult to enforce given the burden of proof is placed with OSHA, this clause functions when OSHA has not developed a specific standard for the particular workplace hazard at issues.³¹ Federal funding for OSHA specifically restricts the agency's enforcement work in agriculture by exempting farms employing fewer than 11 employees, and OSHA enforcement has been limited.³² In addition, in fiscal year 2019, there were only 5,511 health-related federal OSHA inspections, and the median penalty for occupation-related deaths in 2019 was \$9,282 for federal OSHA.³³ In addition, there is no broad-based infectious disease standard to protect workers from airborne or contact-transmissible diseases such as tuberculosis, influenza or coronaviruses.³³ The OSH Act also prevents OSHA from exercising jurisdiction over working conditions and hazards already covered by other federal agencies.³⁴



SOCIAL CONDITIONS

This section explores social conditions affecting worker wellbeing including discrimination, housing, language, age, social networks, health care and wages, synthesizing peer-reviewed literature on these topics. These social conditions often increase the risk for physical and mental health impacts for farmworkers. Although the connection between social conditions and health outcomes is sometimes speculative, farmworkers' experiences in the US are shaped by these social conditions.

DISCRIMINATION

Farmworkers' strenuous physical labor in the fields is compounded by daily discrimination at their workplaces.^{35,36} A large percentage of farmworkers are immigrants from Mexico (69 percent), a majority of whom have limited English proficiency.² Additionally, over the last decades, the number of Indigenous (im)migrant farmworkers from countries such as Mexico and Guatemala have been growing in the US³⁷, with an estimated 165,000 Indigenous farmworkers from Mexico residing in California.¹¹ Characteristics such as English proficiency, country of birth, ethnicity, legal status, in addition to a prevailing anti-immigrant rhetoric in the US, are some of the most common forces behind discrimination against (im)migrant and Indigenous farmworkers from other countries.^{36,38}

In a 2017 qualitative study by Snipes et al.³⁸ documenting farm owners' discriminatory practices against farmworkers in Texas, many farmworkers reported that their Mexican nationality was used as a basis for discrimination. Specifically, farmworkers shared that employers unfairly withheld vacations, wages, and other benefits from non-US born farmworkers:

*The only thing I can tell you is that we say the same thing to our bosses all the time, but without resolution... And that is what happens to us as Mexicans. We cannot complain because... then they are going to fire you...When [my wife] had given birth, when we had the babies, I had to ask for some days off. I asked him, and he got mad because all he wants is to keep me working. He doesn't let me [have any time off from work]. Well, I'm from Mexico, but he will let the Chicanos (individuals born in the US) [take time off]. That's not right. That's racism or something like it.*³⁹

In fact, some peer-reviewed research demonstrates that employers are most commonly found to be the perpetrators of discrimination against farmworkers.^{9,38,40} According to the same study by Snipes et al.,³⁸ 67 out of 89 farmworkers reported that farm owners or their bosses were most commonly the perpetrators of discrimination against farmworkers at work and had a history of firing farmworkers without any reason. Additionally, as discussed in the gender-based violence section, employers are also perpetrators of gender-based discrimination and sexual harassment toward predominately women farmworkers,^{iv} leading to long-lasting trauma and negative health outcomes for women.⁴⁰

Indigenous (im)migrant farmworkers, especially, are likely to suffer from “double discrimination,” that is discrimination from the mainstream population (on the basis of their country of origin) as well as discrimination from other migrant workers (on the basis of their Indigenous identity).¹¹ Many Indigenous (im)migrant farmworkers face poverty, systemic violence, and discrimination on the basis of skin tone, language, cultural practices in their home countries, although there is little peer-reviewed research on this topic.^{11,42–44} These social factors and conditions drive Indigenous migrant farmworkers to migrate and work in the agricultural sector in the US.^{11,42} However, Indigenous (im)migrant farmworkers face pervasive discrimination from the mainstream population and other migrant workers in the US as well, which often pushes Indigenous (im)migrant farmworkers to the most labor-intensive and poorly-paid jobs.^{37,45–48}

HOUSING

Farmworker housing typically includes four options—government subsidized housing, on-farm housing, community-based housing, and private

iv A number of studies have used the terms “female” and “women” interchangeably, which is why our report uses that terminology in some instances. It is critical to note that the term female usually has a pejorative connotation.⁴¹ Therefore, future research should try to move away from using the term “female” when referring to women farmworkers.

rentals.^{49,50} According to National Agricultural Worker Survey (NAWS) of 2015-2016, many farmworkers rely on their employers for housing—16 percent of workers lived in employer-provided housing.²

In general, farmworkers face significant economic, legal, and social barriers to affordable and safe housing as a result of systemic poverty (often caused because of low wages) and continued disinvestment in farmworker communities. Thus, farmworkers often live with substandard and hazardous housing conditions such as rodent infestations, lack of heat, electrical problems, overcrowding, and poor water quality.⁵¹⁻⁵⁵ According to the NAWS 2015-2016,² 33 percent of farmworkers lived in overcrowded housing. Additionally, even when farmworkers do not have to rely on employer-provided housing, wages are often so low that dwellings designed for a single family occupancy are shared with extended family members.

One of the participants in Postma & Ramon's⁵³ 2016 qualitative research study described the living conditions for farmworkers in Washington:

[Farmworkers] didn't have gas heat so sometimes they had to cook outside in the cold and everything... They didn't even have a washing machine. So they washed their clothes with the hose outside and dried the clothes on logs.

Similarly, in a 2019 qualitative study conducted by Heine et al.,⁵⁶ one of the participants shared the precarious nature of farmworker housing conditions in North Carolina:

These trailers are in ruins, and sometimes we feel like we will fall through the floor, and sometimes we feel like the roof is falling down.

Farmworkers often endure dangerous living conditions out of fear that complaint or reporting would result in retaliation such as deportation or loss of housing. Many believe they just have to “put up with it.”⁵⁶ Especially for farmworkers who rely on their employers for housing, there is a grave risk of losing their jobs, and thus shelter, if they speak up against the poor housing conditions—a risk they often cannot afford.⁵⁶

In addition to poor housing conditions described above, many farmworkers reside in farm labor camps that remain isolated or hidden from the public view. This isolation, especially in rural areas, exacerbates structural vulnerability for farmworkers. Hidden housing or camps receive less natural surveillance, often do not follow housing regulations, are more vulnerable to crime including theft of property and exploitation of workers through

human trafficking and enslavement.⁵⁷ Isolated farm labor camps also create additional access and transportation barriers for workers seeking social and health services.⁵⁷

Decades of research has shown that poor housing conditions and housing insecurity can lead to chronic health problems such as asthma, lead poisoning, and depression.^{53,58,59} Overcrowded housing conditions—which is especially prevalent in farmworker housing—is also associated with an increased incidence of tuberculosis, influenza pandemics, and adverse mental health outcomes such as anxiety and stress.^{50,56} Federal regulations such as the Migrant and Seasonal Agricultural Worker Protection Act (MSPA) set minimum standards for farmworker housing.^{60,61} However, the MSPA regulations do not apply to all types of farmworker housing.^{60,61} Additionally, research suggests that adherence to the federal and state regulations and protections is limited and sometimes non-existent.^{52,54,56} For example, a 2016 Mora et al.⁵² study found that all farmworker camps studied in North Carolina had housing regulation violations, with 56.5 percent of the camps having eight to 12 violations.

LANGUAGE

A majority of farmworkers in the US feel more comfortable communicating in Spanish or Indigenous languages such as Mixtec, Zapotec, Trique and Mayan.^{2,37} According to the 2015–16 data from the National Agricultural Worker Survey,² 77 percent of the US farmworkers reported Spanish to be the language in which they are most comfortable conversing in, while two percent reported an Indigenous language—such as Acateco, Amuzgo, Chatino, Chuj, Mam, Nahuatl, Popti, Purepecha/Tarasco, Tlapaneco, and Triqui—as their preferred language. However, these statistics might be underreported due to the widespread miscategorization of Indigenous farmworkers on the basis of their race/ethnicity or languages spoken. Additionally, 30 percent of farmworkers stated they could not speak English at all, and 41 percent reported that they could not read English at all.²

Although there are few studies that investigate the prevalence of bilingual communication, many employers' instructions and communications are only offered in English, thereby creating language and communication barriers and increasing the threats of occupational injury for farmworkers.⁶² Specifically, the absence of language support hinders proper safety training for farmworkers, increases miscommunication around hazards and workplace processes, and limits workers' knowledge of their rights and their agency in fighting against workplace occupational health violations.⁶³ In

fact, Snipes et al.,³⁸ in a 2017 study of Latino workers in Texas, found that the supervisors' inability to speak in Spanish was associated with a two-fold increase in the odds of occupational injury.

Language barriers can make it harder for farmworkers to access necessary and timely health care services, potentially exacerbating their already high burden of poor health outcomes and reducing the dignity of the health care-seeking experience.⁶⁴ These barriers are even more pronounced for Indigenous (im)migrant workers, a majority of whom speak Indigenous languages. One study in California found that due to the lack of Indigenous language translators or interpreters in the US health care systems, Indigenous (im)migrant farmworkers have to navigate this system without adequate in-person interpretation.⁶⁴

AGE

The average age of hired migrant farmworkers has risen steadily over the past 15 years. In 2006, the average age of migrant farmworkers in the US was 35.7, and in 2017 that age rose to 41.6 years old.⁶⁵ This change in demographics has profound impacts on farmworker health and safety, and a study of the National Agricultural Workers Survey data between 2002-2004 and 2008-2010 found that older workers (45 years old and greater) made up a greater portion of injury cases between 2008-2010 than the previous time period.⁶⁶ In addition, many of the leading types of injuries that farmworkers sustain, such as sprains and strains, are exacerbated over time, especially in older demographics. A 2019 study by Rachel Soper investigating wage structures for farmworkers working on strawberry farms in California found that older farmworkers often find themselves accepting lower pay than others as they often can no longer keep pace with younger piece-rate workers in non-organic operations.⁶⁷

On the other side of the age spectrum, workers under the age of 24 comprise a significant portion of the farmworker population and also face distinct health risks. According to a 2019 study by Quandt et al.,⁶⁸ in 2014 every day 33 children were injured in an agriculture-related incident across the US.⁶⁹ In North Carolina, a research team found that most Latinx child farmworkers in the state experience an occupational injury each year, with migrant child farmworkers experiencing more injuries than their non-migrant farmworker peers.⁷⁰ In addition, when minors are too young to meet working age thresholds, labor supervisors often tie employment to loaned or fabricated identity documents, giving supervisors power to set exploitative contract terms.⁷¹ In addition, lack of child care options for farmwork-

ers with children^{72,73} and the fact that parents sometimes rely on their children to work in order to cover household expenses may contribute to the large portion of young farmworkers.⁷⁴

SOCIAL NETWORKS

Social support is essential to wellbeing and mental health.⁷⁵ Working as a migrant farmworker often puts stress on social networks and support systems due to physical distance from family, long work hours, and living in isolated environments on farms.^{51,76-78} According to the 2015-16 National Agricultural Worker Survey (NAWS)² data, about 40 percent of farmworkers are living apart from their nuclear family members. Especially for migrant farmworkers who are in temporary living situations and who may be distant from family members, social connections with other workers are important to share knowledge, find safe workplaces, and access health services.^{75,79}

For undocumented farmworkers, leaving the farm may mean risking exposure to immigration enforcement agents. Many undocumented farmworkers also lack access to a driver's license or vehicle, which makes going to the grocery store, pharmacy, or visiting family more difficult. This can result in undocumented farmworkers further straining social support networks due to minimal off farm travel, limiting individuals' independence and increasing social isolation.⁸⁰ In addition, H2-A work visas are linked to only one farm employer, restricting an individual's mobility and agency to leave unsafe or exploitative work environments.^v Given these risks, farmworkers in one study describe their situation as *encerrado*, or "penned up on the farm day and night."⁵¹ Sexsmith⁵¹ describes this phenomenon as entrapment, when migrant farmworkers are unable to "leave a farm where they feel abused or unappreciated but lack social networks to help identify better alternatives." Furthermore, a work day for farmworkers can be long, further reducing time for social connection. For example, a worker who lives off of the farm may leave their home at 6 am and not get back until 8 pm⁶⁸ or even work overnight.⁸² This narrows the time farmworkers have to spend with families and friends.⁶⁸ One tobacco producer and seasonal farmworker in the US South stated:

*Being there, there is no time, since you work from Monday to Saturday and Sunday is the day that you can go out to buy lunch, the day you clean your house so it can be acceptable. There is no time for sports or any other activity... There, you go exclusively to work.*⁸³

v As of the publication of this report, The Farmworker Modernization Act (H.R.1603)⁸¹ would change these requirements, though some advocates have raised concerns about some of the provisions in this bill.

HEALTH CARE

Farmworkers experience significant barriers accessing health services. First, services may be a barrier due to lack of insurance, sick leave, or transportation.⁸⁴⁻⁸⁶ Second, farmworkers may rightfully fear accessing services for work-related conditions because of threat of deportation or retaliation from their employer.^{86,87} Furthermore, available services may be inadequate or culturally, medically, or linguistically inappropriate.^{85,86,88-90} Some farmworkers also experience significant barriers to accessing health services related to a general mistrust of the US health care system (for reasons including negative experiences, medical racism, and systemic barriers).^{85,86,88}

An analysis of recent data found that 41 percent of farmworkers did not use US health care services in the last two years, compared to 16.8 percent of the general population.⁸⁹ One study of medical records found that 71 percent of adult migrant agricultural workers were uninsured⁹¹ while the 2015-2018 National Agricultural Worker Survey (NAWS) found 53 percent were uninsured and that only 18 percent of farmworkers' employers provided "health insurance for illness or injury suffered while not on the job."² The Affordable Care Act (ACA) excluded agricultural employers with fewer than 50 employees or with seasonal workers from the employer health insurance benefits requirements.⁹² A survey of farmworkers in Sonoma County, California, found that 30 percent of farmworkers had US-based insurance, compared to 86 percent of the adult population.⁹³ These disparities in insurance coverage can contribute to farmworkers' decisions to access medical care.⁹³ The impact of differences in health care access on health outcomes by racial, ethnic, and socioeconomic groups have been widely documented.⁹³⁻⁹⁶

ACCESS TO CARE

Farmworkers often struggle to get the time off from work to access essential health services and may lack transportation to a health care center.⁹⁷ One 2016 study with Hispanic dairy workers in Wisconsin found that the majority of participants described fear of job loss as a reason to not report an injury to a supervisor.⁸⁷ Another 2017 study including 180 farmworkers in Texas looked at farmworkers' experiences with discrimination, injury, and treatment. In this context, Snipes et al.³⁸ found that some farm owners

coerced their employees to work through injuries without treatment. One woman was required to work even during pregnancy complications:

Even after I had the baby, a couple of hours later, he wanted me to [start working again] as soon as I got out of the hospital...I went out there for three weeks, and I wasn't supposed to work. I was on medical observation and in pain, but if I told him he [would have] fired me.³⁸

Due to a lack of paid sick leave and transportation, some individuals may have to miss a full workday for a medical appointment in addition to the cost of services, which, as described above, many must pay out-of-pocket.^{89,92} In a 2016 study, Liebman et al.⁸⁷ found that for immigrant dairy workers in Wisconsin, lack of paid leave and pressure to work added to the risk of injury. For example, one participant shared their experience:

I had a compressed vertebra, so [the doctors] gave me a month and a half...they [the farm] gave me two days and then I had to return to work, otherwise they would fire me. They didn't pay me, and the MRI was \$9,500.

For undocumented workers, the fear of losing their job is compounded by the fear of deportation.⁹⁸ One 2017 qualitative study with dairy workers in New York asked the farmworkers about access to health care services. They found that immigrant farmworkers did not feel safe calling 911 in a medical emergency, and that it is not uncommon for injured farmworkers “to be detained after calling 911, or upon exiting hospitals after seeking treatment.”⁷⁹ Farmworkers, especially undocumented workers, may rely on their employers to pay for or drive them to health clinics. This constraint on mobility and access to services means that farmworkers rely heavily on their employers, “who then determine their health care access.”⁷⁹ This reliance on employers limits individual bodily autonomy and farmworkers’ right to make their own decisions regarding their health and health care access.

AVAILABILITY OF APPROPRIATE SERVICES

Even if able to reach a health center, access to multilingual and culturally respectful care for farmworkers can be challenging.⁹⁷ In the US, patients with limited English proficiency have a legal right to access health care in their preferred language.⁹⁹ However, patients may experience cultural and racial barriers as well. For example, some physicians' implicit racial biases can have consequences for the health outcomes of their patients.¹⁰⁰ A 2018 study from Hagood and Schriemer¹⁰¹ examined 17 oral histories from farmworkers in Michigan to analyze the significance of cultural sensitivity and "deep structure" for effective health care in marginalized communities. They recommend that physicians ask open-ended questions to understand their patients' occupational, environmental, and cultural lives in order to improve understanding, trust and quality of care.¹⁰¹ Furthermore, health care services that are culturally appropriate should include an understanding of the use of traditional healers, medical pluralism, and complementary therapies.^{88,102} A 2016 study with Mexican farmworkers in North Carolina found that 20 percent of participants had been treated by a traditional healer.⁷⁰ To better serve their patients who are farmworkers, physicians should educate themselves about the specific contexts, cultures, and health vulnerabilities of farmworkers. Health care providers should also actively seek to reduce barriers to treatment, respect and complement traditional and cultural health care practices, and advocate for systemic reform by reporting occupational injury and illness.¹⁰³

Migrant health centers and community health centers provide necessary resources to address the unique health care needs of farmworkers. These centers reported serving about 20 percent of the farmworker population in 2014.⁸⁹ Furthermore, undocumented farmworkers may opt to use more costly private clinics because they may pose less visibility to immigration enforcement authorities than public health care facilities.⁹² Greater resources and better policy are needed to expand mobile health care, insurance coverage and quality, and respectful and informed treatment options for farmworker communities.

WAGES

Farmworkers are usually paid either hourly or by "piece rate," which allows farms to pay workers based on the volume of fruit or vegetable they harvest. The average hourly wage for nonsupervisory farmworkers in 2019 was \$13.99 per hour, whereas the average wage for all workers irrespective of industry was \$26.53 per hour.^{12,16} Technically, piece-rate wages must be at

least as high as the minimum wage (which is \$7.25 at the federal level and can be higher at the state level), although often farmers defy rules through loopholes that allow them to pay workers less than minimum wage. A study by Fan and Pena,¹⁰⁴ using national data from the Current Population Survey

“There is a long, documented history of abuse of workers in the H-2A program. Workers come to the US on false promises only to find a different reality, one where they are not paid their wages promptly nor the wage rate they were promised by the recruiter. Time and again we hear stories of workers that have experienced wage theft and return to their country in debt even after working long, full work seasons in the US.”

Sulma Guzmán, Policy Director & Legislative Counsel, Centro de los Derechos del Migrante

and a state-level case study of agricultural workers in California, found that minimum wage has little or no impact on the wages of piece-rate farmworkers. In addition to these low hourly wages, farmworkers in the fruit and vegetable sector are often employed seasonally instead of year-round and may not find additional work in the off-season. As a result, yearly earnings for these workers are even lower than one might deduce by calculations based on person-hours and hourly wages.

H-2A visa-holding immigrant farmworkers, who only comprise a portion of migrant farmworkers, are often paid the adverse effective wage rate (AEWR).^{vi} The adverse effective wage rate, created under the Bracero Program, is the regional average hourly wage for nonsupervisory field and livestock farmworkers combined, as determined by the Farm Labor Survey of employers conducted by the USDA. In 2020, the AEWRs were as low as \$11.71 per hour in several southern states and as high as \$15.83 per hour in Washington.¹⁰⁶

Farmworkers coming to the US through the H-2A program face additional costs usually not accounted for in their wages. While legally entitled to workers compensation benefits for work-related medical costs and reimbursement for travel to and from the farm worksite and their home country, in practice, employers often flout these rules.¹³

Farm employers often rely on private labor recruiters to recruit guestworkers, and these recruiters usually charge workers to cover travel, visas and other costs. This occurs even though farm operators are responsible for these expenses. According to the Southern Poverty Law Center, farmworkers typically arrive in the US with fee-related debt ranging from \$500 to well over \$10,000 often associated with recruitment costs (which are illegal) and

vi Technically, farmworkers must be paid wages that are the highest of:
(a) the local labor market’s “prevailing wage” for a particular crop;
(b) the state or federal minimum wage; or
(c) the “adverse effect wage rate.”¹⁰⁵

unreimbursed travel costs.¹⁰⁵ Often, when farmworkers do not receive the wages they were promised, they are unable to pay back their debts. This is often referred to as debt bondage, and is a form of forced labor (or coercive labor practices).^{105,107}

Many workers are hired, transported or supervised via intermediary farm labor contractors and subcontractors, intermediary employers whom farmers hire for a variety of reasons.¹⁰⁸ A 2016 study by Sexsmith et al.,⁵¹ which analyzed how undocumented migrant farmworkers on New York dairies respond to workplace grievances, found that labor contractors often take advantage of farmworkers' vulnerability by taking a cut of their pay and charging fees for providing services (such as transportation). As a result, many farmworkers found it nearly impossible to repay their debt.⁵¹ In addition, farm operators sometimes argue that because they hire farm labor contractors, they do not "employ" any farmworkers and therefore are not responsible for providing minimum wage or for offering workers' compensation insurance coverage to farmworkers.¹⁰⁸

While migration from Mexico has decreased over the past decade resulting in a decline in migrant labor, including agricultural labor, many authors contend that there could be modest increases in wages for hired farm laborers in response to the tightening labor market.^{16,109-111} Despite such increases, however, economic exploitation is widespread and commonplace, and stolen wages and debt bondage often make it difficult for farmworkers to leave a particular farm or exploitative work environment. In the most extreme cases, these conditions constitute modern-day slavery as workers are threatened or forcefully prohibited from leaving their workplace.¹¹² There have been multiple reports of enslavement in farmwork in the United States, such as in the tomato industry in Florida, and there are multiple media reports that document such abuse.^{113,114}



HEALTH IMPACTS

This section explores health impacts affecting worker wellbeing for both crop and livestock workers, synthesizing peer-reviewed literature on these topics. For each health impact discussed, the report first discusses exposure, then synthesizes health outcomes and summarizes interventions, opportunities and challenges for improvement.



HEALTH IMPACTS FOR CROP WORKERS

This section explores health impacts affecting crop workers including work hours and breaks, heat, sun and climate change, pesticides and repetitive motion injuries.

Work Hours and Breaks

Exposure

Farmworkers—including children—engage in strenuous physical labor without access to meaningful work breaks and workplace sanitation. For example, in a 2019 study conducted by Quandt et al.,⁶⁸ a 13-year old participant who was working outside school hours reported that on average, on the days that she was working on farms in North Carolina, she worked for approximately fifteen hours—waking up between 5 and 6 am, and working until 8 pm. Most farm employers pay farmworkers per piece/unit of crop harvested instead of an hourly wage, often forcing farmworkers to forgo water or bathroom breaks, or take necessary work breaks in order to maintain and maximize their pay.^{115–117} For example, as part of the California Heat Illness Prevention Study (CHIPS), Courville et al.¹¹⁸ analyzed five focus groups with farmworkers from Fresno, California, to explore how to prevent heat-related illnesses (HRIs) in farmworkers. In this 2016 study, many

farmworkers described that the piece rate system pushed them to continue working without any rest breaks:

*We continue working because we want... to earn what we are supposed to for the day, when it is piecework, we have to continue working, until we can't handle it anymore....*¹¹⁸

An additional factor affecting worker well-being is the inability to take breaks when needed. It is estimated that farmworkers work about 45 hours per week on average, with those harvesting field crops and those working on dairy farms working an average of 54 hours a week.¹¹⁹ According to the 2009 survey of New York dairy farm employers, about 52 percent of milkers and general laborers worked more than 50 hours per week, while 21 percent worked more than 70 hours per week,¹²⁰ without qualifying for overtime pay.⁵¹ In a 2019 qualitative study by Luque et al.,¹¹⁷ farmworkers in South Carolina explained that “when being paid hourly, only the boss decided when farmworkers could take breaks.” Similarly, a 16-year-old boy working in tobacco in North Carolina reported how taking necessary breaks were frowned upon:

*Sometimes, if you are the first one to finish your row you could take a break at the end, but you have to be careful because if the leader sees you, he's going to scream at you.*⁶⁸

Some employers leveraged lunch breaks to “increase” work productivity. For example, Quandt et al.,⁶⁸ in the same 2019 qualitative study in North Carolina, found that contractors would withhold lunch breaks

Inadequate sanitation facilities further add to the dangerous working conditions for farmworkers. In the absence of any opportunity for breaks, farmworkers limit their water intake in order to avoid going to the bathroom.¹¹⁷

Health Outcomes

Working overtime in the fields without any rest, in part as a result of being paid piece-rate, can also be associated with serious health conditions such as acute kidney illness (AKI) and chronic kidney disease (CKD).^{116,121} For example, as part of CHIPS, researchers recruited 300 farmworkers in California in 2015 to measure the impact of working for longer uninterrupted periods, in part because of being paid by piece rate, on farmworkers' health.¹¹⁶ In this quantitative study using multivariate models, the researchers found that AKI was detected in 11.8 percent of the farmworkers after only a single shift, and that farmworkers being paid by the piece had 4.5 times higher odds of developing AKI than others.¹¹⁶ Most importantly,

these findings were independent of age, body mass index, diabetes, or hypertension, indicating that “development of AKI in this study is explained primarily by the occupational risk, irrespective of the individuals’ physiological predisposition.”¹¹⁶ This higher risk of developing AKI due to long working hours without breaks suggests a causation between occupational exposure and CKD.¹¹⁶

There is evidence that indicates the serious health implications of lack of sanitation facilities.¹²² For example, previous evidence documented how in a sample of 936 migrant farmworkers who were not provided access to water and sanitation facilities, farmworkers showed a heightened rate of diarrhea, twenty times higher than the urban poor populations.¹²³ However, there is need for more recent data to better understand the relationship between access to water and sanitation facilities, work breaks and farmworker health.

Interventions, Opportunities and Challenges

Weak industry oversight of farm work activity, and the precarious social and economic conditions farmworkers face serve as some of the barriers to improvement. Despite the well-documented evidence that absence of work breaks can lead to serious health implications such as HRIs for farmworkers, there is no federal standard mandating worker protection from heat stress such as mandatory work breaks.^{117,124} Even though there are regulations pertaining to access to water and sanitation, there is fragmented oversight of these regulations that leads to poor or no enforcement. For example, Occupational Safety and Health Administration (OSHA) regulations mandate that free potable drinking water (either single-use drinking cups or by fountains that do not require shared cups) be available to work-

ers, and that a toilet and handwashing facility be available within a quarter mile walk of the field location.¹²² Despite these OSHA regulations, many farmworkers still do not have access to basic field sanitation.⁴⁶

The lack of legal oversight allows employers to avoid paying overtime in some cases, especially to workers who are using other people's work authorization paperwork.⁷¹ As described by participants in a 2016 qualitative study conducted by Horton⁷¹ in the Central Valley of California:

Participant #5: I say that also what's bad is that they only let me work Monday to Saturday. And sometimes you need to work Sunday, but on Sunday they make you work another...

Participant #2: Another name.

Participant #5: The Social Security number of another person.

Participant #2: Exactly.

Participant #3: To pay less.

Participant #5: To not have to pay us "overtime." And if not, they look at you as if to say, "I'm going to lay Fulana off, she won't work until Monday..." They make you lose a day [of work]. They lay you off on Sunday or you work under another name.

The weakness of federal and state oversight over farm working conditions create an environment in which farmworkers employ physical labor for long hours, under varied weather conditions, often without sufficient water, food, or restroom breaks or facilities. Until federal and state oversight is strengthened, farmworkers are at a heightened risk of psychological and physical illnesses and injuries.^{51,125,126}

Heat, Sun, & Climate Change

Exposure

The highly skilled nature of farm work requires strenuous physical labor under frequently hot temperatures, often in the absence of protections such as rest, water, and shade. Therefore, HRIs are extremely common among individuals working on farms.^{127,128} For example, a 2010 study in North Carolina found that 40 percent of farmworkers reported experiencing at least one HRI symptom ever, while another 2013 study in Oregon found that 64 percent of farmworkers reported experiencing at least one HRI symptom in the previous week while working under hot temperatures.^{129,76} Similarly, a 2013 study in Georgia found that more than one third of farmworkers experienced at least three HRI symptoms over a one-week period.¹³⁰ Oth-

er risk factors that are associated with HRIs include heat acclimatization, improper or heavy clothing, and lack of water, rest, or cooling-off conditions.^{115,131} Without proper heat acclimatization (getting used to working in hot weather conditions), workers have a higher risk of developing HRIs. In fact, research suggests that acclimatized workers benefit from physiologic adaptations that allow them to start sweating earlier with greater volume, which improves heat dissipation and reduces loss of electrolytes.¹³²

The risks associated with working for long periods of time under extreme weather conditions are only likely to worsen due to climate change.¹³³⁻¹³⁵ Since the 1970s, the average temperatures in most states in the US appear to be increasing at a rate of 0.26 to 0.43 per decade.^{117,136} This trend is continuing and worsening—2020 was likely the hottest year on record.¹³⁷⁻¹³⁹ One component of climate change is longer hotter summers and heat waves, which increases the risk of wildfires. In 2018, California—a state that has approximately over half a million farmworkers¹¹⁵—recorded its worst fire season due to record hot temperatures and heat waves with over 100 deaths.¹⁴⁰ In fact, annual wildfire extent increased fivefold in California since the 1970s with an eightfold increase in summertime forest-fire area due to an increase in warmer temperatures.¹⁴¹

Health Outcomes

Social and economic precarity leaves farmworkers vulnerable to significant and prolonged heat exposure. As a result, many farmworkers suffer from serious health implications. For example, in a qualitative study of farmworkers on the Florida-Georgia line conducted by Luque et al. in 2019,¹⁴² the authors shared several stories of farmworkers dying due to heat stroke:

Unfortunately, stories of death due to heat strokes are not unique. It is well-documented that agricultural workers experience heat-related deaths at an annual rate that is 20 times that of all civilian workers in the US.^{127, 143-146}

Environmental conditions such as exposure to high temperatures and direct sunlight contribute to heat-related illnesses (HRIs), which include heat cramps, heat syncope, heat exhaustion, fatigue, nausea, dizziness, dehydration, and life-threatening outcomes such as heat stroke.^{115,127,131,147} According to existing research, heat stroke can occur when the core body temperature rises above 104°F (40°C).¹⁴² However, a study with Florida fernery workers found that over half of the eighteen workers participating in a three-day biomonitoring protocol surpassed the recommended core body limit of 100.4°F (38°C).¹⁴⁸

Prolonged heat exposure is also associated with an increased risk of traumatic injuries in farmworkers,^{143,149,150} as well as serious conditions such as acute kidney disease (AKI) and chronic kidney disease (CKD).^{116,132,143} This is likely to occur due to farmworkers' lack of access to water and rest breaks while working in hot temperatures. According to a study with 192 Florida agricultural workers, the odds of AKI increased 47 percent for each 5°F increase in heat index, with 33 percent of the workers having AKI on at least one workday.¹³² In this study, the percent of Florida farmworkers who were dehydrated increased from 53 percent pre-shift, to 81 percent post-shift.¹³² Additionally, researchers hypothesized that "occupational heat exposure and dehydration are related to the epidemic of chronic kidney disease of unknown etiology (CKDu) in Mesoamerica, among those who lack the traditional risk factors of CKD such as old age....diabetes, hypertension, and nephrotoxic drug use."¹³²

The consistent and dramatic rise in hot temperatures over the years will also make the already hazardous working conditions for farmworkers even worse, with warmer temperatures potentially increasing pesticide use and volatility.¹⁵¹ This is because warmer temperatures tend to decrease the efficacy of pesticides by increasing their volatilization, thereby leading to higher application rates.¹⁵²⁻¹⁵⁴ This may have significant consequences for farmworker health, increasing workers' vulnerability to heat exposure, pesticide exposure and injury, heat-related illnesses, and other wildfire health threats including smoke, stress, and respiratory issues.^{155,156}

In addition, the increased smoke exposure and unhealthy air quality as a result of wildfires further threaten the health and lives of farmworkers,^{157,158} and leave them vulnerable to acute and chronic illnesses such as heart disease, diabetes, asthma, and other respiratory illnesses.¹⁵⁹

Interventions, Opportunities and Challenges

In the absence of federal and state protections regulating the unsafe working conditions that expose farmworkers to heat-related illnesses, employers can further exploit farmworkers. For example, a farmworker in the same 2019 qualitative study by Luque et al.¹¹⁷ reported that farmworkers in South Carolina, despite experiencing symptoms of HRIs, feel the need to resume work as soon as possible in order to maintain their job and income status:

Justicia related a story of a female co-worker who displayed heat illness symptoms at midday and was sweating excessively. An example of a person working too hard and getting sick was described where the farmworker was working por contrato

[piece-rate], and the co-worker just doused herself with cool water and kept working. The woman's eyes then became blood-shot, so Justicia had to alert the truck driver to come get her where she then rested on the truck for an hour, and then went back to work.

“We talk about climate impacting agriculture...the folks who are really experiencing working through those climate change conditions have such a visceral first hand experience of what’s going on and how things are changing day-to-day and season-to-season. [Yet, when] we think about farmers and farmworkers...there is a social, economic, and racialized distinction that is being made.... People too often think of folks working in the fields as having less knowledge or understanding [about] how agriculture can adapt to climate change, and also stop contributing to it. But really, these are people who had a deep understanding of those relationships between climate, agriculture, health, and community impacts.”

Julia Jordan, Policy Coordinator,
Leadership Counsel for Justice
and Accountability

There is robust evidence that prolonged heat exposure leads to poor health outcomes for both adult and child farmworkers, which will likely worsen with climate change. In fact, the Occupational and Safety Health Administration (OSHA) itself acknowledges that heavy physical activity and warm or hot environments are occupational risk factors for heat illness.¹⁶⁰ Similarly, the National Institute for Occupational Safety and Health (NIOSH) has published criteria for a recommended standard for occupational heat stress.¹⁶¹ However, there are still no federal regulations in the US limiting heat exposure to protect farmworkers from these conditions. On a state level, many states run their own OSHA-approved state plans to protect their workers and prevent worker-related injuries, illnesses, and deaths.¹⁶² Three states—California, Minnesota and Washington—have state provisions governing occupational heat exposure in their OSHA approved state plans.^{31,117,124,161} Accordingly, more states should adopt, implement, and enforce similar occupational heat standards.^{vii}

While implementing and enforcing occupational safety and health standards are necessary protections, it is important to highlight that in the presence of overarching social and economic precarity, such interventions do not provide farmworkers with the full protections they deserve. For example, even though Washington State’s outdoor heat rule mandates employee HRI training, a study revealed that only 34

percent received this training.¹⁶⁴ Similarly, while increasing reliable access to air-conditioned rest areas or drinking water can help mitigate the effects

vii States and OSHA can use the General Duty Clause, Section 5(a)(1) of the Occupational Safety and Health Act of 1970¹⁶³ to address heat hazards. To learn more about the promise, potential, and challenges of using the General Duty Clause to protect workers from heat-related illness, see companion report “Essentially Unprotected: A Focus on Farmworker Health Laws and Policies Addressing Pesticide Exposure and Heat-Related Illness”³¹

of extreme heat, it still fails to remove the barriers that exacerbate farmworker health disparities in the first place.¹²⁹ Therefore, in order to effectively address the disproportionate death and illness among farmworkers due to heat exposure, it is critical to complement occupational heat standards with structural interventions.¹⁴² This includes increasing farmworker wages to reflect the highly skilled nature of their work; providing legal protection and representation to all farmworkers; ensuring access to adequate sanitation and work breaks; and holding employers accountable to provide safe working conditions through increased industry oversight.

Pesticides

Exposure

Pesticide use in agriculture puts the environment and farmworkers' health at risk.¹⁶⁵ Agriculture in the US has become increasingly reliant on pesticides to control insects, fungi, weeds, and other organisms that may threaten crops. In the US, around 1.1 billion pounds of pesticides are applied annually and farmworkers are consistently exposed to these toxic chemicals.¹⁶⁶ The term "pesticides" refers to a broad range of chemicals, including over 1000 active substances and 16,000 formulations, including insecticides, herbicides, fungicides, and fumigants.¹⁶⁷ The level of use for each pesticide, as well as risk to human health and available risk data varies by pesticide type.

Beyond the risks of mixing and application of pesticides, most pesticide overexposures occur when workers inadvertently have direct contact with pesticide residue on crops, soil, or drift from nearby fields.^{72,168} In California, results from the Pesticide Illness Surveillance Program in 2017 found that pesticide drift was associated with 51 percent of the 323 illness cases for field workers, whereas residue contributed to 30 percent and 12 percent from both drift and residue.¹⁶⁹ Farmworkers are primarily exposed to pesticides through contact with skin and through inhalation.¹⁶⁸ Acute toxic exposure may also occur due to issues with labeling of pesticides, accidental spills, leakages, faulty equipment, or difficulties with protective equipment.¹⁷⁰ Similarly, farmworkers and their families that live in agricultural communities often experience multiple exposures due to the pesticide residue in their home, which can be brought into the home on farmworkers' work clothes or via direct deposit from aerial drift.¹⁷¹ Children are especially vulnerable to these community exposures to harmful chemicals, which may disrupt their development and cause long-term health issues.^{172–174}

This section will describe both acute and chronic health concerns that farmworkers exposed to pesticides experience, as well as the health impacts for

farmworker families and communities. Then, we will discuss interventions and barriers to comprehensive protections for farmworkers from pesticide risks. Despite well-documented threats to human health, worker protections remain minimal and often ineffective in addressing the root causes of unsafe work conditions.

Acute Health Outcomes

Even short-term exposure to some pesticides can lead to dizziness, blurred vision, muscle ache, nausea, seizures, loss of consciousness and respiratory distress.^{175,176} Farmworkers are at high risk of acute pesticide-related illness, which can occur within 48 hours of exposure to toxic levels of pesticides.^{86,177}

The EPA estimates that each year farmworkers suffer “up to 300,000 acute illnesses and injuries from exposure to pesticides.”¹⁷⁸ The symptoms of acute pesticide illness include irritation and damage to nerves, skin, and eyes, dizziness, headaches, nausea, confusion, fatigue, diarrhea, vomiting, and abdominal pain. Unfortunately, these symptoms can be easily confused with flu-like illnesses and pesticide poisoning may go misdiagnosed or unreported, which can lead to avoidable fatalities.¹⁷⁰

The CDC has two programs that monitor occupational acute pesticide illness and poisoning, the SENSOR-Pesticides program and the National Poison Data System (NPDS). The SENSOR program tracks acute occupational pesticide-related illness and injury in 12 states. Between 2007–2011, a total of 2,606 cases were identified.¹⁷⁹ During this time, the rates of illness and injury for agricultural workers were 37 times greater than the rates for nonagricultural workers.¹⁷⁹ Of these cases, 18 percent were reported as moderate severity, with one percent high severity and two fatalities.¹⁷⁹ The SENSOR program has been inactive since 2017, according to the last update of the website. Therefore, the majority of reporting relies on the National Poison Data System, which collects data from poison control centers. It is estimated that 88 to 95 percent of acute occupational pesticide illness cases are not reported.^{86,180} This is due to a myriad of factors, such as fear of job loss and retaliation, lack of recognition of pesticide-related illness symptoms among workers, lack of access to health care services, and lack of training of health care professionals to diagnose and report.⁸⁶ The complex interaction between pesticides, the environment, and individual health make it difficult to research and monitor the acute and chronic effects of pesticide poisoning.

Chronic health impacts

Health hazards for the people who work to cultivate, harvest, and package crops treated with pesticides can have long-term, debilitating impacts. Chronic health issues can occur months or years after pesticide exposure, making research and surveillance difficult to understand the full extent of the impact of pesticides on chronic disease. For example, farmworkers frequently move across states for work and lack regular access to health care, and there are very few cross-state registries for chronic diseases.^{181,182} Some of the chronic health effects of prolonged pesticide exposure include higher risks for certain cancers, neurological hazards, metabolic and thyroid disorders, DNA damage, lowered fertility, and hormone disruption.^{170,183} We will discuss these health impacts further in the paragraphs below.

Cancer

Pesticide exposure has been linked to certain cancers, such as Non-Hodgkin's lymphoma, childhood leukemia, brain cancer, breast cancer, pancreatic, gastric, and prostate cancer.^{151,184,185} One study in California's San Joaquin Valley found that agricultural work was linked to increased breast cancer risk for female Hispanic farmworkers.¹⁸⁶ Furthermore, the chemicals associated with breast cancer risk included organophosphates, organochlorines, and one phthalimide.¹⁸⁶ In 2015, the International Agency for Research on Cancer (IARC) evaluated five organophosphate pesticides (tetrachlorvinphos, parathion, malathion, diazinon, and glyphosate) and found that three "probably" cause cancer and two "possibly" cause cancer.¹⁸⁷ The EPA also monitors the carcinogenic potential of pesticides, but due to variations in risk measurement cut-offs and methods, these results may underestimate risks for farmworkers.¹⁸⁸ A recent study on the Agricultural Health Study (AHS) cohort of nearly 90,000 people found that cancer rates varied by type, but pesticide applicators had higher incidence rates of acute myeloid leukemia, thyroid and testicular cancer, which are likely linked to pesticide exposure.¹⁸³

Neurological effects

Farmworkers are routinely exposed to doses of various classes of pesticides, some of which are known neurotoxins such as organophosphates, organochlorines, and pyrethroids.¹⁸⁹ Organophosphates are one of the most effective and widely used insecticides in the agricultural industry. These insecticides operate by inhibiting insects' nervous system.¹⁷⁵ In humans, neurotoxic effects are the most frequently described consequences of exposure to organophosphate pesticides.¹⁹⁰

One systematic review of fifty-three articles on pesticide exposure and neurodegenerative disease found that chronic organophosphates exposure was associated with deficits in attention and short-term memory, increased incidence of neurodegenerative diseases and effects on peripheral nerves and neurodevelopment.¹⁷⁵ Numerous studies have linked occupational pesticide exposure to increased risk of neurodegenerative disorders such as attention deficit hyperactivity disorder (ADHD), anxiety, depression, Parkinson's disease, Alzheimer's, and ALS.^{183,189} Other adult neurological deficits associated with organophosphates exposures include visual motor speed, nerve function, postural balance, mental development, memory, and attention.^{167,176,183}

A longitudinal birth cohort study, the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS), has followed the long-term effects of prenatal organophosphate exposure for 279 children in the Salinas Valley, California, and contributed to the growing evidence of pesticide exposure on childhood development. From this cohort, studies have found a number of associations with organophosphates and neurological development, including inhibited executive function and attention.^{191,192}

Metabolic effects

Environmental exposure to pesticides and changes to the microbiome may affect metabolic syndrome and diet-related disease. A 2017 longitudinal cohort study in Washington demonstrated that organophosphate pesticide exposure is associated with large-scale significant alterations of the oral microbiome.¹⁹³ In addition, research has suggested that exposure to pesticides, particularly organophosphates, may be associated with type II diabetes mellitus.¹⁹³ A study of the AHS cohort also found increased odds of diabetes linked to seven different pesticides.^{183,194}

Respiratory effects

Although skin contact is the main pathway of farmworkers' exposure to pesticides, inhalation poses additional risk.¹⁸³ Pesticides may exacerbate respiratory issues and pre-existing conditions in farmworkers, such as asthma.¹⁷⁰ One study of a longitudinal birth cohort of 7-year-old children of farmworkers found that organophosphate exposure was significantly associated with decreased lung function in the children participating in the study.^{175,195}

DNA damage, hormones, and reproduction

Not only can the effects of pesticide exposure become chronic and even fatal for farmworkers, but this exposure can have ripple effects on the health of farmworkers' families and communities for generations. Some

pesticides contain endocrine disrupting chemicals (EDCs) that interfere with hormone regulation and thyroid function with possible harmful effects for pregnant women, children, and mature adults.¹⁹⁶ Substantial evidence has demonstrated a link between prenatal pesticide exposure and delays in fetal growth, birth defects, and childhood leukemia.¹⁹⁷ Also, children are more susceptible to the harmful effects of toxic chemicals, which may disrupt healthy development.¹⁷² Children who are exposed to some pesticides have an increased risk for adverse neurocognitive development, leading to disproportionate burdens of learning difficulties.¹⁷³

Due to the endocrine disrupting chemicals in pesticides, contact with select insecticides, herbicides and fungicides correlate to higher rates of miscarriage and reproductive disorders such as reduced sperm count and infertility in adults.^{167,197} A 2018 study in California asked pregnant farmworkers about their experiences with pesticide exposure in the strawberry industry.⁹ One woman describes this experience:

*[They said] that we are notified when [pesticides] are sprayed, but they've never taken us into account. We cannot afford more cancer in our communities, we cannot afford women having abortions that they did not plan for. We cannot afford the risk of having newborn children born without hands, legs, [a] backbone [or] without [a] brain. I have seen many of those cases in my life. We don't believe any amount of money should be bigger or more important than having safety and security in our communities and in the fields that we work.*⁹

Further evidence has shown that pesticides can alter epigenetic changes to DNA expression, or DNA methylation.¹⁹⁸ While the complete impacts of DNA methylation (DNAm) are unknown, recent studies find that DNAm may influence long-term disease outcomes from pesticide exposure, such as depression, prostate cancer, learning functions, and Alzheimer's.^{198,199}

The long-term impacts on neurological development demonstrate that the impact of toxic exposure to pesticides can cause intergenerational harm.⁹ The intergenerational effects of pesticides on the fertility and prenatal/perinatal development for farmworkers and their children are violations of their right to reproductive autonomy and justice.^{200,201}

Interventions, Opportunities and Challenges_ regarding on-farm prevention and policy

Despite widespread documentation of the health risks of pesticides, the regulatory environment has largely failed to protect farmworkers from exposure (including exposure via pesticide drift and residue). The EPA oversees federal pesticide regulation in the US, governed under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The FIFRA requires that all pesticides intended for use in the US must be registered with the EPA.³² In addition, through FIFRA, the EPA implements and enforces the Agricultural Worker Protection Standard (WPS), which aims to reduce pesticide poisonings through “pesticide safety training, notification of pesticide applications, use of personal protective equipment, restricted entry intervals after pesticide application, decontamination supplies, and emergency medical assistance.”²⁰² States are primarily responsible for implementing the WPS (with EPA oversight).²⁰³ However, the WPS is notably weaker than other occupational standards outside of agriculture, and the WPS is poorly enforced,²⁰² though recent revisions to the WPS include important new requirements.^{viii} The WPS also does not protect worker confidentiality when reporting a pesticide use violation, which further exacerbates issues of underreporting due to farmworkers’ fear of retaliation.⁹ Therefore, these standards and preventative measures, such as violation enforcement and safety training, fail to address the power dynamics and realities that farmworkers face.

For example, the WPS requires proper use of protective equipment, yet these regulations have significant weaknesses in regards to safety and prevention. First, the use of protective clothing such as long-sleeves, pants, boots, hats, gloves, and masks increase the risk for heat stress and illness by adding extra layers of warm clothing.^{167,178} One study asked Latinx farmworkers about their perceptions of pesticide protective behaviors working on tobacco farms in North Carolina. They found that “once clothing becomes wet with rainwater, dew, or sweat, it no longer provides adequate protection and may, in fact, increase absorption for both pesticides and nicotine.”²⁰⁵ Furthermore, these protective behaviors may be implausible if they hinder productivity and wages for those working for piece rate. For example, individuals harvesting crops may not use gloves to protect their hands from pesticide residue because the gloves slow down their work.⁹

viii The EPA most recently revised the WPS in 2015. The revised WPS “establishes a minimum age of 18 for pesticide handlers; increases the frequency of worker safety training from once every five years to every year; improves the content and quality of worker safety trainings; provides new rules on decontamination and personal protective equipment; and improves the quality of information that workers receive about the pesticides that have been applied at their workplace.”²⁰⁴

Similarly, washing stations, if available, can be far from worksites, making it difficult or impossible to maximize time and income while practicing safe sanitation practices.⁹ Around 20 percent of farmworkers do not have access to handwashing facilities at their worksite, which may lack basic supplies such as soap and paper towels.²⁰⁶ Additionally, individuals exposed to pesticides may lack sufficient access to laundry facilities to prevent carrying the pesticides on their clothes and into their homes.²⁰⁷ Even the WPS recommendations to change clothes at work become difficult if there is no appropriate place for workers to change into a clean set of clothes.

In addition to protective equipment, WPS provisions, such as interventions to avoid re-entry after a field is sprayed, also ignore the power dynamics on farms. Fields are given restricted-entry intervals (REI), a requirement listed on the pesticide labeling, which restricts the entry to the application zone for a period of time following each pesticide spraying. These intervals can last from four hours up to 30 days.¹⁷⁸ A newer rule in the WPS, the “Application Exclusion Zone” (AEZ), requires that employers must keep workers and others away from treated areas during pesticide applications. Applicators must suspend pesticide application if anyone other than the trained and equipped handlers enters the AEZ.²⁰⁸ Yet, most violations of these zones and re-entry intervals occur due to a failure to notify farmworkers.¹⁷⁸ One 2018 study interviewed farmworker perspectives on pesticide exposure in California’s strawberry industry and found that lack of information and knowledge about pesticide risk was not a central issue.⁹ The workers stressed the importance of knowing the health effects of the pesticides they work with yet described limited ability to avoid exposure:

There were instances when we felt like vomiting, so we would let the supervisor know...He would tell us that they were spraying the fields, but that the chemicals were not harmful and would not affect us. So he would tell us to start working on the other side of the field. So how were we going to know if it [the spraying] was good or bad? On one occasion, they sprayed a woman co-worker! The tractor passed by and sprayed her! They never respect the waiting periods...you enter and you can smell it. You say something and the mayordomo^{ix} says no, no, it’s ok.⁹

However, even if all protocols are followed, evidence shows these interventions are not sufficient to protect individuals and their families. One study shows that strawberry fieldworkers in California who followed self-protective behaviors (hand-washing, wearing gloves and protective clothing and

ix A *mayordomo* is a “a crew supervisor who monitors the work done at the farm.”²⁰⁹

washing work clothes) still had higher levels of organophosphate metabolites in their bodies.⁹ Policies such as the WPS that rely solely on protective behaviors by workers work within a framework of “acceptable exposure” in order to bolster productivity, thus making these protocols and protective measures “inherently unreliable.”⁹ Agricultural systems must work to legislate and enforce tighter protective measures and create viable alternatives in order to eliminate dangerous levels of pesticides and their harmful effects. For example, agricultural systems should create or promote the replacement of hazardous pesticides with safer crop and pest management practices while also maintaining work safety measures and fair pay for field work. These solutions emphasize prevention and resilience over treatment solutions.

Interventions, Opportunities and Challenges to surveillance and policy

Farm employers, contractors, and supervisors have the responsibility to prevent pesticide exposure by enforcing protective measures. Similarly, clinicians must work to diagnose and report pesticide poisonings in order to treat workers and inform public health surveillance. Policymakers also must enact and implement comprehensive legislation and regulations to protect workers from pesticides.

Clinicians have limited diagnostic tools to report poisonings through pesticide illness surveillance systems.²¹⁰ Thirty states require clinicians to report pesticide illness, but only eleven of those states require action on reported cases.^{167,210} One diagnostic tool to monitor pesticide exposure is to monitor cholinesterase activity, a marker of overexposure to organophosphate and carbamate pesticides.²⁰² Washington and California require biomonitoring of cholinesterase activity, a biomarker for exposure.²¹⁰ These biomonitoring programs have been effective to reduce overexposure.^{202,210}

Comprehensive surveillance systems must also work swiftly and broadly in order to prevent pesticide poisoning from new and existing chemicals. However, the EPA has no worker pesticide exposure monitoring requirement or federal pesticide use reporting. The EPA relies on surveillance systems from the CDC, risk assessment models, and epidemiology studies to make decisions on whether to remove or enact restrictions for unsafe pesticides.^{202,211} Much of this information is historically limited and there are few sources for quality epidemiological data for specific pesticides, meaning the EPA continues to rely on toxicology animal laboratory data.²¹² The EPA risk assessments also focus on linear dose-response data (“dose makes the

poison”), which may underestimate or miss specific risk factors for farmworkers, such as chronic exposure, field exposure in pregnant women and children, intergenerational epigenetic effects, interactions between multiple pesticides, and other risk factors.^{9,207} Studies that examine the risks of individual pesticides find that farms frequently spray more than one type of pesticide and risk assessment does not account for compounding effects. It is crucial that human risk assessments for pesticide exposure consider occupational exposure levels and “real-world human-exposure scenarios,” as well as “high exposure episodes.”¹⁸⁸ California is currently the only state with mandatory pesticide use reporting. This program provides essential temporal, geographic, and crop-level data. However, nation-wide gaps and methodological challenges highlight the need for improved surveillance and federal pesticide illness and use reporting for agricultural work.

Regulations are often at the mercy of political will and have failed to keep up with the science that is available for a number of pesticides.²¹³ For example, the EPA has documented the harmful effects of chlorpyrifos and proposed a ban on the pesticide in 2015.²¹⁴ However, in 2017 the EPA denied a petition to cancel all chlorpyrifos registration concluding that there was not enough scientific evidence available to justify cancelling the registrations.²¹⁵ According to Pesticide Action Network International and Investigate Midwest, about 70 of the 150 pesticides deemed hazardous by the WHO that are used in the US are banned in at least one country and 25 pesticides are banned in more than 30 countries.²¹⁶ However, advocates have worked successfully for legislation at the state level to ban or restrict the use of pesticides. For example, a number of states have advanced legislation to restrict the use of chlorpyrifos, including Hawai’i, California, Washington, Oregon, and Maryland.³¹

Broad reform is necessary to protect farmworkers from the negative and potentially long-lasting health impacts of pesticide exposure. Toxicology and risk assessments for pesticide use should include the realities of farmworkers and their communities.¹⁸⁸ Surveillance should be nation-wide and include mandatory reporting of illness and safety violations without retaliation.⁹ Farms are also responsible for creating conditions to protect workers from exposure and to implement alternatives to harmful chemical use.

Repetitive Motion Injuries

Exposure

Crop work requires swift, exertive, repetitive motion which often puts farmworkers at risk for musculoskeletal sprain, strain and injury such as back

injury, hand, wrist, and shoulder pain.¹⁰³ Overexertion, or strenuous effort, through field work is also commonplace on crop farms, and multiple studies have found that the combination of overexertion and repetitive motion pose risks for farmworkers.^{66,103,217} As a result of overexertion and repeated movement, farmworkers frequently experience work-related musculoskeletal disorders (WMSDs) or “physical, human conditions, typically involving pain, that are made worse by the physical performance of work activities or work conditions.”²¹⁷ The pressure to work quickly in order to avoid getting fired exacerbates musculoskeletal strain.⁹⁷ According to a study with farmworkers in Southern California Eastern Coachella Valley:

*The possibility of getting fired was a constant strain and farmworkers’ emotional selves and physical bodies suffered. Farmworker participants talked about their bodies hurting—their hands, waist, and shoulders ached.*⁹⁷

While farmworkers rely on physical stamina and strength to perform repetitive farm tasks, it is those same tasks that often pose a significant threat to their long-term physical wellbeing.

Health Outcomes

Musculoskeletal disorders if left untreated over long periods can lead to serious injuries, increased discomfort, persistent pain, tendonitis, bursitis, and the inability to move normally.²¹⁷ Musculoskeletal injuries are widespread, and the injury rate for crop workers in 2012 was 43 percent higher than the national incidence rate for all industries.⁶⁶ In addition, a study that investigated occupational injuries among farmworkers between 2002–2004 and 2008–2010 found that muscular sprains and strain to the back and upper extremities were common in both periods, and comprised fifty percent of all injuries in the later period.⁶⁶ Other studies have also found that sprains and strains, often due to overexertion and repetitive movements, is one of the leading types of injury among farmworkers.⁶⁶ Children are also vulnerable to musculoskeletal injury, and a study of child farmworkers in North Carolina found that 42.6 percent of children surveyed suffered from musculoskeletal injury in a one-year period.²¹⁷

If left untreated over the long term, musculoskeletal pain and disorders often affect farmworkers’ mental health. A study by Tribble et al.²¹⁸ found that depressive symptoms among farmworkers were significantly associated with neck, shoulder, wrist and hand pain. In addition, these musculoskeletal disorders and pain can lead to long-term disability. In a study examining disability among farmers and farmworkers, the authors found that long-

term physical difficulties was one of the most prevalent disabilities among the entire farm population.²¹⁹

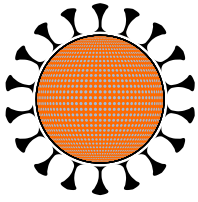
Interventions, Opportunities and Challenges

There are a number of barriers that stand in the way of meaningful reform to lessen the incidence of musculoskeletal injury among farmworkers, and due to the slow moving, and often invisible, nature of these health issues makes prevention and treatment all the more difficult. At the individual levels, physical therapy, priming activities (such as stretching and warm-up exercises), training for proper body mechanics, environmental modifications, the use of adaptive equipment, and education are all useful in minimizing injury.²²⁰ However, these individual and farm-level changes need to be enforced and should be accompanied by improvements to harmful labor practices and policies.

There is significant opportunity for stronger policies and enforcement to be put in place in order to protect workers. At a systemic level, employers should provide meaningful occupational health and safety information to workers and train them about the risks and preventive actions workers can take to avoid musculoskeletal injury.²²¹ In addition, the Migrant and Seasonal Agricultural Worker Protection Act^x should be strengthened and enforced so that workers are informed about their rights to job payment and workers' compensation should they be injured at work.²²¹ Furthermore, there are not OSHA regulations specific to ergonomics. In addition, because many farmworkers lack official work authorization, they are often hesitant to report injuries to their supervisors for fear of deportation. As such, workers are not afforded the health care access necessary to prevent long-term effects from musculoskeletal pain and injury.⁷¹

Even when farmworkers do have access to physicians, these medical professionals often do not consider treatment in the context of the workers' unique vulnerabilities and often do not report dangerous conditions when they become apparent.¹⁰³ In addition, due to inadequate government surveillance and the lack of reporting requirements for smaller operations, agricultural injuries are under-reported in official statistics.²²³ In order to truly address and minimize agricultural injuries that farmworkers face, more resources, reporting requirements, and enforcement are needed in order to understand and address the full scope of the problem.

x This Act establishes employment standards related to wages, housing, transportation, disclosures and recordkeeping.²²²



HEALTH IMPACTS FOR LIVESTOCK WORKERS

This section explores health impacts unique to livestock workers (excluding meat processing workers) including health impacts resulting from exposure to animal waste as well as dangerous machinery and animals.

Animal Waste

Exposure

Manure and liquid wastes are routinely stored in open or covered pits of liquid lagoons. Animal waste can contain constituents and byproducts of health concern including antibiotics, pathogens, bacteria, hormones, nitrogen, and phosphorus.²²⁴ Farmworkers are exposed to animal waste through a variety of mechanisms. The most common form of exposure is through manure generated on concentrated animal feeding operations (CAFOs). While any size CAFO operation presents a risk of exposure for workers via waste handling systems, the risk of exposure happening increases based on the size of the CAFO (larger CAFOs pose a higher risk) because the amount of waste increases as CAFO size increases.²²⁵ People who work in animal agriculture have two times the odds of being exposed to harmful substances, usually through animal waste, than those who work in crop production.²²⁶ Animal waste also remains largely untreated during management, handling and land application.²²⁵ In addition, the widespread preventative use of antibiotics in CAFO-style production has contributed to methicillin-resistant *Staphylococcus aureus* (MRSA), as workers are exposed to amplified antibiotic resistant bacteria and antibiotic resistant genes.²²⁷

Direct Contact

Farmworkers are not only in direct contact with this waste when working in livestock barns, but harmful bacteria from livestock waste also colonize environmental surfaces. A study by O'Shaughnessy²²⁸ in 2019 found that environmental surfaces, including worker break rooms and swine housing areas, contributed to the transmission of *Clostridioides difficile* from swine to farmworkers, suggesting that workers are not only exposed to harmful bacteria in swine-populated rooms, but throughout the farm premises. Common hazards associated with animal waste that often lead to farmworkers' direct exposure to contaminants include bacterial colonization of farm buildings, spills and discharges from waste storage, direct land application, and runoff into surface water and groundwater leaching.²²⁷ In addition, manure from CAFOs can contaminate ground and surface water

with nitrates, drug residues, and other chemical and biological hazards. Farmworkers are often exposed to this contaminated water via ingestion.²²⁴

Exposure via Air Particulates

Other contaminants of concern include noxious gases and agricultural dust, which are often dispersed via aerosols.^{210,229} Not only does dust inhalation expose workers to waste particles through volatile organic compounds, but dust is a vehicle in transmitting methicillin-resistant *Staphylococcus aureus* (MRSA) between livestock and farmworkers.²³⁰ Workers are also often exposed to toxic airborne waste particles, which include particulates, volatile organic compounds, and gases such as hydrogen sulfide and ammonia.²²⁴

Health Outcomes

These exposures can have a direct negative impact on the health of livestock workers. Pathogens in manure, such as *Campylobacter* and *Salmonella* species, as well as *Listeria monocytogenes*, *Yersinia enterocolitica*, fecal coliforms (*Escherichia coli*, and the protozoa *Cryptosporidium parvum* and *Giardia lamblia*), can cause severe gastrointestinal disease, complications, and sometimes death in humans.^{224,231} Other studies have confirmed the link between human disease outbreaks involving these pathogens and livestock waste.^{224,231} In addition, many of these pathogens are also resistant to antibiotics used to treat human infections, and MRSA can be transmitted from pigs to humans harming farmworkers' health as well as the health of surrounding community.^{227,232}

A 2018 study by Miller et al.²¹⁹ found that livestock handling put farmworkers at risk for injury, especially respiratory injury. Waste by-products that are inhaled via noxious gas and dust can have further unique health impacts for farmworkers. Many of these health impacts present in the form of respiratory health issues. In Missouri, a convenience sample of forty Latinx immigrant swine CAFO workers found that 28.2 percent reported occupational health issues such as burning eyes, muscular pain, headaches, coughing, nausea, nasal congestion, and sneezing, and 42.5 percent rated their health as poor.²³³ Farmworkers who are exposed to dust without protection can develop asthma or agricultural bronchitis, which is more common among farmworkers who work with animals.²¹⁰ Chronic exposure to such organic dust can also have long-term effects, and workers in these environments are at a higher risk for lung disease.²³⁴ In poultry production, airborne endotoxin levels can also be high enough to initiate airway inflammation and trigger respiratory-related health symptoms.^{235,236}

Health Outcomes for Communities

The waste particles present in the air and water on farms also affect workers and their families living in communities close to CAFO facilities. These communities are exposed to air pollution from CAFO operations, which can cause health issues including asthma, eye irritation, wheezing, sore throat, chest tightness, bronchitis, and allergic reactions.²²⁴ In addition, high levels of coliform bacteria from animal waste can be present in farmworker camps and communities, and cause serious health problems including diarrhea, vomiting, dehydration and diseases such as hepatitis A, Legionnaires' disease, and cholera.²³⁷ These risks are also often higher among children and immunocompromised individuals in farmworker communities.²³⁸

Interventions, Opportunities and Challenges

Individual Interventions, Opportunities and Challenges

Despite overwhelming evidence documenting the harmful health impacts of animal waste exposure for farmworkers and surrounding communities, many individual and systemic barriers stand in the way of meaningful reform. At the individual level, farmworkers often do not receive training about the risks and preventative measures that they can take to protect themselves from direct exposure to animal waste.^{235,239} In terms of protections from volatile air particulates, one farmworker study on poultry farms in North Carolina found that 76 percent of farmworker participants ranked respiratory protections as being important; yet 48 percent of participants reported never or rarely wearing respiratory protection when working in dusty conditions. Common reasons cited for workers not wearing personal protective equipment (PPE) include that PPE was not made available, and wearing PPE makes it difficult to communicate and increases discomfort due to excessive heat.²³⁵ In addition, while most farm employers receive respiratory health education, that information is often not communicated to workers.²³⁵ A study by Almeida et al.²³⁹ found that in order to effectively disseminate information regarding PPE to farmworkers, researchers should work with diverse stakeholders and partners beyond academics and non-profit organizations. Studies have also shown that researchers are most effective in supporting farmworkers when they provide results in a format that is easily accessible to community advocates and policy makers.²³⁷ This problem is compounded by language barriers. A study by Ramos et al.²⁴⁰ found that workers on a swine CAFO in Missouri with limited English proficiency were significantly less likely to receive work-related health and safety training than their English-proficient counterparts. Researchers and physicians are also often ill-equipped to meet the needs of farmworkers.

Studies have also shown that researchers are most effective in supporting farmworkers when they provide results in a format that is easily accessible to community advocates and policymakers such as short policy briefs.²³⁷

Societal and Policy Interventions, Opportunities and Challenges

At the policy level, so-called “ag-gag policies,” which limit whistleblowers from accessing agricultural worksites and information, further stifle effective research and data collection to inform regulatory agencies about Industrial Farm Animal Production (IFAP) practices. In addition, ag-gag laws make research difficult on these farms, as workers may be prohibited from participating in research and federally protected surveillance activities without express permissions from their employers.²⁴¹ Ag-gag legislation is one way to stifle public knowledge of the harmful effects of CAFOs for workers, yet there are many steps that are needed to make animal production safer for workers and communities. Like ag-gag legislation, the preventative use of antibiotics hinders important progress to protect workers. If the US comes into compliance with World Health Organization standards that prohibit the prophylactic use of antibiotics in livestock production, antimicrobial resistance that results from CAFO production will likely be significantly reduced.²⁴²

There are specific policies and practices that fail to provide protections against the negative respiratory health outcomes for farmworkers who work with animals. Many animal agriculture operations are exempt for OSHA requirements because they do not employ more than ten workers. Therefore, there is limited enforcement of basic education and PPE requirements.²³⁵ In addition, workers have the rights to know about hazards in their workplace per the OSHA Hazard Communication Standard, but often this information is not provided to workers.²³³ A National Institute of Occupational Safety and Health (NIOSH) survey in 2001 also found that workers are not provided with information about inhalation exposure control (including respirators).²⁴³ At the state level, agricultural agencies’ responses to health concerns related to IFAP are constrained due to narrow regulations, lack of public health expertise within the agencies, and limited resources.²⁴⁴

Physicians also often do not receive proper training in order to protect workers from respiratory disease. According to Akpinar-Elci et al.,²⁴⁵ early management of upper airway symptoms is important in controlling lower airway diseases among farmworkers, but farmworkers often cannot afford to see medical doctors. In a study by Ramos et al.,²³³ approximately 30 percent of poultry farmworkers surveyed could not afford to see a doctor within the past 12 months. The study accordingly recommended that all

employers have a respiratory protection program in place and should consider pre-employment screenings to assess respiratory health so that workers are not assigned to tasks that will exacerbate underlying respiratory health problems.²³³ However, even with proper enforcement mechanisms in place, occupational illness are often underreported due to fear of retaliation (especially among those who are undocumented), lack of knowledge about how to report injuries, and the financial implications of taking time off to tend to illness and injuries.²³³

Dangerous Machinery & Animals

Exposure

Working with animals or large machinery may result in injury from falls and other accidents.^{219,226} In one study of fatal injuries among farmworkers, researchers found that falls were the second leading cause of injury in animal production related work,²²⁶ and that livestock handling is an injury and disability risk to farmworkers.²¹⁹

Dairy farming also poses unique risks to workers. Over the past decade, dairy farms have become larger, resulting in increased task specialization and work demands.²⁴⁶ This leads to further reliance on immigrant workers with limited experience and health and safety training.^{87,247} A study by Lieberman et al.⁸⁷ in 2016 found that dairy cows, pressure to work quickly, inclement weather and lack of knowledge and communication all contributed to farmworker injury on dairy farms in Wisconsin. In addition, repetitive tasks (including reaching overhead), insufficient rest breaks and other factors have led to a high prevalence of work-related musculoskeletal symptoms among dairy workers.²⁴⁷

Agricultural machinery (such as tractors), which farmworkers often use in livestock operations, also poses unique risks. Hearing loss due to farm machinery also increases the risk of agriculture injury and fatality.²¹⁹

Health Outcomes

Animal-related injuries are very common and often severe, accounting for a large portion of farm work related injury.²⁴⁸ In a study that reviewed inpatient discharge summaries and emergency department and hospital-based outpatient clinic records of non-fatal work-related farm injuries in Michigan, approximately 40 percent of all injuries occurred on dairy farms (when farm type was recorded).²⁴⁸ Animal-related injuries can include body fractures, extremity injuries, and multisystem trauma.²⁴⁹ In 2014, there were almost 480 farm work-related fatalities in the US (25.6 fatalities per 100,000, com-

pared to 3.4 for all workers), and a major cause of these deaths included large animals.²¹⁰ CAFO workers are also susceptible to animal-related injuries. A study of 40 CAFO workers in Missouri found that approximately one third of workers had been injured on the job with the most frequently cited physical injury to the leg, knee or hip, followed by the hand or wrist.²⁴⁰

Transportation hazards (such as tractor rollovers or tractor overturns) and mechanical issues are also a leading cause of fatality among farmworkers. In a study of fatal injuries among farmworkers in the midwest between 2005 to 2012, researchers also found that nearly half of all injuries were due to transportation-related incidents, especially through tractor overturn events.²²⁶ Major causes of non-fatal injury also include mechanical hazards.²¹⁰ In a study of agricultural injuries in Louisville, Kentucky, researchers found that machinery incidents cause half of all farm injuries and a quarter of all farm-related deaths, often due to tractor accidents.²⁴⁹

Interventions, Opportunities and Challenges

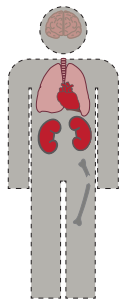
A number of barriers stand in the way of adequate protection against animal and machinery-related injuries. The first barrier is inadequate surveillance. Agricultural injuries are under-reported in official statistics often due to inadequate surveillance and reporting.²²³ While occupational health and safety management systems, or frameworks to identify and control health and safety risks, could reduce injury rates, there are no binding mandates to implement such systems on farms.²⁵⁰ One positive development is the recent rollout of OSHA's Local Emphasis Program (LEP) launched on dairy farms in Wisconsin in 2011 and New York in 2014. LEPs (developed by OSHA regional offices) are enforcement strategies for industries or hazards that are of particular risk to employees and can be carried out by OSHA regional or area offices (usually in the form of unannounced inspections).²⁵¹ This program and increased surveillance has increased dairy producers' awareness of inherent hazards and methods to correct them.²⁵¹

When workers do become injured as a result of livestock handling, these injuries often require a trip to a medical health care provider, and sometimes to the emergency room, in order for farmworkers to receive proper care. However, farmworkers often do not have access to adequate health care, and often rely on their employers for health care access.^{79,87} As one Hispanic farmworker on a dairy farm in Wisconsin stated:

*By the time the boss finally pays attention, you're dying. Because you have to show where [on the farm] it happened...Listen brother, if I told you that I'm bleeding out, when am I going to find the time to show you that?*⁸⁷

These difficulties are compounded by the fact that workers often are not provided appropriate workers compensation coverage.²⁵² In addition, immigration status and fear of deportation influenced injury and hazard reporting, leading many undocumented farmworkers not to report injuries when they occur for fear of losing their job and of being deported. Some farmworkers are even instructed not to inform health care providers when injuries occurred at work.

Similarly, there are barriers that inhibit meaningful protection against tractor and machinery-related injury. First, there is a lack of adequate monitoring and safety training for farmworkers using agricultural machinery.²⁵³ Second, according to Kornuta and Kennedy (2016),²⁵⁴ “there appears to be no federal agency that regulates the design of tractors with regards to safety.” While the introduction of roll-over protective structures on tractors, an industry standard requirement on tractors manufactured since the 1980s, is a promising development, much more protections are needed. Tractor and machinery-related fatalities are still among the leading causes of death for farmworkers even with these protections in place.²²⁶ More research is also needed to investigate the specific impact of machinery safety-mitigation devices.²⁵⁴ It is important that all of these barriers be taken into consideration together when investigating necessary reform to protect workers from animal and machinery-related injury.



HEALTH IMPACTS FOR BOTH CROP AND LIVESTOCK WORKERS

This section explores health impacts common to both crop and livestock workers including mental health, gender-based violence, and food security.

Mental Health

Exposure

Farmworkers often work in settings that are high-stress, rapidly paced, and isolated, with limited pay and workplace protections. This impacts farmworkers' mental health and often leads to higher levels of stress and depression.^{221,255} The injustices that farmworkers face in the US also manifest as everyday stressors through exposure to pesticides, sexual harassment and violence, unfair wages, and poor housing, among other issues.³⁶ These abuses are often perpetuated by agricultural labor contractors and upheld by US agricultural policy.^{36,38}

Farmworkers face frequent dehumanization within the US through misconceptions that immigrants take US jobs and through epithets such as “illegal alien.”^{36,38} In addition, farmworkers refer to the fear of deportation and the possibility of getting fired from their job as a constant emotional strain.^{36,97}

Migrant farmworkers also face a number of daily stresses related to economic and physical isolation, living far away from their families and loved ones, and difficult work settings, together leading to significant emotional hardships and psychological distress.^{36,97,256} One 2018 study in eastern Washington state found that the highest stressors that farmworkers report includes language barriers, separation from family members, and lack of money to pay medical bills.²⁵⁷ In North Carolina, a study of farmworker housing conditions found that living in crowded conditions (those living with more than five people per room) is also linked to poorer mental health for occupants, such as depression and anxiety.⁵²

Health Outcomes

Research has estimated that 20 to 55 percent of farmworkers suffer from at least one mental health disorder at some point in their lifetime.²⁵⁷ Furthermore, depression rates among farmworkers are approximately two times the national average for adults.³⁶ Between 20 and 35 percent farmworkers sampled in one study showed depressive symptoms.³⁶ A 2018 study by Arcury et al.,²⁵⁵ found that farmworkers experienced higher rates of stress and anxiety than both employed and unemployed non-farmworkers.

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In order to minimize the mental health challenges that farmworkers experience, it is crucial that agricultural employers improve occupational health and safety and ensure fair pay and treatment on farms. In addition, farmworkers must have access to culturally-relevant mental health services.²²¹ For example, farmworkers in Arizona described preferences for culturally appropriate, secure, and onsite mental health services as high priorities for primary care.²⁵⁸ Similarly, increasing community-based mental health resources can help to strengthen social support and outreach to crop workers.²⁵⁹ Herman et al.,²⁶⁰ in a 2016 study, suggest that mental health resources should be expanded, including a 24/7 crisis line, therapy and support groups, and counseling services. Furthermore, simply improving the support from farm supervisors can reduce work distress and work-family conflicts.²⁶¹ The mental health impacts that farmworkers face are closely tied to family and community, housing, immigration status, and work environment. US agricultural policy should address this issue by expanding mental

health services for farmworkers and improve the work conditions and livelihoods for farmworkers and their families. Increased wages for farmworkers would also greatly improve mental health outcomes, as increased income is associated with a decrease in stress.²⁵⁷

Gender-based Violence

Exposure

Male farm employers and foremen have a history of verbally and sexually harassing women farmworkers in the fields.^{45,51,262-264} Many women working on the farms have been forced to have sex at gunpoint, been threatened, and been fired after filing complaints against their managers and foreman.^{40,264} According to a 2010 qualitative study by Waugh et al.⁴⁰ surveying Mexican women farmworkers in California, 80 percent of women reported being sexually harassed at work.²⁶⁵ Similarly, a 2015 study conducted in Oregon found that sexual harassment was rampant among Spanish and Indigenous language speaking farmworkers.²⁶⁶ A 2016 qualitative study by Kim et al.⁴⁰ revealed that 75 percent of women in rural Washington had a personal account or knew of someone with a similar story of being sexually harassed at work. In this study, many women reported that the majority of harassers were men (84 percent) and foremen (58 percent) in the fields.⁴⁰

In addition to gender-based discrimination and violence on the fields, women farmworkers are also expected to lead “double work days,” wherein they return home from earning income and enduring discrimination and abuse to meet the gendered cultural expectations of family care.^{9,201,265} Women are also often impacted by a lack of adequate childcare, and sometimes have to bring their children onto the fields with them.

Health outcomes

Health outcomes for farmworkers

Gendered discrimination and violence in the fields are associated with multiple negative health outcomes for women farmworkers. Women working in agriculture face similar occupational hazards as men such as being at a heightened risk for developing heat-related illnesses (HRIs), pain, fatigue, and acute kidney illness (AKI).^{45,121,267,268} However, the gendered discrimination at their workplaces leaves women farmworkers to do the lowest-paying jobs and exacerbates these hazardous working conditions.^{9,265} For example, women experience higher rates of facial injury and trauma than men due to the high risk nature of low-paying farm tasks such as milking farm animals and being responsible for livestock care and cleaning.²⁶⁹ Additionally,

women who are pregnant have to work as if “they are not pregnant” due to the fear of losing their jobs.⁹ This means pregnant women often continue to endure the strenuous labor of bending low and exerting themselves without breaks.⁹ In fact, a 2018 qualitative study showed that 11 women out of 23 performed the same backbreaking tasks during their pregnancies, even seven to eight months into their term.⁹ In addition, pregnant women are also exposed to pesticides, which have lasting negative implications on their health and the health of their future children.⁹

In addition to these negative health outcomes caused by precarious working conditions, the exposure to gendered discrimination and violence in the fields often leads to physical and psychological stress.^{40,264} Sexual discrimination and violence are associated with higher health care use.^{40,270} However, Latinx women farmworkers have especially inadequate access to health care services.²⁷¹ This is reflected in the high burden of cervical cancer among Latinx women farmworkers. Latinx women farmworkers have the highest incidence rate of cervical cancer (9.2 new cases per 100,000 women) and second highest cervical cancer mortality rate (2.6 deaths per 100,000 women) compared to other racial and ethnic groups²⁷² due to limited access to necessary health care services such as screening and treatment.^{271,273,274} Additionally, sexual violence in the field increases women farmworkers’ risk of developing acute kidney illness.¹²¹ This is because sexual assault incidents tend to occur near bathroom facilities.^{40,266} As a result, women, out of a fear for their safety, are more likely to limit drinking water, eating during shifts, and delay their trips to the bathroom during the work day.¹²¹

Research has also shown that in general, lack of child care services can affect an employee’s concentration levels, rates of absenteeism and tardiness, and thus, their ability to work effectively.⁷² The lack of child care services is perhaps even more meaningful for farmworkers, given the hazardous working conditions in the fields. In a report authored by Miller et al.,²⁷⁵ women farmworkers in Washington revealed that many brought children to work on the farm, thereby exposing children to occupational injuries, because they had no alternative other than to miss work—a risk they cannot afford.

Health outcomes for communities

The trauma of gendered violence, discrimination, and abuse is long-lasting; its impacts are felt and carried by women both at their workplaces and in their homes. In the same 2016 qualitative study by Kim et al.,⁴⁰ women

farmworkers in rural Washington described the health impacts of workplace sexual harassment and discrimination:

I feel, that [workplace sexual harassment] has affected me psychologically and physically ... when you least expect you fall into depression and you have no desire to see anyone.⁴⁰

This [workplace sexual harassment] affects us not only as a person but as a family. You are so tired of this, that you can't give your child all he needs ... you are so hurt ... it affects our children.⁴⁰

The burden of “double work days,” that is, maintaining employment while caring for their families is one of the reasons why women farmworkers report higher rates of chronic pain and fatigue.²⁶⁷ Additionally, the trauma of harassment and discrimination limits the capacity of women to endure the burden of family care, which often leads to marital strain, family conflict, and high depression rates among women.⁴⁰ Accordingly, research has shown that family conflict as well as economic insecurity is significantly associated with depression in women farmworkers.^{261,276, 277} The association of family conflict and depression is further exacerbated by lack of support at work, thereby making it a vicious cycle.^{261,278} For example, in a qualitative study, women in farmworker families revealed that many employers enforce rules that discourage workers from taking any time off for family emergencies or caring for family members, while simultaneously withholding wages, rest breaks, and health insurance.²⁷⁸

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Lack of protections in the form of legal status, stable income, access to child care and health care, and safe working environments make women farmworkers vulnerable to violence and poor health. In the absence of these protections, women farmworkers tend to remain silent about the trauma of sexual harassment and violence they face to keep their jobs and to avoid retaliation from male farm employers and foremen.^{40,264} Furthermore, women working on farms are already exposed to higher rates of economic insecurity, bearing the burden of the lowest-paying jobs. This burden is further exacerbated by unpaid family care work.⁹

Despite these additional challenges, women farmworkers often find little support from their employers, who usually do not provide child care services.^{72,73} Nonprofit organizations such as Redlands Christian Migrant Association (RCMA) aim to fill the gap by providing child care and early childhood education, among other resources, for children in migrant working and low-income families.²⁷⁹ However, since many of these resources are

largely dependent on donations and grants, the amount of support they can provide does not meet the needs of all women farmworkers, they are not sustainable solutions guaranteed to all women working on farms.

Gender-based discrimination and violence in the fields significantly affects women farmworkers both at their workplaces and in their homes. In order to effectively address this issue, it is critical to invest in women farmworkers, and in creating safe workplace environments that are devoid of occupational hazards and gender-based violence. That is, providing support such as: access to adequate and reliable health care and child care; increased pay that is reflective of their skills; and legal protections in the form of permanent legal status, necessary work breaks for rest, and vacation time.

Food Security

Farmworkers who cultivate and harvest fresh crops, bringing nutritious products from field to table in the US, experience higher levels of food insecurity and economic hardship than the general US population.²⁸⁰ The term “food insecurity” encompasses a number of experiences where one lacks consistent access to safe, affordable, culturally appropriate, and nutritious foods.²⁸¹ A family experiencing food insecurity may limit the diversity or types of foods to eat, limit the amount of food for meals, or seek food assistance through community food pantries or other means. Those who experience severe food insecurity and lack access to food assistance may experience hunger and skip meals altogether in order to cope with limited income to purchase food.²⁸²

Several studies have found rates of food insecurity for migrant farmworkers ranging from 49 to 71 percent, about three to five times the rate of the general population in the US.²⁷⁷ In addition to low wages, farmworkers may experience additional barriers to access healthy and culturally appropriate foods, such as limited transportation and access to food retailers, lack of proper equipment for food preparation and storage, poor quality of food donations, and inadequate and inaccessible food assistance programs.²⁸³ One study found that in a sample of 32 farmworker parents, 56 percent reported being often or sometimes limited in purchasing fruits and vegetables due to cost.²⁸⁰ Another found that 82 percent of migrant farmworker households living near the US-Mexico border were experiencing food insecurity and 49 percent experienced hunger.²⁸⁴ However, many more households have been affected by hunger and food insecurity due to the Covid-19 pandemic. Some states have seen a 50 percent increase in food

insecurity,²⁸⁵ with an unprecedented increase in demand for emergency food assistance.²⁸⁶

The social and geographic conditions that lead to food insecurity are created and perpetuated by systemic racism. This is often referred to as “food apartheid.”²⁸⁷ This term, coined by Eric Jackson and Madeline Hardy of the Black Yield Institute, characterizes the racial and economic disparities that lead to food insecurity through decades of discrimination and under-investment of Black and non-white communities. The concept of food apartheid also emphasizes the power and potential of food sovereignty, or the right of peoples “to define their own food and agriculture systems” and to “healthy and culturally appropriate food produced through ecologically sound and sustainable methods.”²⁸⁸ Within the context of farmworkers, food sovereignty goes beyond food assistance and focuses on long-term reform such as expanding worker ownership, reduced reliance on corporate-controlled farms²⁸⁹, access to land, regional and culturally appropriate food production, and pathways to citizenship for farmworkers.

Health Outcomes

Food insecurity and hunger have lasting effects on human health, especially children’s health. A recent review of the scientific literature found that food insecurity in children “is associated with increased risks of some birth defects, anemia, lower nutrient intakes, cognitive problems...and anxiety.”²⁹⁰ Adults who experience food insecurity also have higher risks for mental health issues and depression, sleep difficulties, and poor health outcomes.²⁹⁰ Those who experience food insecurity are also at a greater risk of hospitalization and living with chronic diseases such as cardiovascular disease, diabetes, dyslipidemia, and hypertension.^{290,291xi} Food insecurity, stress, and hunger can affect the body in myriad ways and interact or exacerbate other health issues. For example, stress may be associated with elevated fasting glucose levels among farmworkers and job strain has been found to be a risk factor for type 2 diabetes.⁹¹

A study of the medical records of 164 Migrant Health Centers in 2012 found that 80 percent of patients who were Migrant and Seasonal Agricultural Workers (MSAWs) earned family incomes below the federal poverty level and often experienced food insecurity.^{91,293} The most common diagnoses

xi Studies regarding food insecurity and obesity typically use the BMI as the principal measurement for obesity. The BMI measures how a person’s height and body weight correlate to a “normal” white male body standard.²⁸¹ This is a faulty diagnosis tool that was “never intended as a measure of individual body fat, build, or health,” and thus, is likely to exacerbate health care disparities for historically disenfranchised communities and contribute to medical sexism and racism.^{281,292} In this review, we exclude studies that rely on BMI measurements in their analysis.

of these MSAW patients were hypertension, diabetes mellitus, and mental health conditions.⁹¹ Another study in Sonoma County, California, found that 15 percent of the farmworker population sample had been diagnosed with diabetes, a prevalence three times higher than the general population in the area.⁹³ The long-term health impacts of food insecurity can result in debilitating medical costs, especially for this community of people who often lack access to health care and insurance.^{91,294}

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Many government programs seek to provide urgent and immediate support for those dealing with food insecurity. Programs such as the Supplemental Nutrition Assistance Program (SNAP), the Women, Infants, and Children (WIC) program, and the National School Breakfast and Lunch Programs are crucial for the health and nutrition of children and adults across the country. There is strong evidence that these programs improve development and school learning for children, increase fruit and vegetable intake, and support economic self-sufficiency.²⁹⁵ However, families with mixed documentation status may have difficulty accessing these food assistance programs. For example, people lacking documentation are not eligible to apply for SNAP benefits but may receive the benefits indirectly if a family member qualifies.²⁹⁶ Therefore, undocumented farmworkers may receive benefits from SNAP if they have an eligible and documented person in their household (such as a child or elder), but may not use this resource due to fear and risk of exposure to immigration authorities.²⁹⁶ Furthermore, mixed documentation households without a citizen family member are not eligible for SNAP benefits and those that are eligible may not participate due to other barriers, such as fear that use may affect immigration status, long waiting periods, language barriers, or lack of outreach for information and technical support.^{296,297}

In September 2018, a new “public charge” rule was introduced to expand the grounds for which authorities could deny permanent residency, and therefore citizenship, to immigrants based on the use of public benefit programs. This rule expands the public charge determination to include SNAP, Medicaid, and housing assistance, further perpetuating the justifiable fear and confusion that immigrants face when seeking government support.²⁸⁶ However, the Biden Administration decided to halt the implementation of this rule in February 2021.²⁹⁸ In a 2018 study, Medel-Herrero and Leigh²⁹⁶ analyzed National Agricultural Worker Survey (NAWS) data from 2003–2012 and found that documented and undocumented agricultural workers had significantly lower SNAP participation rates than citizens. They also found that Latinx documented and undocumented farmworker immigrant house-

holds were 40 percent and 43 percent less likely to participate in SNAP than households headed by non-Latinx citizens with the same need.²⁹⁶

Emergency food and food assistance are necessary to combat the effects of economic inequality. One study found that farmworkers, especially undocumented farmworkers, rely on emergency food “as their only line of defense against food insecurity”²⁹⁹. The stress of food insecurity also disproportionately falls on women. A study with agricultural workers in rural Idaho found that women are often responsible for food provisioning, or the “mental, physical and emotional labor involved in providing food for oneself and one’s family.”³⁰⁰ The labor of provisioning food that aligns with one’s cultural identity is more difficult for those with limited funds, therefore, “race and ethnicity, class and geography often intersect to limit physical and financial access to food.”³⁰⁰

The daily experiences of food insecurity are emotionally and physically draining, with very serious long-term health impacts. The most urgent need to address food security in agriculture is to improve wages for farmworkers and expand and adapt food assistance benefits to meet the unique needs of farmworkers and undocumented people.²⁸³

Those whose work nourishes the vast majority of families in the US often do not have access to the food they grow and harvest. This is usually not due to lack of knowledge or education, but to deeply embedded structures that keep agricultural workers in positions of vulnerability.³⁰¹ In order to truly address food insecurity in farmworker communities, the US must focus on issues such as fair wages, immigration reform, land access and repatriation, and food sovereignty. More work must be done to create opportunities for farmworkers to obtain land, agency, and ownership of farm and food operations.



COVID-19

The Covid-19 pandemic has had major negative social and economic impacts, with nearly 31 million cases of Covid-19 and more than 560,427 deaths in the US (as of April 9, 2021),³⁰² a disproportionate burden of which are borne by historically excluded and marginalized communities.^{303,304} The impacts of this pandemic are especially pronounced within the agricultural worker communities, who remain largely ignored despite working tirelessly on the frontlines to maintain a food supply for the nation.³⁰⁵ As of April 8, 2021, “at least 89,235 workers (58,321 meatpacking workers, 17,881 food processing workers, and 13,033 farmworkers) have tested positive for Covid-19 and at least 378 workers (286 meatpacking workers, 49 food processing workers, and 43 farmworkers) have died [of Covid-19].”³⁰⁶

The federal government was quick in categorizing agricultural workers as “essential workers.” On March 19, 2020, the Cybersecurity and Infrastructure Security Agency (CISA) issued a memorandum, releasing guidance on agricultural workers as “essential workers” expected to “maintain a special responsibility to maintain [their] normal work schedule.”³⁰⁷ On April 26, as Covid-19 rampantly spread, especially within slaughterhouses, the CEO of Tyson Foods took out advertisements in several newspapers including a full page advertisement in **The New York Times**.³⁰⁸ In this advertisement, Tyson leadership called on the federal government to provide liability protection to meatpacking employers for addressing the “imminent meat shortages” as a result of the pandemic.^{308,309} Instead of mandating much needed protection for agricultural workers from Covid-19 risk and exposure, President Donald Trump responded to the full page advertisement from Tyson Foods by issuing an executive order on April 28, 2020, ordering meat-processing plants to remain open during the pandemic and deeming meatpacking workers as “essential workers” to keep the nation’s meat supply chain functioning.³¹⁰

Despite the acknowledgement of agricultural workers as critical infrastructure, the systems in place have failed to support and protect farmworker communities. For example, in the federal Covid-19 relief packages, essential agricultural workers were often overlooked and unprotected.^{305,311–315}

The Covid-19 relief packages not only left many agricultural workers out

“We talk about...the term essential worker. With Covid-19 we’ve started thinking about people in this way. That in mind, especially for farmworkers, allows a justification of the awful conditions that so many experience in the industry. And food and farmworkers...there’s this understanding that they’re doing something that is essential, so we can justify the fact that they’re going to be exposed, and we’re going to justify their death. That to me, is a really racialized thing.”

Julia Jordan, Policy Coordinator,
Leadership Counsel for Justice
and Accountability

of financial relief in the form of stimulus checks but also failed to establish enforceable rules to protect these essential workers from Covid-19 risk and exposure.^{316–318} Accordingly, farms across the nation, including in key states responsible for a majority of the nation’s produce, such as California,³¹⁹ Washington,³²⁰ Florida,³²¹ and Michigan,³²² reported massive outbreaks among hundreds of workers.^{317,318,323,324} One study of farmworkers in California found that over 25 percent of farmworkers surveyed had a loved one become infected with Covid-19 and seven percent had a loved one die from Covid-19.³²⁵ Often, workers at these farms have been directed by their foremen to hide their symptoms from other crew members.³²⁶

Agricultural workers, a majority of whom are immigrants and about half of whom are undocumented, already face a heightened risk to Covid-19 while lacking meaningful legal protection.^{315,327–329} This is due to structural determinants of health such as overcrowded housing, inadequate wages, uncertain legal status, uninsurance, and systemic discrimination that restrict them from practicing social distancing guidelines.^{327,328,330} Despite these risk factors, agricul-

tural workers are expected to work as “essential workers” without adequate hazard compensation and other workers compensation benefits,³³¹ safe workplace conditions, reliable Covid-19 testing, and access to personal protective equipment (PPE).^{315,332,333} Some workplaces have implemented strict attendance policies that force workers to come into work with potential positive Covid-19 symptoms or risk being fired during a pandemic.³³⁴ A meat processing plant lawsuit in Missouri—filed by 120 workers (17 percent) who tested positive with Covid-19—revealed that workers were not required to stand six feet apart, there was no adequate testing for Covid-19, workers were denied bathroom breaks, and sick workers were encouraged to continue to work to receive bonuses.^{335–337} In South Dakota, Smithfield Foods offered a \$500 bonus to those who did not miss work in April 2020.³³⁸ Similarly, due to lack of protections for workers, more than half of South Dakota’s Covid-19 cases (644 in number),³³⁹ and 90 percent of all Covid-19 cases in Iowa were tied to meat-processing plants.³⁴⁰ The exploitation of

agricultural workers, especially amid a pandemic, was also on display when Tyson Food managers organized a “cash buy-in, winner-take-all betting pool for supervisors and managers to wager how many employees would test positive for Covid-19.”^{341,342} The Waterloo plant, where this betting took place, is the largest pork plant in the country, employing approximately 2,800 workers.³⁴³ More than 1,000 employees at this plant have contracted Covid-19, with at least six Covid-related deaths.³⁴¹

Historically, people from marginalized communities have borne the brunt of infectious disease epidemics because of deeply rooted systemic disparities and injustices.³⁴⁴⁻³⁴⁶ Accordingly, the social, economic, and legal precarity—that have long existed within our food systems as a product of racial capitalism—are on display within the Covid-19 pandemic, affecting and exploiting “essential” farmworker communities to keep our food systems running, at the cost of workers’ lives.^{315,342}

Without meaningful federal support, states like California have tried to prioritize the protection of agricultural workers by passing a first-in-the-nation Farmworker Covid-19 Relief Package, including access to Covid-19 related paid sick leave and workers compensation benefits for agricultural workers; expanded telehealth services for rural and community health centers; and expanded virtual access to state trial courts for farmworkers.³⁴⁷ However, in order to effectively facilitate Covid-19 recovery, it is crucial for the federal government and food systems stakeholders to implement necessary protections and relief for agricultural workers with urgency, including priority access to vaccinations.

Agricultural workers have continued to endure injustices in the form of health disparities and systemic discrimination, while working tirelessly to hold our nation’s food supply chain together. The Covid-19 pandemic and its disproportionate impacts on this essential community are an urgent call to take action to treat farmworkers with the respect and dignity they deserve.

“When the pandemic hit our first thought was, ‘what is going to happen to workers?’ These are workers that tend to work and live in close proximity to one another. Most, if not all, migrant workers tend to live in crowded housing with many workers sharing a room, oftentimes sleeping on bunkbeds or on the floor. Because they live in remote areas and depend on their employer for transportation, they tend to share a van or bus to get them into ‘town.’ Social distancing is challenging in these circumstances. Unfortunately, we have seen numerous Covid-19 outbreaks amongst the food and farmworker communities.”

Sulma Guzmán, Policy Director & Legislative Counsel, Centro de los Derechos del Migrante



COLLECTIVE POWER FARMWORKER ADVOCACY

For decades, farmworkers have organized for basic rights, fair pay, and standard labor protections. Formal organizing and labor unions for agricultural workers began to emerge in the 1940s and 1950s, led by activists such as Dolores Huerta, Cesar Chavez, Ernesto Galarza, and Larry Itliong.³⁴⁸ During this time, organizing efforts, aligned with the Civil Rights Movement, successfully ended the Bracero Program.³⁴⁸ These labor groups, now the United Farm Workers, also led the way in advocacy, staging strikes and boycotts for better pay for California grape pickers in the 1960s. Labor unions, farmworker groups, and human rights agencies have won significant state and federal policy improvements for agricultural workers. Today, United Farm Workers and other organizations, such as Farmworker Justice, Migrant Justice, Coalition for Immokalee Workers, and many others, work to organize and advocate for basic rights, fair pay, and standard labor protections for farmworkers.

Although the agriculture industry has one of the lowest rates of unionized workers, union contracts have helped farmworkers obtain a number of benefits, including higher pay and pension plans.³⁴⁹ There are four main labor unions for agricultural workers: the United Farm Workers (UFW) in California, Pineros y Campesinos Unidos del Noroeste (PCUN) in Oregon, the Farm Labor Organizing Committee (FLOC) in North Carolina, and Familias Unidas por la Justicia in Washington.³⁴⁹ Recent successful campaigns from UFW include improved EPA pesticide rules and the first statewide permanent outdoor heat regulations in California. In North Carolina, FLOC represents a number of guestworkers from Mexico. In two years, FLOC has recovered nearly \$600,000 in stolen wages and workers compensation.³⁴⁹ In Washington, Familias Unidas union, led by Indigenous workers, supported farmworkers in organizing and winning a contract with a berry farm, where

workers now earn between \$15 and \$40 an hour, compared to the minimum wage of around \$11.87 an hour, before the contract.^{349,350}

In areas with a limited labor market, union contracts such as these have been a significant benefit for the grower to attract and retain workers.^{21,349}

For example, the strawberry industry in California has faced labor shortages due to increased border and immigration enforcement.²¹ One 2017 study explored the experiences of strawberry growers in California and found that farmworkers were able to negotiate higher pay and better conditions due to the higher demand for skilled labor.²¹ Workers were able to pressure growers by walking off the job or collectively seeking employment at the farms with better conditions.²¹ Therefore, the farms with better working conditions are not restricted by reduced labor and have greater opportunities to harvest their entire product and even expand their operations.²¹

Farmworkers are also able to partner with advocacy groups to pursue direct action, legal challenges, or community organizing to confront environmental racism and harmful policies.¹⁹⁷ For example, farmworker communities work with groups like Pesticide Action Network of North America (PANNA) to collect research samples in fields, homes, and other areas to generate data and hold growers and government regulators accountable.¹⁹⁷

In addition, the Coalition of Immokalee Workers has worked with farmworkers in Florida to advocate for human rights, prevent forced labor, and gain equitable pay through both direct advocacy efforts and market-based strategies.¹⁹⁷ For example, the Coalition of Immokalee Workers created the Fair Food Program, a market-based model for “worker-driven social responsibility,” where workers create their own work standards with legally binding agreements and enforcement mechanisms.³⁵¹ This way, when companies buy a product, they also take responsibility for the working conditions of those that produced it.³⁵¹ The Coalition of Immokalee Workers organized with

“Covid-19 has magnified the dangerous conditions farmworkers already face, including ongoing exposure to pesticides and extreme heat. It has also highlighted how farmworkers are continuing to organize for safe and dignified work, despite the racist exclusions of farmworkers from collective bargaining in much of the country. All farmworkers deserve dignity, respect, and full protection on the job and in the communities in which their families reside. FCWA and our members are fighting for a broad workers rights agenda that lifts up farmworkers’ right to organize, health and safety protections, migrant, and racial justice so that the lives of farmworkers are no longer endangered during and beyond this pandemic.”

Sonia Singh, Co-Director, Food Chain Workers Alliance

tomato pickers in Florida to pressure large tomato buyers, such as Taco Bell and Trader Joe's, to sign on to these worker agreements.³⁵²

Immigrant workers in Vermont used this model to design the Milk with Dignity Program in partnership with Migrant Justice. With this program, farmworkers are able to hold companies accountable for the conditions of production. Buyers sign legal agreements, purchase from suppliers enrolled in the program and pay a premium to the supplier.³⁵¹

“To work on the solutions, those that we determine are going to function for us. It’s up to us to determine what the solutions are... We can’t dream up solutions from here, from Washington, DC, that’s not how things work. We need to think in terms of local and regional solutions.”

Rudy Arredondo, President/CEO,
National Latino Farmers & Ranchers
Trade Association

In the case of violations, buyers can suspend purchases and/or premiums when directed by the Milk with Dignity Council.³⁵¹ In 2017, Ben & Jerry's became the first company to sign on to the Milk with Dignity Program.³⁵¹ In the first two years of the program, the Milk with Dignity Council and Migrant Justice have completed 105 farm audits, resolved 155 complaints, protected 262 qualifying workers on 64 participating farms, and “invested over \$1 million directly in workers’ wages and bonuses and in improvements to labor and housing.”³⁵¹ They also hold worker-to-worker education sessions, so workers are aware of their rights. Through these strategies, companies also benefit from “fair food” labeling, outwardly demonstrating their commitment to human rights and giving

them added clout with consumers. Programs like Milk With Dignity are groundbreaking strategies for worker-driven organizing for safe and fair work, “from empty standards to enforceable rights.”³⁵¹

Today, farmworkers continue to fight for basic labor rights and improved immigration policy, especially in the wake of the Covid-19 pandemic. Groups of workers across the country, including on farms in Washington, Massachusetts, Minnesota, and Arkansas, have organized walkouts, strikes, and other direct action to demand Covid protections.³⁵³ Furthermore, coalitions of labor, Indigenous rights, and environmental justice groups have also established strategies for a broader Just Transition in climate action and food sovereignty. Labor rights movements are closely tied to the struggle for a Just Transition to “democratize, decentralize and diversify economic activity... and redistribute resources and power.”³⁵⁴ These Just Transition strategies work to create new economies and livelihoods for communities, in order to reduce and eliminate the reliance on industries that exploit workers and the environment.³⁵⁴ This requires addressing the persistent issues of agri-food market concentration, as well as the legacy and current reality of racism.³⁵⁵ Through this vision, worker-owned and environmentally beneficial enterprises can work to replace the current dominance of exploitative farms and industries.



LIMITATIONS

Due to the broad scope of research topics covered and purposes of this review, one limitation is that the authors did not perform statistical analysis of the results, instead synthesizing the evidence in order to identify health impacts facing farmworkers and discuss interventions, opportunities and challenges for improving negative health impacts. Furthermore, relying primarily on peer-reviewed research and published web resources to analyze the occupational and environmental health concerns of farmworkers may limit the strength of results. Farmworkers are often not the authors of these studies, due to barriers such as available time, fear of retaliation, and language. As such, studies summarized in this review may underestimate the health impacts discussed, as those who are most marginalized may be less likely to participate in research studies. More community-based participatory research is needed, where farmworkers can help determine research goals, approach, data collection, and analysis. Similarly, although a number of recent qualitative studies have shared valuable insights, more space is needed for farmworkers to safely share their stories and expertise in order to guide policy and food system change. Many abuses and health violations on farms are not reported, and workers face considerable barriers to making reports that could trigger governmental enforcement actions.³⁵⁶ Therefore, research most likely underestimates the injustices that many farmworkers face.^{57,357,358} The focus of this report is also limited to specifically those who work in agricultural production. However, other workers along the food supply chain, such as restaurant, retail, warehouse and delivery workers also face considerable challenges, including challenges rooted in systemic issues such as racism and abuse based on immigration status. Health risks associated with Covid-19 have also had significant negative implications for workers across the entire food supply chain.³⁵⁹



RESEARCH GAPS

We found a number of significant gaps in the research regarding occupational health hazards for farmworkers. For example, much of the recent literature focuses on Hispanic or Latinx farmworkers, but very little attention is given to how Indigenous (im)migrant farmworkers, primarily from Mexico and Central America, many of whom speak an Indigenous language, such as Mam or Nahuatl.^{xii} Indigenous farmworkers may experience discrimination or health concerns differently from those in other racial and ethnic groups. Only two of the 273 articles found in our results included a specific focus on Indigenous migrant farmworkers.^{45,64} Furthermore, we found almost no recent literature that discusses the specific occupational or environmental health concerns for elderly, disabled, gender nonconforming, nonbinary, or LGBTQ+ farmworkers. Although the majority of farmworkers are men, more research is needed to amplify the focus on women, as well as other populations of farmworkers. Other topical areas that would benefit from greater attention include: housing conditions, climate change effects on workers (including other food system workers), and immigration policy.

In addition, the topics that yielded the greatest number of results (pesticides, occupational injury, and health care) would benefit from a wider focus on the structures that maintain systems of oppression (and the actors that reinforce these systems). For instance, studies that measure the effectiveness of protective behaviors against injury or pesticide exposure often do not investigate the structural barriers that put farmworkers at risk in the first place.

xii Indigenous languages reported by farmworkers interviewed in 2015–2016 include Acateco, Amuzgo, Chatino, Chuj, Mam, Nahuatl, Popti, Purepecha/Tarasco, Tlapaneco, and Triqui.²



CONCLUSION

This report provides a summary of the most recent literature documenting public health threats farmworkers are facing in the US. Since the first iteration of this report was published in 2017, farmworkers are still experiencing negative public health impacts, and on-farm as well as public policy interventions do not adequately protect workers. While farmworkers have organized, advocated and won meaningful reforms and market-based incentives to improve working conditions over the past 70 years, it is incumbent upon policymakers to institutionalize and enforce additional protections. The Covid-19 pandemic has drawn awareness to the essential role farmworkers fill while inadequately protected. But any disruptions to the food system, whether they come in the form of infectious disease or climate irregularities, will likely leave farmworkers increasingly vulnerable to illness if laws and policies do not improve. Prioritizing the health and wellbeing of farmworkers will strengthen our food system and improve our collective health and wellbeing.

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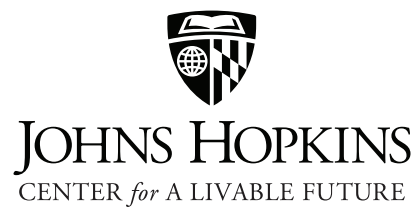
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