

PUBLIC HEALTH, IMMIGRATION REFORM AND FOOD SYSTEM CHANGE

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CONTENTS

Contents

Abstract	1
Introduction	2
Background on U.S. Farmworkers	4
Health Impacts of Working in Industrial Food Production	7
Pesticide Exposure	7
Injuries	10
Physical and Biological Hazards.....	11
Air Quality	12
Animal Waste.....	14
Generation of Novel Flu Viruses	15
Health Impacts of Working in Animal Processing Plants	16
Social and Mental Health Impacts of Agricultural Work	19
Health Impacts Extended to Families and Communities of Farmworkers	20
Barriers to Awareness and Improvement	25
Policy Recommendations for Reform.....	29
Conclusion	35
References.....	36

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

ABSTRACT

Abstract

This paper reviews the public health impacts facing agricultural and meat processing workers in the United States (U.S.)—particularly immigrant workers—and their families due to the inherent risks associated with the predominant industrial model’s production protocols and system structure. The paper provides an overview of the health risks and impacts associated with agricultural labor, low wages, poor housing conditions, and other challenges typically facing agricultural and meat processing workers. It explores how immigrant workers are especially vulnerable to these impacts due to factors including fear of job loss or deportation, limited access to health care, agricultural exceptionalism in labor laws, and inadequate guest worker programs. It presents evidence to support the idea that the security and resiliency of the U.S. food system is jeopardized by the health impacts facing immigrant workers and the barriers that restrict workers from advocating for improved working conditions. It concludes with a discussion of the need for comprehensive immigration reform in order to protect workers, the U.S. food system, and the public’s health and includes recommendations for the reform of immigration policies, in addition to shorter-term policy recommendations in the absence of immigration reform.

INTRODUCTION

Introduction

Reform of the United States' immigration laws has been the subject of contentious debate and a policy issue since the Kennedy Administration. Such reform has direct implications for the production and processing of the U.S. food supply, which employs millions of immigrant workers. The advocacy organization Farmworker Justice estimates that 50-75% of the nation's 2 million farmworkers* are currently undocumented—lacking citizenship and temporary worker visas—and approximately 80% of farmworkers are immigrants.¹ According to the U.S. Department of Labor, hundreds of thousands more are employed in the slaughter plants and processing facilities that are an integral part of our current industrial agricultural system.²

The plight of migratory workers—many of whom are undocumented immigrants—laboring to harvest U.S. produce was significantly brought to the public's attention in November of 1960 with the release of the CBS Reports program, *Harvest of Shame*. Newspapers and magazine articles, documentaries, and news programs have continued to show the conditions under which migratory and/or undocumented workers toil and live, revealing hazards like exposure to pesticides, unsafe procedures in processing facilities, lack of access to health care, inadequate housing, and poverty.

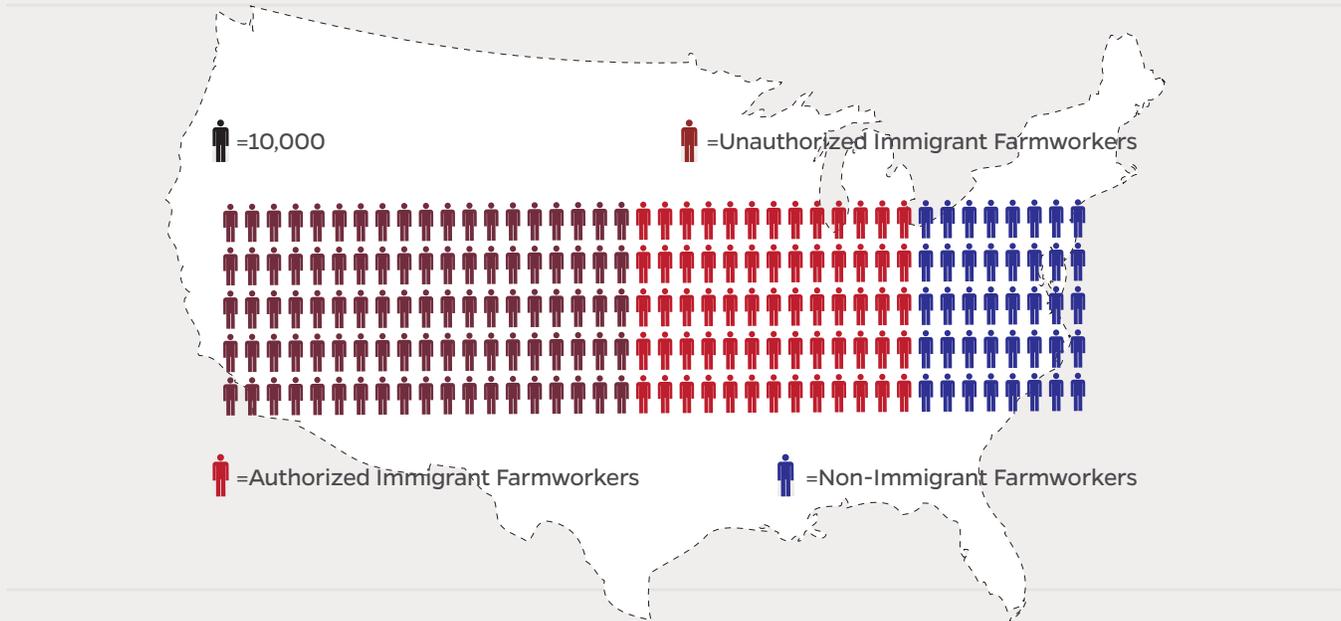
In recent years, there has also been increasing recognition that the industrial produce and animal production and processing systems in the U.S. would collapse without the immigrant and migratory workforce. Former Secretary of Agriculture Tom Vilsack said at the Agriculture Outlook conference in 2013, "Agriculture relies to a great extent on immigrant labor, and everybody in this

*In this paper, we use the terms "farmworker" and "agricultural worker" synonymously to describe people hired to work in crop and/or food animal production.

room understands and appreciates that a good deal of that labor isn't necessarily in this country legally. And that has been the case for a long time...this is a risk to agriculture, and we are beginning to see the implications of that risk."³ Agriculture industry representatives also recognize the fragility of a food system that relies on migratory labor and undocumented workers who may be here under temporary and/or unsafe circumstances; National Chicken Council President Mike Brown was quoted as saying, "We are manufacturers, wanting a stable and permanent workforce that can help sustain the rural communities where we do business."⁴

The obstacles and inefficiencies of the immigration system, which effectively prohibit many workers in the U.S. from obtaining legal work authorization and an eventual path to citizenship, contribute to agricultural and meat processing workers' increased health risks and lack of representation. In turn, these health risks and barriers to advocating for improved working conditions jeopardize the resiliency of the food system by maintaining an unstable and vulnerable workforce, which may threaten the supply and safety of food. A reformed immigration system must acknowledge immigrant workers' vital role in the U.S. food system, prioritize occupational health and safety, and enable agricultural and meat processing workers to demand fair and safe working conditions. This paper presents the public health threats facing U.S. agricultural and meat processing workers and their families, and ultimately the general U.S. population, due to the inherent risks associated with the predominant industrial model's production protocols and system structure. It also provides a review of the health effects associated with low wages, poor housing conditions, and other challenges typically facing agricultural and meat processing workers, and concludes with recommendations for the reform of immigration policies from a public health perspective.

FARMWORKERS IN THE U.S.



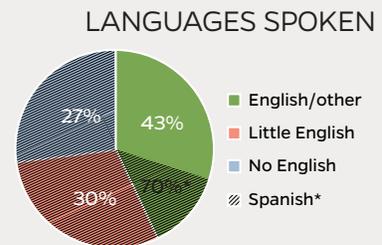
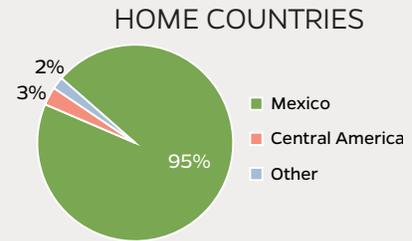
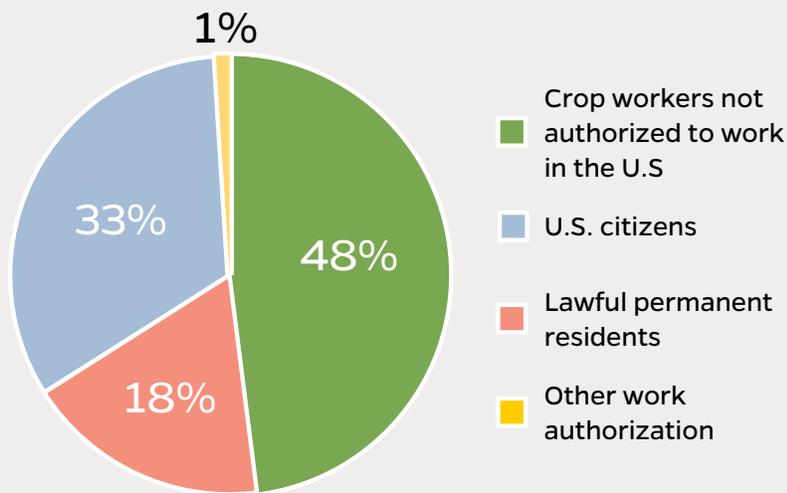
BACKGROUND ON U.S.

Background on U.S. Farmworkers

The most comprehensive information about the current U.S. crop worker population is generated by the National Agricultural Workers Survey (NAWS)—a nationwide, random sample survey administered by the U.S. Department of Labor that collects demographic, employment, and health information from hired workers currently employed in crop and crop-related work.⁵ The NAWS includes workers in pre-harvest, harvest, and post-harvest phases of crop production and also surveys supervisors and those operating machinery

and packing crops.⁵ Importantly, the NAWS does not capture crop workers with an H-2A visa (a temporary-employment visa for foreign agricultural workers) or workers in animal production and processing. While there are several limiting factors in collecting and verifying accurate, representative data on this population, the NAWS is conducted nationwide and surveys employees—on farms and in orchards, greenhouses, and nurseries—regardless of immigration status.

CROP WORKERS IN THE U.S.



Employer consent must be obtained before employees can be located and surveyed, potentially limiting surveyors' access to employees in the worst working conditions.

FARMWORKERS

The most recent NAWS was conducted in 2011-2012 and surveyed 3,025 workers.⁶ Farmworker Justice analyzed the survey's data:⁷

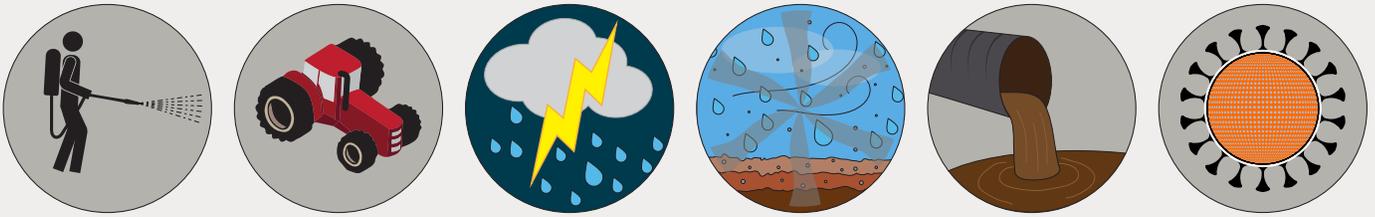
- 48% of crop workers are not authorized to work in the US, although this estimate is probably low (many estimate that 70% or more of the workforce lacks citizenship and work authorization)^{1,8}
- 33% are U.S. citizens, 18% are lawful permanent residents, and 1% have other work authorization
- 71% are immigrants
- Of these crop workers, 95% are from Mexico, 3% from Central America, and 2% from other countries
- Spanish is the most dominant language for 70% of all crop workers
- 57% speak little (30%) or no (27%) English
- 72% are male
- 35% have been working in agriculture for more than 15 years, an additional 20% for 11-15 years
- 58% are married
- 65% of undocumented crop workers are parents, and 49% live in a household with children under 18
- The average total income is between \$15,000-17,499 (including income that some crop workers earn from jobs outside of agriculture), and the average family's total income from crop workers is \$17,500-19,999
- 25% have a family income below the federal poverty line (does not account for dependents living outside the U.S.)

Youth constitute an important minority of agricultural workers. Minors of at least 16 years of age can perform any agricultural job, including those that require hazardous tasks (e.g., operating a tractor or a feed grinder), while minors of at least 12 years of age can be employed outside of school hours.⁹ In some cases, children as young as 10 years of age can hand-harvest crops with parental consent.⁹ The U.S. General Accounting Office* estimated that between 169,000-200,000 youths in the U.S. work in migrant agricultural jobs—those which require a worker to travel so that the worker is unable to return to his/her permanent residence in the same day—though others estimate that the actual number, including undocumented youth, might be as high as 500,000.^{10,11}

While the NAWS provides the best available data on U.S. crop worker demographics, there are limitations. As Don Villarejo writes in a 2012 report, there is limited reliable health information on hired farmworkers because most are foreign-born, which presents linguistic and cultural obstacles to survey research.¹² Additional barriers include the migrant status of many workers, high annual turnover in the farm labor force, and employees' and employers' concerns regarding immigration status.¹² Notably, NAWS field interviewers must obtain permission from agricultural employers before interviewing workers, so interviews are likely not conducted with those working in the worst conditions.

The majority of the information that follows does not segment workers by nationality or legal status, but rather presents the potential and observed direct health impacts of different types of agricultural work and exposures. See *Barriers to Awareness and Improvement* (page 25) for a discussion of the additional disparities and obstacles to health care and representation facing immigrant and/or undocumented workers.

* The U.S. General Accounting Office was renamed the U.S. Government Accountability Office in 2007.



HEALTHY IMPACTS OF

Health Impacts of Working in Industrial Food Production

This section presents evidence on the health risks and impacts associated with employment in industrial food production settings, such as fruit and vegetable fields and food animal operations.

Pesticide Exposure

Pesticides—including herbicides, insecticides, and fungicides—are substances that are used to prevent or destroy organisms that are harmful to crops. In 2008, herbicides accounted for 76% of pounds of pesticides applied by U.S. farmers, while fungicides accounted for 7% and insecticides accounted for 6%.¹³

Acute and chronic pesticide exposure has been associated with various health hazards, including respiratory and skin conditions and the development of certain cancers, neurologic and reproductive disorders, and cardiac, liver, and kidney conditions.¹⁴⁻²¹ Epidemiological studies have found associations between pesticide exposure and multiple forms of cancer, including non-Hodgkin lymphoma, lung, prostate, breast, brain, colorectal, testicular, pancreatic, esophageal, stomach, and skin cancers.²²⁻²⁴ Several childhood cancers have also been associated with both environmental and parental occupational exposure (during and after pregnancy) to pesticides.²⁵ Additional health effects from chronic exposures to pesticides include Alzheimer and Parkinson's diseases, multiple sclerosis, aging, and cardiovascular and kidney disease.²⁶ Other recent studies show a link between pesticide exposure and chronic health effects such as obesity and diabetes,²⁷ hearing loss,²⁸



and non-malignant respiratory diseases.²⁹ Exposure has been linked to higher rates of infertility and miscarriage, birth defects, and adverse effects on development, including poor cognition and behavioral and motor outcomes.^{26,30}

Despite recent reductions in overall pesticide use and changes in the types of pesticides used,¹³ U.S. crop production is still largely dependent on pesticides. Organic products—produced without the use of pesticides—only account for about 4% of total U.S. food sales (including animal products and beverages), and the U.S. Environmental Protection Agency’s (EPA) latest estimate of total annual U.S. pesticide use was 1.1 billion pounds.^{31,32} The EPA also estimates that there are between 1,800 and 3,000 preventable pesticide poisonings of workers every year and acknowledges that this is likely an underestimation due to widespread underreporting.³³

Underreporting of pesticide exposure and illness can result from crop workers not seeking healthcare or consulting healthcare providers outside the jurisdiction of surveillance programs (or outside of the U.S.), the misdiagnosis of pesticide poisoning by healthcare providers, or providers’ neglect of legal requirements to report cases of pesticide-related illness to the appropriate surveillance programs and health officers.^{14,34} Perhaps the most important barrier to quantification is that low-level exposures can take decades to manifest as illnesses; when they do, it can be almost impossible to definitively trace illnesses back to pesticide exposures.

Despite these barriers to accurately estimating pesticide exposure, crop workers are considered to be at risk for pesticide-related illness.¹⁴ NAWS data illustrate factors that may further increase immigrant crop workers’ risk of pesticide exposure and related illness, such as language barriers that may inhibit workers’ ability to understand educational materials and trainings on safe pesticide use.¹⁴ The pace of migration to other farms and a lack of adequate training on pesticide use in each setting may further contribute to crop workers’ risk of unsafe pesticide exposure.¹⁴ Poverty, a lack of access to health care, and a fear among undocumented workers of seeking health-care—due to employer retaliation or risk of deportation—are broader factors that also contribute to the underreporting of pesticide-related illness.¹⁴ A lack of strong worker protections and workplace power may further discourage workers from raising health and safety concerns, refusing unsafe conditions and hazardous roles, or requesting personal protective equipment, potentially contributing to an increased risk of pesticide-related illness.

The Pesticide Illness Surveillance Program (PISP) of the California Department of Pesticide Regulation provides a snapshot of the incidence and causes of pesticide-related illnesses among crop workers in California, although it likely underestimates the actual number of cases for reasons previously discussed. According to PISP data, agricultural use of pesticides was the source of exposure in 239 of the 1,067 reported cases in 2011, and 137 fieldworkers were injured as a result of pesticide exposure in California.³⁵

The California Department of Health Services' surveillance program found that over a 2-year period (1998-1999), 54% of the 1,156 cases of occupational pesticide-related illnesses in California were attributed to the agriculture industry.¹⁴ Among farmworkers, 20% of pesticide illnesses were caused by cholinesterase-inhibiting pesticides (organophosphates and N-methyl carbamates), 14% by inorganic compounds, 8% by pyrethroids, and 5% by organochlorines.¹⁴ "Routine activity"—working in the fields, without mixing or loading pesticides—was listed as the cause for 64% of the cases of pesticide-related illness, and the application of pesticides was responsible for 24% of cases.¹⁴ Illnesses most commonly involved the dermatologic system (44%), the ocular system (33%), the nervous system (39%), the gastrointestinal system (38%), and the respiratory system (24%).¹⁴

An analysis using data from the California Department of Pesticide Regulation and the Centers for Disease Control and Prevention's (CDC) Sentinel Event Notification System for Occupational Risks (SENSOR) national pesticide database program offers an estimate of the percentage of acute pesticide poisoning cases in California that are attributed to agricultural work.³⁴ This analysis found that over the 17-year period, 2,334 (71%) cases of the 3,271 total cases of acute pesticide poisoning in California were people employed as farmworkers, and the remaining cases were miscellaneous agricultural workers, food processing workers, and farmers.³⁴ This study also found that the rate of acute pesticide poisoning was almost twice as high for female agricultural workers than for male workers.³⁴

In 2015, the EPA published revisions to their Worker Protection Standards³³ to strengthen protections for farmworkers at risk of exposure to pesticides. These revisions, effective January 2, 2017, require annual training for farmworkers on the required protections afforded to them, prohibit anyone under 18 from handling pesticides, and prevent employers from retaliating against employees who report violations, among other measures.

For a discussion of pesticide exposures among children and families of farmworkers, see *Health Impacts Extended to Families and Communities of Farmworkers* (page 20).

Injuries



Production agriculture involves labor, the use of machinery, and exposure to other hazards that can place workers at risk of musculoskeletal damage, injury, and even death. In 2013, the agriculture, forestry, fishing and hunting sector reported the highest fatality rate of any industry sector at 22.2 per 100,000 full time employees.³⁶ The CDC's National Institute for Occupational Safety and Health (NIOSH) provides the most current and comprehensive U.S. agricultural safety statistics³⁷:

- In 2012, 374 farmers and agricultural workers died from a work-related injury (tractor overturns were the leading cause of death)
- On average, 113 persons less than 20 years of age die annually from farm-related injuries
- Every day, 167 agricultural workers are injured to the extent that they become at least temporarily unable to work (5% of these injuries result in permanent impairment)
- In 2012, 14,000 youth were injured on farms (2,700 of these were due to farm work)

The major contributing factors in agricultural injury in animal production and processing include machinery, animals, and falls.³⁸ Aquaculture—involving the rearing of aquatic animals for food—workers in the U.S., including inland, near-, and offshore workers, also suffer elevated rates of non-fatal injuries and face risks of musculoskeletal injuries, needle-stick injuries, diving risks (including decompression illness and drowning), extreme temperatures, and falls from boats and cages.^{39,40,*}

In a survey of youth agricultural workers in North Carolina, only 40% reported they were regularly made aware of dangerous work practices or conditions, 40% reported receiving instructions on safety when hired, 32% reported that proper safety equipment was always available, and 23% believed the possibility of being injured at work in the next year was very likely.⁴¹

* Importantly, offshore aquaculture operations may be exempt from Occupational Safety and Health Administration (OSHA) inspections and safety regulations depending on the size and location of the vessel and the number of employees.³⁹ As OSHA has not focused on occupational safety issues offshore (partly because the U.S. offshore aquaculture industry is nascent),³⁹ even aquaculture operations that are not exempt may not yet be adequately inspected or regulated by the administration. See *Policy Recommendations for Reform* (page 29) for further discussion of OSHA limitations.

Language barriers may play a significant role in the delivery and receipt of safety information, as employers may believe they are providing adequate instructions but the information may not be sufficiently available or comprehensible to employees.

There is evidence that injury and illness rates may be underestimated or incorrectly communicated to the public. A recent study attempted to quantify the U.S. government's underestimation of job-related injuries and illnesses in agriculture and calculated that as many as 77% of agricultural worker injuries—74% in crop production and 82% in animal production—may have been missed.⁴² Potential underestimation may stem from the data collection methods used by the U.S. government's source for workplace injuries and illnesses, the Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses (SOII). Notably, the SOII does not include workers on small farms (with fewer than 11 non-family employees) or self-employed farmers and acknowledges an underestimation of the number of total agricultural workers given the nature of agricultural work.⁴² Extending SOII injury and illness rates to self-employed farmers and workers on farms with fewer than 11 employees, and adjusting for underreporting due to willfulness and negligence, the study estimates that there were a total of 143,436 cases of injury and illness among agricultural workers in 2011.⁴²

Physical and Biological Hazards

In addition to injuries from equipment, workers can suffer from extreme heat, cold, and other environmental factors. Between 1992 and 2006, there were a total of 68 reported deaths of crop workers from heat stress.⁴³ As crop workers are typically performing strenuous labor outdoors with limited breaks and access to potable water, they have a high incidence of heat stroke, heat exhaustion, and heat cramps.⁴⁴ Agricultural workers are 4 times more likely than non-agricultural workers to experience heat-related illness.⁴⁴

While there are few data on incidences of injuries or illnesses among agricultural workers related to other biological exposures, NIOSH recognizes lightning, noise, ultraviolet radiation, poisonous plants, venomous wildlife and insects, and mosquito- and tick-borne diseases as additional hazards facing workers in production agriculture.⁴⁵

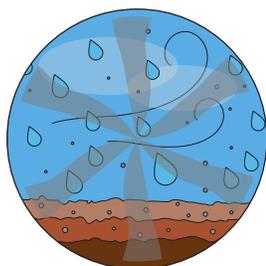
Typical farm work activities—such as stooping/bending, driving farm equipment, kneeling, crawling, and performing repetitive motions—may also con-



tribute to chronic musculoskeletal problems, which develop from repeated exposure to a stressor.⁴⁶ A 2014 study of the association between agricultural work and chronic pain among Latino agricultural workers in California found that chronic musculoskeletal pain is prevalent among agricultural workers and is influenced by work positions.⁴⁷ Workers have most commonly reported back, knee, foot, and hand pain⁴⁸; in one study, workers' 12-month period prevalence of musculoskeletal pain was 37.5% for low back pain, and around 25% for shoulder, knee, and neck pain.⁴⁹

Sanitation measures and access to potable water in work settings are important public health measures, as they contribute to individual workers' health and limit the spread of illness to the larger community. These measures have notably improved since the Occupational Safety and Health Administration (OSHA) began prioritizing field sanitation enforcement and education in the mid-1990's.¹² Still, some workers report lacking sanitation facilities. In the 2005-2006 NAWS interviews (which have known limitations), 91% reported that drinking water was provided every day, 95% said their employer provided a field toilet every day, and 96% said hand washing facilities were provided every day.¹² These rates indicate improvement from the 1999 NAWS survey results and demonstrate that it is possible to improve conditions with pressure from OSHA,¹² though they still merit continued and increased enforcement of regulations to ensure that all workers have adequate access to sanitation and clean drinking water.

Air Quality



Agricultural and meat processing workers in both crop and animal production are routinely exposed to air that is polluted with particulate matter, volatile organic compounds, harmful bacteria, toxins, odorous compounds, and other potential health hazards.⁵⁰ The level and duration of exposure varies by occupation and location—for example, workers in industrial dairy operations would face different risks related to air quality than those in almond orchards.^{51,52} Unique air quality factors in each setting, coupled with the fast pace of migration to different agricultural jobs and the likelihood that workers are exposed to multiple agents, make it difficult to characterize individual workers' cumulative risk of health problems related to poor air quality.

Field workers can be exposed to natural (i.e., dust, soil, clay, sand) and synthetic (i.e., certain fertilizers) agents that become airborne as inhalable particulate matter. As the application of untreated animal waste to fields has

been shown to result in the presence of enteric pathogens in fields,⁵³ field workers are also presumably exposed to pathogens through contact with fields where waste has been applied as fertilizer. *Salmonella* introduced by contaminated poultry or cow manure has been shown to survive in soil for up to 230 days,⁵⁴ potentially placing field workers at risk of contracting infections long after manure application. In California, where 50% of U.S. fruit, vegetable, and nut production occurs,⁵¹ studies have shown that workers have decreased respiratory function and increased respiratory symptoms, such as chronic cough, wheeze, and increased mortality rates from chronic pulmonary disease.⁵⁵⁻⁵⁸ Agricultural workers have also been found to be at increased risk of developing organic dust toxic syndrome (a febrile illness following inhalation exposure to dust), exacerbation or onset of asthma-like symptoms, and pneumoconiosis (black lung disease).⁵⁹⁻⁶²

Workers in animal production are exposed to various airborne pollutants while working in and around animal housing structures, including elevated concentrations of particulate matter, endotoxins, pathogens, pharmaceuticals, gases, and other health hazards.^{60,62,63} Exposure to endotoxins and particulate matter is associated with various respiratory symptoms, including decreased respiratory function, chronic bronchitis, asthma-like symptoms, and chest tightness.⁶⁴⁻⁶⁶ Harmful bacteria—such as *Campylobacter* and *Staphylococcus aureus* and antibiotic- and multi-drug resistant bacteria—can contaminate both the air inside of animal houses and the surrounding environment via ventilation systems.^{63,67-69}

In a study among workers in broiler chicken operations on the Delmarva Peninsula, workers were found to have 32 times the odds of carrying gentamicin-resistant *E. coli* compared with other residents in the community.⁷⁰ In North Carolina, swine operation workers were found to carry livestock-associated, multidrug-resistant and methicillin-resistant *Staphylococcus aureus* (MRSA) in their noses over a 14-day period and after up to 96 hours away from work.⁷¹ A carrier, despite having no noticeable signs or symptoms of infection, is capable of transmitting a pathogen to others. This can result in pathogen transmission since the carrier will not engage in any special precautionary measures to prevent the spread of infection without its detection.⁷² Additionally, antimicrobials have been detected in dust samples from swine operations,⁷³ suggesting that workers may inhale antimicrobials and other drugs used in animal production while on or near farms.⁷³ Volatile organic compounds (VOCs) and gases such as hydrogen sulfide and ammonia, which are released from the decomposition of manure and other materials typi-

cally present in animal operations, have also been associated with various adverse health outcomes including respiratory problems, neuropsychological symptoms, headache, and nasal, throat, and eye irritation.⁷⁴⁻⁷⁶ A 2010 U.S. Department of Agriculture (USDA) study measured volatile organic compounds (VOCs) inside industrial broiler chicken operations and found that VOCs included acetic acid, 2,3-butanedione, methanol, acetone, and ethanol⁷⁷; these compounds are associated with eye, skin, nose, throat, and dental irritation, dizziness, nausea, and other health problems.⁷⁸⁻⁸¹ Odors originating from these substances are associated with similar health effects and have been shown to interfere more broadly with daily activities, quality of life, social gatherings, and community cohesion.^{50,82,83}

Animal Waste



Animal waste naturally contains nutrients and bacteria and can also contain drug residues, heavy metals, and antibiotic-resistant bacteria that are associated with adverse human health outcomes.⁸⁴⁻⁸⁷ Although crop workers can be at risk for these effects through contact with animal waste that is spread on fields, most research focuses on workers in animal production operations who are routinely near or in contact with manure.

Animal waste disposal has changed dramatically with the industrialization of food systems and the concentration and confinement of food animals. With an estimated 314 million metric tons of animal waste generated on U.S. farms each year⁶³ and the concentration of animals to geographic areas too small for the land to naturally absorb wastes,⁸⁵ many animal production operations, particularly large swine and dairy operations, now rely on water-based slurry systems that flush manure from the floors of animal houses into large storage ponds (often called lagoons).⁸⁵ Workers in animal production facilities can experience health effects from inhaling airborne waste particles in or around animal houses (as discussed above), or through direct contact when removing waste from animal houses or transporting or spreading manure.^{63,88} Bacterial decomposition of manure results in the production of gases (e.g., hydrogen sulfide, ammonia, carbon dioxide, and methane) that, when confined under manure storage pits or in outdoor storage ponds, can reach acute toxicity levels that are considered “immediately dangerous to life and health” and constitute an occupational health risk.⁸⁹

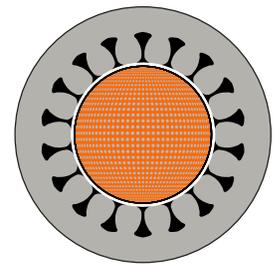
Manure contains a host of potentially harmful bacteria and substances, regardless of the animal species. Several types of bacteria commonly found

in manure—including *Salmonella* spp., *Campylobacter* spp., *Listeria monocytogenes*, and *E. coli* O157:H7—have been implicated in disease outbreaks in which the pathogen was thought to have originated from animal operations⁹⁰; these pathogens could place workers in such operations at greater risk of bacteria colonization and associated illness. The use of antimicrobials in animal feed has been found to contribute to the emergence and spread of antibiotic-resistant bacteria; as discussed earlier, studies have shown that workers in animal production have a greater risk of contracting antimicrobial-resistant infections than the general U.S. population.^{70,91,92}

Though there are few data on health effects related to workers' exposure to hormones, heavy metals, and other pharmaceuticals present in manure, there are concentrated releases of hormones, heavy metals, and nutrients to the environment where manure is stored and applied.⁸⁸ Presumably, workers who are near or in contact with manure have an increased risk of health effects associated with exposure to harmful nutrients and these compounds, which are added to animal feed for non-therapeutic purposes. Future studies should aim to characterize the risk workers face related to exposure to feed additives through contact with animal wastes.

Generation of Novel Flu Viruses

The generation of novel flu viruses may also be a threat to industrial food animal production workers. In 2008, The Pew Commission on Industrial Farm Animal Production final report cited a serious public health concern with the industrial production model and its role in the generation and spread of novel flu viruses.⁹³ It stated, “the continual cycling of viruses...increases opportunities for the generation of novel viruses through mutation or recombinant events that could result in more efficient human-to-human transmission,” and further noted that agricultural workers are the bridging population between large animal facilities and their communities.⁹³ Further, studies suggest that the presence of concentrated swine feeding operations in a community amplify the transmission of influenza when a novel influenza virus is circulating.^{94,95}





Health Impacts of Working in Animal Processing Plants

Animal processing plants are designed for rapid slaughtering, cleaning, butchering, and packaging of animal products. In assembly-line style, modern processing entails rapid line speed and clear divisions of labor on the processing line.⁹⁶ A 2005 report from the Government Accountability Office found that the largest proportion of workers in the meat and poultry industry are young and Hispanic.⁹⁷ A 2016 update to the report found that 28.7 percent of meat and poultry workers are foreign-born noncitizens.⁹⁸ The report highlights the unsafe conditions often found in processing plants, involving loud noise, sharp tools, exposure to chemicals, fast-paced, repetitive, and forceful tasks, and hazardous machinery. It describes typical tasks and conditions, such as standing for long periods of time while using knives and hooks to slaughter and butcher meat on fast-moving production lines, and using strong chemicals and hot pressurized water to clean areas of the plants.⁹⁷ According to the report, the most common injuries in processing plants are cuts, strains, cumulative trauma, and injuries sustained from falls; it also acknowledges that more serious injuries, like fractures and amputation, also occur.⁹⁷

Worker injuries and illnesses in processing plants can result from the physical demands and repetitive nature of tasks, worker contact with animal wastes and other organic substances on the processing line, a damp climate inside the processing plants, and the use of sharp equipment.⁹⁹ Data from the Bureau of Labor Statistics show that the combined rate of illnesses and injuries among workers in animal production was nearly double the national average in 2013,¹⁰⁰ and the rate of illnesses for workers in animal processing

alone was almost 9 times the national average.¹⁰¹ Given the potential language barriers and fear of job loss or deportation,¹⁰² the reported rates of illnesses and injuries in the poultry industry—the largest and fastest growing sector of the U.S. meat products industry, in pounds produced and number of workers—are thought to be gross underestimations of actual rates, with as many as two-thirds of injuries never reported.¹⁰³

A survey of poultry processing workers in Alabama found that 17% of workers in secondary processing (which involves de-boning, cutting, and trimming) have suffered serious cuts that required medical attention.¹⁰⁴ The Assistant Secretary of Labor for OSHA has stated, “musculoskeletal injuries caused by these hazards in poultry plants are too common.”¹⁰⁵ OSHA recently fined a poultry processing facility in Ohio \$861,500 after it found amputation hazards, a lack of personal protective equipment, violations of electrical safety standards, wet work surfaces, and other hazards.¹⁰⁶ In August 2016, OSHA also fined Tyson Foods \$263,500 month for violations after an amputation investigation exposed chemical, fire, and fall hazards, with a total of 15 serious and 2 repeated violations at a chicken processing facility in Texas.¹⁰⁷ OSHA also recently cited Pilgrim’s Pride—one of the largest U.S. poultry companies—for routinely delaying medical care to its injured employees, marking the first citation of this kind.¹⁰⁸ OSHA officials have called on poultry plant operating companies to address the combination of musculoskeletal disorder hazards, lack of proper medical treatment for musculoskeletal disorders and other serious injuries, and underreporting of injuries at other plants,¹⁰⁵ highlighting the recurrence of worker safety issues in processing facilities.

It is believed that there is high worker exploitation in the poultry industry—and perhaps in the rest of the meat industry—due to the high Latino and foreign-born composition of the processing workforce.¹⁰⁹ In the 1980’s and 1990’s, poultry processing plants concentrated in rural areas in the Southeast and Midwest to reduce labor costs,¹¹⁰ spurring the migration of large populations of workers to these areas. Particularly in the rural Southeast, there is limited unionization, a lack of social services in place for the protection of workers’ rights, and few employment alternatives.^{102,111} The percentage of poultry processing workers that were represented by a union fell from 46% to 21% during the 1980’s alone, and remains low today.¹⁰⁴

While there may be inherent risk involved in meat and poultry processing, the current predominant industrial food system may place workers at an unnecessarily high risk of injury and illness. The rapid speed of production lines, which can process tens of thousands of animals daily, has been reported to

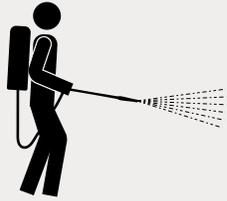
increase workers' risk of cuts and lacerations.¹⁰⁴ Workers frequently experience bacterial infections of these cuts and lacerations (from *Staphylococci*, *Streptococci*, *Mycobacterium* spp., *Campylobacter*, and *Bacillus anthracis*, among others), and the presence of antibiotic-resistant bacteria on industrially produced animals, coupled with the high prevalence of open skin wounds on workers, may result in an increase in workers' risk of developing a resistant infection and associated illness.^{92,112-114}

In 2007, another risk of working in processing plants was discovered when 10 workers in a Minnesota swine processing facility experienced chronic numbness, tingling, and limb weakness after working the "head-table," where skin, skeletal muscle, and brain matter were removed from severed swine heads using compressed air, which aerosolizes the matter.¹¹⁵ The brain matter is typically exported to countries where there is a higher culinary demand for it. The CDC investigated and determined that these workers had developed sensory predominant, immune-mediated polyradiculoneuropathy (IP)¹¹⁵—in this case, an autoimmune reaction after exposure to aerosolized brain matter, possibly because of the similarities between the nervous tissues of swine and humans.¹¹⁶ While the process of cleaning swine heads with compressed air has discontinued, these cases demonstrate the potential for unanticipated occupational dangers in animal processing facilities.



Social and Mental Health Impacts of Agricultural Work

Low income, limited education, lack of medical care, poor working conditions, substandard housing, and frequent migration may contribute to high rates of economic pressure, acculturative stress, psychological distress, substance abuse, depression and suicide among agricultural workers.^{117,118} Studies have found prevalence rates of food insecurity—an indicator of economic hardship—as high as 82% among migrant and seasonal workers' households.^{119,120} Food insecurity among children has been found to have psychological consequences, including depression, anxiety, hyperactivity, and inattention.¹²¹ The prevalence of depressive symptoms is also generally higher among farmworkers, with 40% of farmworkers in North Carolina and the upper Midwest and 38% of Mexican-American farmworkers in the Ohio/Michigan area reporting clinically significant levels of depressive symptoms.^{122,123} Mexican-American farmworkers in the mid-west were also found to have a higher risk for depression than the general population.¹¹⁷ Separation from family is common among migrant and/or undocumented workers, which may further increase the risk for depression. Studies suggest that women in farmworker families are also at increased risk for depression, which may put their children's mental health at risk.^{121,124}



Health Impacts Extended to Families and Communities of Farmworkers

The adverse health effects and risks associated with working in U.S. food production and processing systems may follow workers to their homes and communities. The majority of undocumented farmworkers are married and have children (though their family members may not live with them or in the U.S.), and 49% live in households with children under the age of 18.⁷ Moreover, the majority of migrant, seasonal, and immigrant farmworkers stay or live immediately within agricultural areas, either in on-farm dwellings or labor camps, or in private market single-family houses or apartments.¹²

While the risk of workplace injury may not transfer to the families or peers of agricultural and meat processing workers, these populations may face other health hazards related to the agriculture industry, including pesticide exposure, poor air quality, contaminated water, and increased pathogen presence.

Children living in agricultural communities are especially susceptible to pesticide exposure and have an increased risk of exposure to environmental contaminants, as compared to adults, due to their physiology and behavior (e.g. crawling and putting objects in the mouth).¹²⁵⁻¹²⁷ Multiple studies, conducted across various U.S. agricultural regions, have detected pesticide metabolites in the urine of children of farmworker households.¹²⁶⁻¹³⁰ Exposure to organophosphorus pesticides—detected in the urine of pregnant women and children living in agricultural communities¹³⁰—has been associated with decreased mental development and attention deficits.^{131,132} A 2012 study found an inverse association between birth weight and the number

of pesticides detected in cord blood, leading to calls for more research on the effects of exposure to mixtures of multiple pesticides in addition to individual pesticides.¹³³

Residents of agricultural areas may also be exposed to air and water contaminated by agricultural inputs and wastes. Just as workers may be exposed to particulate matter, gases, VOCs, pathogens, and pesticides via air, people living near farms and/or animal production operations are also exposed to agricultural air pollution and may experience health impacts similar to those observed among workers.^{62,134-136} Odor from animal production operations has been found to induce eye, nose, and throat irritation, trigger nausea, vomiting, headaches, stress, and negative mood, and disrupt nearby residents' daily activities.¹³⁶ Often, animal production is concentrated in rural, low-income areas; swine feeding operations, for example, are located disproportionately in low-income communities of color,¹³⁷ and researchers have predicted that a fear of reprisals—in areas where employment options are limited—may discourage residents from reporting malodor or related health concerns to their representative officials.¹³⁸ Harmful nutrients, drug residues, pathogens, and other contaminants from crop fields and animal operations can run off into surface water or leach into groundwater,¹³⁹ putting those who rely on those water sources at risk. Environmental inequities have been observed in drinking water quality, with higher nitrate levels found in community water systems that serve areas in which a larger percentage of the population is Latino and homeownership rates are lower.¹⁴⁰ Residents of agricultural areas and workers presumably face a similar level of risk associated with water contamination by manure and agricultural wastes, since exposure to contaminated drinking and/or recreational water often happens near the farm, though workers may face less or varying exposure depending on whether they live near the farm and if they are traveling from farm to farm.

Families and nearby residents of agricultural workers may also face a greater risk of contracting an antimicrobial-resistant infection, as workers in animal production have been found to have a greater risk of carrying antimicrobial-resistant bacteria than the general population,⁷⁰ and studies have suggested that workers may transport resistant bacteria out of the workplace to their families and communities.^{70,141}

There has been a documented shift in farm labor housing in recent years, with fewer employers offering on-farm housing or labor camps and more workers seeking private market housing, which is not subject to federal regulation.¹² Poor housing conditions in agricultural areas may place children and families

of farmworkers at increased risk of certain health problems, and the housing environments in which people live early in life may have long-term negative health effects.¹⁴² Many farmworker households are located near agricultural fields, and pesticide drift and residues have been documented in these homes; since children live in the majority of these households, they are thought to be at risk of pesticide-related illness and developmental disorders.^{127,130} Crowded living conditions have also been found to increase residents' exposure to environmental toxicants and communicable disease.¹⁴³

The California Agricultural Workers Health Study found that overcrowding is common in farm labor housing and that extremely overcrowded conditions are prevalent when multiple families share an apartment or house (41% of male participants and 31% of female participants in the survey reported sharing housing with unrelated persons).¹⁴⁴ While the majority of participants reported renting, 11% lived in informal dwellings—a place of residence not recognized by the U.S. Postal Service or county tax assessors—including mobile homes, garages, sheds, abandoned equipment or animal facilities, or cars.¹⁴⁵ As the authors of a review of housing characteristics of farmworker families in North Carolina concluded, “Farmworker housing is generally characterized as crowded, in disrepair, lacking basic facilities (e.g., indoor plumbing) and appliances (e.g., washing machines, fully functioning stovetops), located near fields in which pesticides are applied, and costly.”¹⁴⁵

Sanitation issues have been documented in both employer-provided and private housing. In many cases, there are no laundry facilities, ventilation is poor, and plumbing is inadequate or nonexistent.⁴⁴ This means that contaminated clothing worn at work may be washed in the same sink or basin in which food is prepared, or in the bathtub where children are bathed.⁴⁴ And when agricultural workers cannot find or afford housing, they may resort to sleeping outdoors or in tents or cars.⁴⁴ These private housing situations may be hidden from public view or government officials, so it is difficult to assess the sanitation risks facing workers and their families. Aware of these issues, the Department of Labor announced in July 2016 that it would provide \$81 million in grants through the National Farmworker Jobs Program to assist migrant and seasonal farmworkers with training, employment, and housing.¹⁴⁶

Poor worker health and hygiene are frequently linked to foodborne outbreaks, as reflected in food safety policy and discussions. But worker health and hygiene are also subject to social determinants of health and influenced by workers' limited economic resources, which may lead to increased vulnerability to disease.¹⁴⁷ Recent research has called for a shift in the food safety

narrative to address the broader social and structural factors influencing worker health and hygiene.¹⁴⁷ Efforts to address food safety through improved worker health must not only focus on increasing workers' education of health and hygiene practices, but must also confront the socioeconomic factors and poor and unsafe working and housing conditions that may lead to food safety concerns in the workplace.

Poor working and living conditions for undocumented, immigrant agricultural workers have been found to cross the line into slavery and human trafficking. Investigations by the Coalition of Immokalee Workers (CIW) have found workers in conditions that meet the definition of slavery under federal law; workers have reportedly been forced to live in box trucks, have been found with their arms chained, and have shown signs of physical abuse.¹⁴⁸ The Civil Rights Division of the U.S. Department of Justice has invoked the Victims of Trafficking and Violence Protection Act to prosecute employers for recruiting, harboring, transporting, or obtaining a worker for labor through the use of force, fraud, or coercion.¹⁴⁸ While not all poor working and living conditions constitute a violation of human rights, it is important to recognize the occurrence of such violations in the U.S. and to employ the necessary preventive and judicial measures to protect workers' rights and safety.

U.S. citizens, legal permanent residents, foreign nationals with temporary work visas and undocumented immigrants are all vulnerable to labor trafficking in the agricultural sector,^{149,150} but a report prepared for the National Institute of Justice found that a worker's lack of legal status has been identified as the strongest and most consistent predictor of experiencing trafficking and other violations.¹⁵¹ Labor exploitation and abuse, while a frequent and significant problem for agricultural and meat processing workers, does not always represent a case of human trafficking.¹⁵² It is only when employers exert control over workers through coercion, fraud, and force—convincing workers that they are bound to their situation without means of escape or the ability to choose other options—that human trafficking is established.^{149,152} Agricultural workers are particularly vulnerable to labor trafficking and exploitation due to the isolated conditions of agricultural work, and the exclusion of migrant and seasonal workers from labor laws.^{149,150,152} In addition, the seasonality and temporary nature of farm labor results in a high turnover of workers, leading agricultural workers to frequently move between jobs and thereby increasing their exposure to traffickers.¹⁴⁹ Isolated, temporary labor situations also prevent agricultural workers from assimilating into local communities, limiting their access to social services and support networks, and their understanding of local laws and labor rights.¹⁵²

Some of the coercive tactics used in human trafficking include threatening the victim and their family members with harm, trapping victims through debt bondage, and confiscation of passports and visas.¹⁴⁹ Employers may also purposely deceive workers and lie about the conditions of the work and their intentions. They may also redefine the terms of contracts, withhold wages, and charge extortionate recruitment fees for what turns out to be low wage or unpaid work.^{149,150} Employers often exert control over victims by prohibiting the movement of farmworkers and their communication with the outside world, which is very effective given the isolated nature of rural farm work.^{149,150} In addition, workers who are undocumented or have temporary immigration status are less likely to report abuses and trafficking activities to law enforcement, and less likely to seek out and utilize assistance programs.¹⁵⁰ Physical and/or sexual abuse is also frequently used as a tactic to force workers to comply with the employer demands.¹⁴⁹ One study found that more than 60% of surveyed female farmworkers had experienced sexual harassment.¹⁵³ The New York Times reported that an immigrant farmworker in Iowa told her lawyer, “We thought it was normal in the United States that in order to keep your job, you had to have sex.”¹⁵⁴ Several barriers prevent sexually harassed farmworkers from filing complaints, including a lack of Equal Employment Opportunity Commission offices in rural areas (and limited hours and Spanish-speaking staff in these offices), a requirement by government agencies that complaints must be filed online, and discouragement from the fact that sexual harassment investigations can last for months or years.¹⁵⁴

“The dire situation faced by farmworkers stems from their lack of economic and political power.”

Barriers to Awareness and Improvement

There are additional challenges to adequate representation, healthcare access, and legal protection for immigrant, rural, and/or undocumented agricultural and meat processing worker populations. Testifying before the U.S. Senate in 2008, Mary Bauer of the Southern Poverty Law Center said, “The dire situation faced by farmworkers stems from their lack of economic and political power. Because farmworkers have no measurable political influence, there has been little organized opposition to the efforts of agribusiness interests to deny farmworkers most of the legal protections other American workers take for granted.”¹⁵⁵ Lacking the right to vote, undocumented workers presumably have difficulty finding elected representatives who will advocate for their fair treatment and protection. There are several examples of “agricultural exceptionalism” in the law whereby agricultural labor is not subject to the same regulations as the labor in other industries: farmworkers are not covered by workers’ compensation in many states; farmworkers are typically not entitled to overtime pay under federal law; youth agricultural workers are exempt from the child labor provisions of the Fair Labor Standards Act; and farmworkers are not covered by the National Labor Relations Act, effectively eliminating their rights to collective bargaining.¹⁵⁶⁻¹⁵⁸ Migrant and seasonal

workers, who make up 42% of the farm labor workforce, face these same exclusions from labor laws and regulations.^{149,150,159} Without the ability to collectively bargain, workers have no means of organizing and negotiating for better wages or safer working conditions; employers can continue to provide unlivable wages and poor working conditions without any threat of opposition from their employees. The exclusion of immigrant, migrant and seasonal workers from labor laws increases their susceptibility to the tactics of human trafficking, and even creates the conditions for exploitation to develop. The combination of low wages, requirements for workers to buy food and basic goods at inflated rates, and refusal by the farm to reimburse workers for exorbitant recruitment fees can exacerbate and lead to situations of debt bondage.¹⁵⁰

Immigrant workers can be further marginalized by a lack of work authorization, which may prevent workers, their families, and agricultural communities from seeking improved working conditions and stronger enforcement of health and safety regulations for fear of job loss, retaliatory violence, or deportation.^{14,137,160,161} These unauthorized and undocumented foreign national workers, who have comprised about 50% of the farm labor workforce since 2001,^{150,159,162} have high levels of vulnerability due to their lack of familiarity with local customs and laws, language gaps, and high susceptibility to coercion through threats of deportation.¹⁴⁹ Employers may also threaten authorized foreign workers with deportation in retaliation for reporting or complaining about poor work conditions or human rights violations. Additional threats include adding workers to lists preventing their future hire and job prospects, which is often too great a risk for workers who depend on their employers for housing, food, transportation and more for their entire families, not to mention their visas and legal working status.¹⁵⁰ Additionally, undocumented workers are not able to apply for or receive assistance through certain state and federal programs (e.g., the U.S. Department of Agriculture-Rural Housing Service program, which provides affordable housing to households where at least one household member earns a substantial portion of their income as farm laborers).¹⁶³

Immigrant workers often lack adequate access to health care due to physical, financial, and cultural/linguistic barriers. In one survey, 32% of male farmworkers and 12% of female farmworkers had never been to a doctor or clinic, and 18% of those who had sought medical care had done so in Mexico.⁴⁸ Workers may not seek medical care because of a lack of transportation or health insurance, language barriers, cost of care, clinic hours that con-

flict with working hours, and a fast pace of migration to other locales.⁴⁸ The Affordable Care Act may further exclude certain agricultural and meat processing workers from obtaining health insurance, as temporary and undocumented workers are excluded from the subsidies available to all others.²¹ This limited access to health care may contribute to the underreporting and lack of awareness of work related injuries, illnesses, and conditions of exploitation and abuse.

Guest worker programs have been the focus of much of the debate concerning immigrant workers in agricultural jobs. The H-2A Temporary Agricultural Workers Visa—an example of a guest worker program—allows foreign workers to come to the U.S. if an employer can offer a job that is temporary or seasonal and demonstrate that there are no U.S. workers who are able to take the job.¹⁶⁴ The program is intended to fill agricultural jobs in the U.S. in areas and job settings experiencing labor shortages. It is not supposed to negatively affect the wages or working conditions of similarly employed U.S. workers,¹⁶⁴ but several investigations have found that the program, as implemented, suppresses wages and is rife with human rights violations.^{165,166} Guest workers have faced wage theft and human trafficking, have been bound by employers or labor brokers who seize their documentation, have been forced to live in inadequate and dirty housing, and have been denied medical benefits for work-related injuries.¹⁶⁶ Workers may be recruited in their home countries under false pretenses—including promises of green cards or visa extensions—and may already be in debt for travel, visa, and/or hiring fees by the time they arrive.¹⁶⁶ One fundamental issue with the program is that it restricts guest workers from changing employers once they arrive, forcing some workers to remain in untenable working and living conditions in order to keep their visas.

There are additional challenges to litigating on behalf of agricultural and meat processing workers, particularly migrant workers and those who lack authorization to work. Frequent migration makes it difficult for lawyers to stay in contact with workers, but it also presents challenges for proving causation; as one example, an employer may escape liability for harmful pesticide exposure by demonstrating that a worker was exposed in multiple settings and thus cannot establish that the employer's conduct caused the injury.

The threat of deportation may discourage workers from making and maintaining contact with an attorney, but it also places pressure on the attorney to protect the client from exposure to such risks. Public Justice—a public interest law firm that works on food safety and health, among other issues—main-

tains that some of the major impediments to impact litigation on behalf of agricultural and meat processing workers include 1) the difficulty of bringing class action lawsuits (which require extensive preliminary showings and high degrees of uniformity among the plaintiffs); 2) barriers to suits imposed by employee contracts, such as arbitration clauses, which force suits into expensive quasi-judicial forums that lack procedural protections and can prohibit class actions; and 3) preemption of state laws by federal laws, undermining state law remedies. In addition, worker protection statutes often do not have fee-shifting provisions that require the defendant to pay the plaintiffs' attorneys' fees if the plaintiff wins. This can make it difficult to find attorneys willing to take these cases or result in attorneys demanding a contingency from their clients' recovery, which necessitates a higher value claim.

The U.S. should extend work authorization to immigration and provide a path to citizenship. But until then ...

- ✓ provide health insurance to all agricultural and meat processing workers through the ACA and other programs
- ✓ revise labor laws to require overtime pay and minimum wage for all agricultural workers
- ✓ mandate that employers provide workers' compensation for all agricultural and meat processing workers
- ✓ expand and increase NIOSH and OSHA funding, and extend OSHA coverage to smaller-scale farms
- ✓ establish funding at state level for safe, adequate, subsidized agricultural worker housing programs
- ✓ strengthen enforcement of human trafficking laws in agriculture

Bottom line: There are long-term solutions (path to citizenship) and short-term solutions (revised state and federal laws) that should be put into place to protect the fragile agricultural and meat processing worker populations and the equally fragile U.S. food system.

Policy Recommendations for Reform

The stability of the U.S. food supply is inextricably tied to the stability of an agricultural workforce, yet much of our current workforce is unauthorized to work in the U.S. and is continually threatened with the health consequences of poor working and living conditions. The American Farm Bureau Federation acknowledges that immigration reform is necessary to avoid to worker shortages (which cost American farms more than \$300 million in 2010) and increases in food prices.¹⁶⁷ A recent study found that eliminating immigrant labor would reduce the U.S. dairy herd by 2.1 million cows and would increase the retail price of milk by 90%.¹⁶⁸ The current U.S. food system is dependent on immigrant workers, yet this argument fails to be made in many immigration reform debates.

As the immigration reform debate resurfaces, there are opportunities for public health practitioners to create awareness about the unique health challenges facing undocumented immigrant populations and to advocate for increased representation and protection of these populations through intermediary policy changes and, eventually, immigration reform. A path to citizenship is necessary in the long run to ensure a stable workforce and protect both the health of agricultural and meat processing workers and the stability of the U.S. food system.

Comprehensive immigration reform should extend work authorization to immigrants currently working in food production and processing and provide a path to citizenship. In 2013, the Senate passed a bill that would allow undoc-

umented immigrants to apply for lawful permanent residence via a Registered Provisional Immigrant (RPI) program.¹⁶⁹ The bill also contains a special program for farmworkers, in which undocumented workers who have performed 575 hours or 100 days of work during a 2 year period (ending December 31, 2012), have paid a penalty, and have passed background checks may be eligible for a blue card. A blue card would enable workers to switch employers and apply for permanent residency after 5 years; employers of blue card holders would also be required to pay workers at least minimum wage and provide housing or a housing allowance. Blue card holders would not be eligible for federal means-tested public benefits (such as benefits under the Affordable Care Act, Medicaid, or food assistance).¹⁶⁹ The bill containing these provisions, entitled the “Border Security, Economic Opportunity, and Immigration Modernization Act,” has not passed in the House of Representatives.

President Obama announced executive actions in November 2014 that would have protected undocumented immigrants who are parents of U.S. citizens or lawful permanent residents and have been in the U.S. for 5 years. This program, called Deferred Action for Parental Accountability (DAPA), would allow an estimated 450,000 farmworkers to apply for temporary relief from deportation and work authorization.¹⁷⁰ In February 2015, a federal judge issued a court order temporarily preventing the government from implementing this program,¹⁴³ and in June of 2016, the Supreme Court affirmed the rule, blocking implementation of DAPA by a 4-4 split vote. Although the Supreme Court ruling does not set a legal precedent, it holds millions of undocumented immigrants—many of them parents to U.S. citizens—under the threat of deportation. In July 2016, President Obama asked the Supreme Court to reconsider the ruling once a ninth Supreme Court justice is confirmed.¹⁷¹ Implementation of DAPA is a necessary first step toward more widespread immigration reform that would allow all immigrant agricultural and meat processing workers to apply for work authorization and have a path toward citizenship. Until undocumented workers have the protection of authorization to work in the U.S., the fear of deportation will dissuade these workers from seeking out better working conditions and health care, and wages and working conditions will remain depressed for all U.S. agricultural and meat processing workers.

Several policy changes should be considered to offer immediate reductions in health risks and improvements in health-related policies. Intermediary policy reforms should:

Extend eligibility for health insurance benefits for workers and their families.

Subsidies available under the Affordable Care Act (ACA) should eventually be expanded to all U.S. agricultural and meat processing workers. In the meantime, states should provide health insurance subsidies to workers who are excluded from the ACA and other programs so that workers may access medical, dental, mental health, and eye care. Though it has not yet been funded, legislation has been introduced in California that provides state-sponsored subsidies (similar to the ACA) for all eligible persons, regardless of authorization status.²¹ Protecting agricultural and food processing workers' health is especially important given the connection to food safety and broader public health impacts.

Remove exemptions for agricultural workers and increase minimum wage in the Fair Labor Standards Act (FLSA).

Agricultural workers have been covered by the FLSA since 1966, but overtime pay provisions and some minimum wage requirements do not apply to all workers. Virtually all agricultural employers are exempt from paying employees time and one half the regular pay rates for hours worked in excess of forty per week.¹⁷² Youth agricultural workers are exempt from the child labor provisions of the Fair Labor Standards Act.¹⁵⁷ Minimum wage exemptions apply to those who are “principally engaged on the range in the production of livestock,” hand harvest laborers who are paid on a piece rate basis, and others.¹⁷² It is time for a revision of the FLSA that covers youth agricultural workers and extends overtime pay and minimum wage coverage to all agricultural workers. The minimum wage should also be increased, as workers laboring to provide a safe and sufficient U.S. food supply should consistently earn enough to be able to feed themselves and their families, without having to apply for Supplemental Nutrition Assistance Program (SNAP) benefits or turn to local food banks for support. Agricultural workers who earn minimum wage should not be trapped below the federal poverty line. Additionally, work authorization—or protection from the threat of loss of employment and/or deportation—will be essential to enforce the FLSA.

Mandate that employers provide full workers' compensation coverage for agricultural and meat processing workers.

Migrant and seasonal workers are not guaranteed sufficient workers' compensation coverage in about half of all U.S. states.¹⁷³ Only thirteen states

require agricultural employers to cover seasonal workers to the same extent as all other workers, and sixteen states do not require employers to provide any coverage for these workers.¹⁷³ Given the high risk of injury in most agricultural work and the limited resources that are usually available to workers and agricultural communities, the federal government should mandate that agricultural employers must provide workers' compensation coverage for migrant and seasonal agricultural workers to the same extent as all other workers. Additionally, some states⁴ explicitly allow undocumented workers to receive compensation coverage; given the percentage of agricultural and meat processing workers that are undocumented and the higher rates of injury in this sector, all states should require agricultural employers to provide coverage for all employees.

Remove the OSHA exemption for the number of employees required for enforcement and inspection.

With the advent of mechanized farm and food processing equipment, large-scale farms and food animal production operations increasingly operate with fewer employees. A farming operation is currently exempt from all OSHA activities—including inspections and enforcement—if it employs 10 or fewer non-family employees.¹⁷⁴ The scale of production and waste created by farming operations can be significant even if the number of employees exempts the operation from OSHA activities. Recently, a ruling in Yakima Valley, Washington established that mishandled manure created at an industrial animal operation will be considered a solid waste under the Resource Conservation and Recovery Act (RCRA),¹⁷⁵ highlighting the threats present on animal operations (in this case, dairies) that may employ fewer than 11 people. In order to protect all workers from occupational hazards, OSHA should not exempt food production and processing facilities based on the number of employees.

Ensure that agricultural workers and their families have access to safe, affordable housing in the U.S.

A few states have established funding sources to develop new, affordable housing specifically for agricultural workers; other states should follow.¹⁷⁶ Unauthorized workers must not be considered ineligible for subsidized agricultural worker housing programs. Additionally, employers hiring temporary workers under the H-2A guest worker program, or any similar programs that may be established in the future, should not be permitted to substitute hous-

⁴ Arkansas' workers' compensation statute, for example, defines an employee as "any person, including a minor, whether lawfully or unlawfully employed in the service of an employer," (2014 Arkansas Code Title 11—Labor and Industrial Relations. Chapter 9—Workers' Compensation. Subchapter 1—General Provisions 11-9-102-Definitions. Justia U.S. Law. Available at: <http://law.justia.com/codes/arkansas/2014/title-11/chapter-9/subchapter-1/section-11-9-102>).

ing vouchers for living quarters, and living quarters should be subject to regular inspections to ensure the safety and adequacy of housing and utilities.¹⁷⁶

Replace the H-2A visa with a variation of the Blue Card program.

In order to protect temporary workers from wage theft, inordinate debt, restriction to one employer, human trafficking, and other abuses, a new visa should be established for agricultural workers that replaces the H-2A visa program. Similar to the 2013 Senate bill's proposed Blue Card program, this new visa should allow workers to switch employers, apply for a green card after 5 years, and come and go from the U.S. as long as 100 days of agricultural work are completed in a year. Currently unauthorized workers in the U.S. should also be eligible for this new program.

Expand and increase funding for NIOSH and OSHA.

NIOSH implements vital surveillance, research, and technology transfer programs with the goal of preventing work-related illnesses and injuries. NIOSH has identified emerging issues (e.g., avian flu, the use of new technology and equipment) in the Agriculture, Forestry, and Fishing sector that merit increased research.¹⁷⁷ Further, NIOSH is well positioned to conduct wider surveillance on agricultural and meat processing workers' health risks and outcomes and could collect valuable data to better assess the needs of this population. Increased funding is necessary for OSHA to ensure that there are adequate numbers of inspectors available. Additionally, enforcement of OSHA regulations should be strengthened and fines for violations increased in order to change working conditions and prevent injuries. Testifying before Congress in October 2015, the Assistant Secretary of OSHA stated that the agency only has enough resources to inspect each job site in the U.S. once every 140 years and is inspecting less than 40% of injury and illness reports.¹⁷⁸ He added, "The fewer inspections we do, the more injuries are going to occur, and the more costs are going to go up, and so we know this is going to have [a] bad impact on workers".¹⁷⁸

Strengthen enforcement of human trafficking violations and sexual harassment in agriculture.

The Trafficking Victims Protection Act of 2000 (TVPA)—the most comprehensive anti-trafficking legislation ever passed—expired in 2011 and has not been reauthorized by the U.S. Congress. Reauthorization, and adequate funding, is essential in order to increase enforcement of trafficking violations

and protect survivors. Unfortunately, anti-trafficking enforcement may have been overshadowed by an increased focus on detainment and deportation of undocumented immigrants.¹⁷⁹ As a result, trafficked or abused workers may avoid contact with U.S. police or government officials for fear of deportation, and traffickers may use undocumented immigrants' fear of deportation as a coercion tactic.¹⁷⁹ In addition to reauthorization of the TVPA, there must be additional efforts to enforce sexual harassment laws and facilitate the reporting of violations (e.g., increase the number of Equal Employment Opportunity Commission offices in rural areas, ensure that there are Spanish-speaking employees on staff, and allow complaints to be filed offline).

Strengthen protections for workers who report hazards, exposures, and health conditions, and protect workers' right to organize.

Food production and processing workers who report health hazards or poor working conditions must be protected under federal law from employer retaliations. Whistleblower provisions—such as those that protect U.S. government employees from reporting waste, abuse, or fraud—should serve as a model of protection for food systems employees who are subject to health risks in their workplace. Furthermore, agricultural and meat processing workers should have the right to organize and collectively bargain, as employers in other sectors are free to do under the National Labor Relations Act. California passed its own Agricultural Labor Relations Act in 1975 that should serve as a model for other states to empower their resident agricultural and meat processing workers.

CONCLUSION

Conclusion

There is a need to re-shape the immigration debate and discuss reform in a way that recognizes undocumented workers' contributions to, and sacrifices for, the U.S. food system and economy. Several organizations and institutes (including Farmworker Justice, the Coalition of Immokalee Workers, and the California Institute for Rural Studies, among others) have made great strides to increase awareness of the health risks facing agricultural workers and to push for reform. As the debate evolves, the public health community must continue to provide research, education, and advocacy around the link between the health and security of agricultural and meat processing workers and the U.S. food system.

The information we do have on the impacts of industrial food production and processing demands that the health threats and living conditions that workers face be considered during any debate on immigration reform. The U.S. food supply should be considered insecure as long as it relies on an impermanent, underrepresented, and at-risk workforce.

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