

Examining the association of labor laws on workplace safety and health indicators among Latinx
agricultural workers

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Abstract

Examining the association of labor laws on workplace safety and health indicators among agricultural workers

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Health Systems and Population Health

There are roughly 2.6 million agricultural workers in the US that grow, tend, and harvest the food Americans in the US eat. Agricultural workers are an integral part of our food system, yet they experience health and social inequities rooted in structural racism. Agricultural exceptionalism excludes agricultural workers from national labor and social laws. They were excluded from federal minimum wage, overtime pay, the prohibition of child labor and collective bargaining rights established in the 1930s. Agricultural exceptionalism can be considered a form of structural racism as 78% of AW identify as Latinx, 70% are born outside the US, and 44% are undocumented. Additionally, agricultural workers are exposed to occupational risks, paid low wages, lack health insurance coverage, adequate housing, and sanitation. The purpose of this

research was to investigate the association of labor and social laws with agricultural workers' health by looking critically at laws that expand and/or exclude agricultural workers at the state-level. Our study incorporated mixed and community-based participatory research methods. For aim 1, we conducted qualitative interviews with agricultural workers. For aim 2, we used legal epidemiology methods to assess how inclusive three state-level protections- workers' compensation, minimum wage, and overtime pay - were of agricultural workers to develop a labor law equity index (LLEI). Higher LLEI scores were indicative with more inclusive and beneficial protections for agricultural workers. For aim 3, we assessed the association of the LLEI with agricultural worker health indicators using the National Agricultural Workers Survey using regression models. In aim 1 we completed 32 agricultural workers interviews from across five counties in Central and Eastern WA. We identified four main themes including: physically demanding work can lead to poor physical and mental health; agricultural workers face many barriers accessing health care and workers' compensation; agricultural workers are vulnerable to marginalization and mistreatment at work due to their race/ethnicity and immigration status; and laws that are intended to protect agricultural workers may not be implemented as intended across employers. For aim 2 we found that most states extended workers' compensation (N=27) and minimum wage (N=24) to some or all AW. Most states did not extend the benefit of overtime pay to AW (N=35). The LLEI scores ranged from -2 to 5. Five states amended their laws to extend labor protections to AW between 2001 and 2017 (NE, NM, FL, ID, MO), all of which led to higher LLEI scores. Most states had positive scores (N = 23) indicating inclusive laws for AW, 7 states scored 0 or neutral laws for AW, and 9 states had negative scores. For aim 3 we found our NAWS analytic sample consisted of respondents who identified as Hispanic (n = 30,833). The mean age was 36.4 (standard deviation = 12.5), most were male (74%) and unauthorized for work (61%).

There were significant associations between LLEI scores and employer provision of water (aOR = 1.18, p-value <0.05), toilet (aOR = 1.49, p-value <0.001), water for handwash station (aOR = 1.38, p-value <0.001), and pesticide training (aOR = 1.19, p-value <0.001) for both unadjusted and adjusted model. However, we did not find a statistically significant association between LLEI scores and reporting an injury or injury severity.

This study highlights agricultural workers' ongoing experiences with many work conditions and exposures that cause adverse health effects. These findings offer insight and opportunities to intervene and implement changes to improve occupational health and safety of an essential, yet often undervalued, group of workers. The LLEI can help examine how the legal environment shapes health, and similar methodologies can be applied for other occupations and industries.

TABLE OF CONTENTS

List of Figures	viii
List of Tables	ix
Acknowledgments	x
Dedication	xiii
Chapter 1. Introduction	14
1.1 Background	14
1.2 Conceptual Models	19
1.3 Specific Aims.....	22
Chapter 2. “A Veces No Aguantas Lo Pesado Que Es El Trabajo”- A Qualitative Study on Work Conditions, Labor and Social Policies, and Health among Latinx Agricultural Workers in Washington	25
2.1 Introduction	25
2.2 Methods	29
2.3 Results	33
2.4 Discussion	42
Chapter 3. Agricultural Exceptionalism: Development of a Labor Law Equity Index to Capture State Variation in Legal Protections for Agricultural Workers in the US	48
3.1 Introduction	48
3.2 Methods	50
3.3 Results	53
3.4 Discussion	56

Chapter 4. Equity in State Labor Laws and Hispanic Agricultural Worker Health Indicators: A	
Cross-Sectional Study Using the National Agricultural Workers Survey	76
4.1 Introduction	76
4.2 Methods	79
4.3 Results	83
4.4 Discussion	84
Chapter 5. Conclusion	96
Bibliography	101

LIST OF FIGURES

Figure 1.1 Conceptual model developed using Sorenson’s et al, 2021 work, safety, health, and well-being conceptual model and Misra’s et al, 2021 structural racism and immigrant health framework	21
Figure 2.1 Conceptual model developed using Sorenson’s et al, 2021 work, safety, health, and well-being conceptual model and Misra’s et al, 2021 structural racism and immigrant health framework.....	29
Figure 3.1 Labor Law Equity Index scores by state.....	62
Figure 3.2. Map of the Labor Law Equity Index Scores.....	63
Figure 3.3 Supplemental figure: Workers’ compensation scores by state – 2017.....	68
Figure 3.4. Supplemental figure: Workers’ compensation score distribution – 2017.....	69
Figure 3.5 Supplemental figure: Minimum wage scores by state – 2017	70
Figure 3.6 Supplemental figure: Minimum wage score distribution – 2017.....	71
Figure 3.7 Supplemental figure: Overtime pay scores 2001- 2017.....	72
Figure 3.8 Supplemental figure: Overtime pay score distribution – 2017.....	73

LIST OF TABLES

Table 2.1. Participant Characteristics (N = 32)	47
Table 3.1 Descriptive statistics of labor protection scores and LLEI score across state.....	61
Table 3.2 LLEI score distribution across sample.....	61
Table 3.3 Supplemental table: Workers’ compensation coding questions	64
Table 3.4 Supplemental table: Minimum wage coding questions.....	65
Table 3.5 Supplemental table: Overtime pay coding questions	66
Table 3.6 Supplemental table: Labor Law Equity Index (LLEI) scores by state and law for 2001-2017.....	73
Table 3.7 Supplemental table: Labor Law Equity Index laws and citations	75
Table 4.1 National Agricultural Workers Survey Characteristics of Hispanic Participants Hispanic Participants	90
Table 4.2 National Agricultural Workers Survey Workplace Health Indicator Reported by Hispanic Participants.....	91
Table 4.3 State-level Covariates & National Agricultural Workers Survey Hispanic Participants by State	93
Table 4.4 Unadjusted and Adjusted Logistic Regression Models Estimating Associations Between LLEI and Workplace Health Indicators.....	95

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DEDICATION

Para mi mamá y papá:

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Gracias por siempre ser mis alas, gracias a ustedes, yo pude volar hacia mis sueños.

CHAPTER 1. INTRODUCTION

1.1 Background

Agricultural workers in the United States

Agricultural workers are vital to the US food system. In 2022, there were 22.1 million full-and-part-time jobs related to the agricultural and food industries, making it 10.4 percent of the total US employment.¹ Among these, there are about 2.6 million agricultural workers that work to plant, cultivate, and harvest food crops with California, Texas, Tennessee, Oklahoma, and Florida being the states with the highest number of agricultural workers.^{1, 2} An estimated 78% of agricultural workers are Hispanic or Latine, 70% of agricultural workers are born outside the US, and 44% of agricultural workers are undocumented.³ These demographics are important considering there are documented differences among agricultural workers and how they're treated at work.⁴ Agricultural workers who are U.S. citizens have more secure work, work less physically demanding tasks, and were more likely to do piece work^a than undocumented Latine workers.⁴ Latine agricultural workers with documentation or authorization to work in the U.S. tend to do more semi-skilled tasks and work more hours per week than other workers, including U.S. citizens.⁴ Reid et al. found that even after controlling for multiple variables including years of experience, English speaking and literacy, employer, region, crop, etc., undocumented Latine and indigenous workers were paid less per hour than U.S.-born workers.⁴ There are additional racial and ethnic power dynamics that indigenous agricultural workers face when we consider colorism, language barriers, and social inequalities rooted in colonialism.

^a Piece work is a method of payment where agricultural workers are paid by how much produce they can harvest or pick in a day instead of being paid an hourly wage.

Agricultural exceptionalism - Exclusion of agricultural workers from labor laws

Agricultural exceptionalism is a form of structural racism that excludes agricultural workers from federal labor laws in the US.⁵ The National Labor Relations Act (NLRA) in 1935 and the Fair Labor Standards Act (FLSA) enacted in 1938 were the first federal level labor laws in the United States to address work conditions.^{6, 7} The NLRA provided workers the right to organize without retaliation while the FLSA established a variety of protections and standards for workers, including the federal minimum wage and overtime pay as well as youth employment standards.^{7, 8} Agricultural workers, along with domestic workers or household cleaners, were expressly excluded from both the FLSA and the NLRA.⁸ At the time of these laws, Black workers disproportionately represented most agricultural workers and domestic workers, and Southern Democrats deliberately excluded these groups of workers in order to preserve racial segregation and exploitation.⁹⁻¹² In 1966, the US expanded to apply minimum wage and recordkeeping provisions to most agricultural workers and employers.¹³ Additionally, although agricultural work is hazardous, FLSA set the minimum age for children working in agricultural as 12 years old as opposed to 16 years old which is the standard for other jobs.⁷ FLSA was never amended to provide overtime pay for agricultural workers and only a few states have laws that require overtime pay.⁷

At the state-level there is variation across states in the protections offered to agricultural workers. For example, while most states have state minimum wages that are higher than the federal minimum wage of \$7.25,¹⁴ only seven states (Arizona, California, Colorado, Connecticut, Nevada, New York, and South Dakota) have minimum wages that are both higher than the federal minimum wage and inclusive of all agricultural workers.^{15, 16} An additional 13 states (Arkansas, Florida, Hawaii, Illinois, Maryland, Michigan, Minnesota, Missouri, Montana, New

Mexico, Ohio, Oregon, and Washington) have minimum wages higher than the federal minimum wage and require *some* employers (small farm exemptions) to pay agricultural workers the state minimum wage.¹⁶ However, the variation in how states define small employers leads to complexities in understanding whether agricultural workers are entitled to a minimum wage in these states.^{15, 16} Similarly, overtime pay is an important protection for agricultural workers, considering the long hours they are required to work during the busy harvest months. The FLSA was never amended to provide overtime pay for agricultural workers,¹⁷ and only a few states have laws that provide overtime pay to agricultural workers, including California in 2016, Colorado and Washington in 2022, and Oregon in 2023.¹⁸⁻²² Several other states - Hawaii, Maryland, Minnesota, and New York - also enacted overtime pay laws to include agricultural workers with restrictions (small farm exemptions or more hours required above the traditional 40-hour work week before qualifying).^{15, 18, 23-26 27} These minimum wage and overtime pay laws directly impact agricultural workers' income.

The injustice of agricultural exceptionalism

Agricultural workers have some of the lowest annual family incomes in the US, with the average and median annual family incomes being \$25,000-29,999.³ Agricultural workers' income is well below the federal poverty level and the median US household income of \$68,703.²⁸ Limited overtime pay and low wages are important factors considering the long work hours required of agricultural workers during the summer harvest months and the important role income has on health.²⁷ There are states that have expanded labor protections, like pesticide exposure monitoring, heat rules, workers' compensation, minimum wage, and overtime pay for agricultural workers, but many states uphold the long history of agricultural exceptionalism.^{15, 29} Agricultural workers are integral to the country, both in terms of feeding the entire US

population as well as being fundamental to the rich economic contribution the agricultural industry plays across the country. Agricultural exceptionalism perpetuates injustice in that agricultural workers work to keep Americans fed, yet financially struggle to provide for and feed their own families.³⁰

Work as a social determinant of health

Work is an important determinant of health. Not only does work provide an income and hence affects other determinants of health, like ability to afford housing, live in a specific neighborhood, afford nutritious foods, quality education for kids, etc. but also people spend a significant amount of time at work and the environment in which one works affects physical, mental, and emotional well-being.^{31, 32} Relatedly, in the US, work also provides a vital avenue through which about 49-54% of the US population, varying from 2018-2022, are able to access health care.³³⁻³⁵ As much as work can offer health benefits and opportunities, the COVID-19 pandemic also made it significantly evident that work also places workers at increased risk for injury and illnesses.³² In addition to more traditional occupational health hazards, such as, physical and chemical hazards, research shows that psychosocial stressors, income, job insecurity, control/autonomy at work, work hours, and management style can all impact health.³⁶⁻³⁹ Furthermore, COVID-19 highlighted prominent racial and ethnic health disparities caused by workplace exposure. Latine and Black workers in the US disproportionately represent higher proportions of jobs deemed ‘essential,’ which included the agricultural industry, during the pandemic and were at higher risk of work-related exposure for COVID-19, demonstrated by the higher COVID-19 prevalence among these racial and ethnic groups.⁴⁰⁻⁴³ Therefore, prioritizing workplace safety and health, isn’t solely an occupational health issue, it’s about racial and health equity for all.

The intersection of agricultural workers, work environment, labor laws, and health:

Agricultural work is not only labor-intensive, but agricultural workers often endure harsh working conditions.⁴⁴ Agricultural workers face varied physical, chemical, and psychosocial risks to health linked to various adverse health outcomes.⁴⁴⁻⁴⁶ For example, these workers face elevated exposure to heat leading to elevated risk of heat-related illness, repetitive motion leading to musculoskeletal pain or chronic disease, pesticide and chemical exposure leading to increased risk of acute and long-term conditions, as well as challenges including unstable work hours and lack of health insurance.⁴⁴⁻⁴⁶ Consequently, the agricultural industry is among the most dangerous. In 2015, the agricultural industry had the highest fatal work injury rate of 22.8 per 100,000 full-time workers, compared to an all-worker fatal injury rate of 3.4, and 573 total number of fatal work injuries in 2019, surpassed only by the transportation and warehousing industry.^{47, 48} Additionally, about 100 agricultural workers across the US have an injury that results in work time loss per day.⁴⁹ These are likely underestimates considering workplace injuries often go unreported due to lack of labor law protections, employer retaliation, lack of awareness of workers' rights, lack of workers compensation in many states, fear of job loss, and language barriers.^{12, 13}

Previous research found that multi-level factors including individual (gender, immigrant status, English proficiency, health status), environmental (proximity to US-Mexico Border) and policy-level (insurance status, workplace climate and pay structure) factors affect whether agricultural workers utilized US healthcare.⁵⁰ Furthermore, agricultural workers experience discrimination and mistreatment from their employers, due to their race, ethnicity, and immigration and documentation status in addition to being forced to continue working through injuries.⁵¹ Agricultural workers' documentation and immigration status can also hinder their

access to information through anti-immigrant rhetoric and policies that cause fear of deportation or incarceration in immigration detention centers, and many other reasons that make it harder for workers to get the information they need and feel empowered to advocate for themselves should they need to.^{52, 53}

Agricultural workers that immigrate to the US seeking economic survival and without documentation to live and work in the US, leads to exploitative work conditions where workers are less likely to report wage and workplace safety violations, have access to training and personal protective equipment (PPE), and seek health services if needed.²⁹ The lack of equitable immigration policies that provide a pathway to US residency and citizenship coupled with anti-immigrant sentiment contribute to the not only dehumanizing conditions agricultural workers endure at work but also in their own communities.^{53, 54} This highlights ways in which the social and political context agricultural workers work in, coupled with their intersectional identity, can affect their health. Moreover, these are examples of how systemic and interpersonal racism manifests and adversely affects agricultural workers in a multitude of ways.

1.2 Conceptual model

This conceptual model builds off Sorenson's et al, 2021 conceptual model on work, safety, health, and well-being that incorporates the socio-ecological model framework with an emphasis on how sociopolitical and economic environment shape current laws and practices and thus the work environment and worker health as well as Misra's et al, 2021 framework on structural racism and immigrant health.⁵⁵⁻⁵⁷ Labor laws at the federal, state, and local level have historically been established to create minimum safety and wage standards for workers.⁵⁸ This conceptual model starts with acknowledging agricultural exceptionalism, a form of structural racism that excludes agricultural workers from federal labor laws in the US.⁵ Societal factors

such as colonialism, colorism, discrimination, racism, prejudice, and classism produce agricultural exceptionalism.⁵

Grounded in this, we wanted to further understand the extent of agricultural exceptionalism across US states by capturing whether states include or exclude agricultural workers in their labor protections and how it affects agricultural workers' health. We applied a legal epidemiology theoretical framework in that the types of laws that are enacted affect health in many ways- specifically in how laws are enforced, how laws influence behaviors and/or environments, and are then over time internalized as norms.⁵⁹

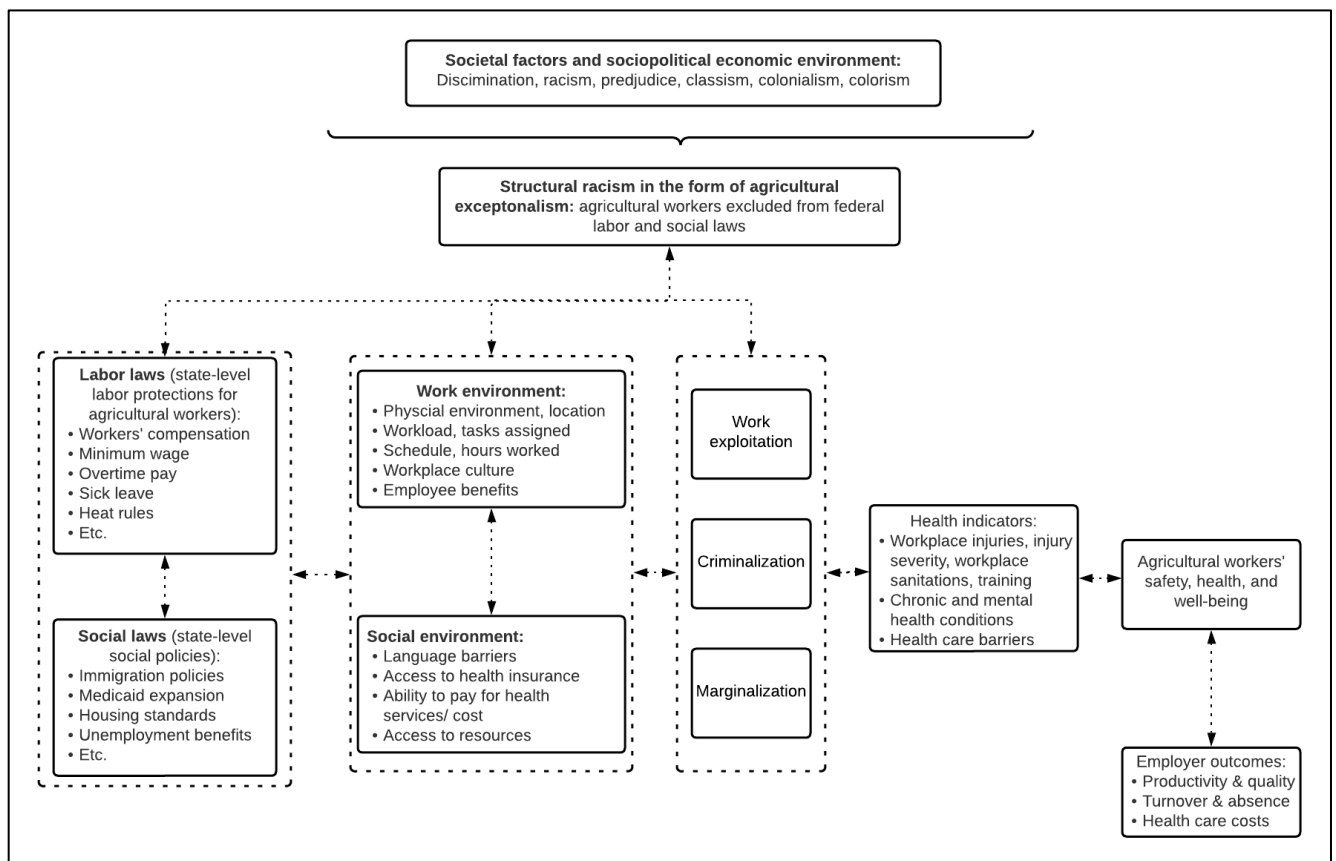


Figure 1.1 Conceptual model developed using Sorenson's et al, 2021 work, safety, health, and well-being conceptual model and Misra's et al, 2021 structural racism and immigrant health framework.

The dotted lines in my conceptual model signify two things, 1.) groupings and 2.) the causal pathways that informed this research. In terms of groupings, the left-most dotted rectangle groups laws, including labor and social laws. To the right, is the second dotted rectangle grouping environment, including work and social environment, and the third grouping is the mechanisms, more specifically, work exploitation, criminalization, and marginalization, through which laws and the environment impact health using Sorenson's and Misra's frameworks.^{56, 57}

An important component from Sorenson's et al work is that social, political, and economic environments, influence employment and labor patterns, including worker safety and overall wellbeing.⁵⁶ Especially relevant to this work are the changing demographics, social inequalities, laws, and regulatory environments mentioned in their work.⁵⁶ More specifically, the COVID-19 pandemic highlighted the disproportionate impacts Black, Indigenous, and People of Color (BIPOC) and immigrant communities experienced due to representing a higher proportion of low-wage occupations with more adverse occupational health exposures, which are a result of racial capitalism.^{42, 56, 60}

From Misra's et al work, critical race theory and within it, intersectionality, are central to the conceptual model. Given that the majority of US agricultural workers are Latine (78%) and foreign born (7%), an intersectional lens' for how structural racism manifests not only in the workplace, but also housing, education, economic conditions, health care, and criminal justice systems is essential.^{57, 61} The three pathways mentioned in Misra's et al work in which structural racism affects immigrant health are 1) formal racialization via immigration policy and citizenship that affect access to material and health resources, 2) informal racialization via disproportionate immigration enforcement and criminalization (e.g. detention and deportation), and 3) intersections of economic exploitation and disinvestment.⁵⁷

We converge Sorenson and Misra's work to highlight the historical and present exclusion of agricultural workers from labor laws, which affects their environment, including work conditions as well as the social environment, like material and knowledge resources available to agricultural worker communities. From environment, is another double-sided arrow to the third grouping, work exploitation, criminalization, and marginalization. This builds off of how laws impact the environment by shaping the communities people live in and furthermore, whether people are more at risk to be exploited at work and criminalized and marginalized in the communities they live and work in, thereby putting workers at increased risk for workplace injuries, chronic and mental health conditions, and then experiencing barriers to receiving health care.

In summary, we aim to take a system's thinking and socioecological model approach to understand how state labor laws are associated with agricultural workers' health. We acknowledge that there are more upstream factors (public policy, federal laws), and downstream factors (how these laws shape community and interpersonal interactions) that also affect agricultural workers' health. And within these factors, there's agricultural exceptionalism that is a result of racism and discrimination that agricultural workers can experience. We studied how to capture, measure and examine the impact of labor laws on agricultural workers health outcomes.

1.3 Specific aims

In Aim 1 (chapter 2), we sought to understand how labor laws impact agricultural workers' work environment, including their awareness of the laws and their implementation and enforcement at their workplace. We also sought to understand how these laws impact their experiences living in their community and using health care services. Aim 1 used Community-Based Participatory Action research approach and was conducted in collaboration with

community and worker advocacy organizations.⁶² We conducted 32 qualitative interviews with individuals 18 and older who identified as agricultural workers in Washington. Interviews were conducted and transcribed in Spanish and qualitatively coded by three researchers. The analysis used an abductive analytic approach.^{63, 64} Through these interviews we were able to understand the labor and social laws that are important and are impacting agricultural workers' lives in various ways and we used what we learned in the interviews to determine the laws we focused on for Aim 2.

For Aim 2 (chapter 3), we wanted to understand the extent of state-level agricultural exceptionalism. We used legal epidemiology⁶⁵ and policy surveillance methods⁶⁶ to create a Labor Law Equity Index (LLEI) that included three labor protections: workers' compensation, minimum wage, and overtime pay, across 39 states and from 2001 to 2017. We collected relevant laws (i.e. legal text) from Westlaw,⁶⁷ a legal research software, and legislative websites. We developed nine coding questions and responses to systematically code the extent to which states covered or included agricultural workers in the three labor protections. We then calculated a score for each state from 2001 to 2017 using the Public Health Information Portal, a legal epidemiology software.⁶⁸ For each topic, we scored states on an integer scale of -1 to +2 according to the extent to which they afforded protections to agricultural workers. The LLEI is the sum of three scores, with a potential range of -3 to 6, where higher scores indicate more inclusive labor protections for agricultural workers.

In Aim 3 (chapter 4), we aimed to examine how labor laws shape health, specifically, how the inclusion of agricultural workers in three labor laws, workers' compensation, minimum wage, and overtime pay, are associated with agricultural worker health indicators. We used the National Agricultural Worker Surveys data (NAWS), an employment-based, random sample

survey of US crop workers conducted by the US Department of Labor.⁶⁹ We selected the workplace injuries, injury severity, and workplace sanitation including, provision of water, toilet, handwash station, and pesticide training from the NAWs data as outcomes, or health indicators, in our model because these are commonly used measures to assess occupational health and safety and work environment safety.⁷⁰⁻⁷² We used the LLEI from Aim 2 as our main exposure of interest. Our hypothesis predicted that higher LLEI scores, or more protective and inclusive labor laws for agricultural workers, will be associated with positive worker health indicators (i.e. less injuries reported and severity, and increased provision of water, toilet, handwash station, and training). In this exploratory study, we conducted multivariable logistic regression models to assess the association of the LLEI and workplace environment health indicators.

CHAPTER 2: “A VECES NO AGUANTAS LO PESADO QUE ES EL TRABAJO”- A QUALITATIVE STUDY ON WORK CONDITIONS, LABOR AND SOCIAL POLICIES, AND HEALTH AMONG LATINX AGRICULTURAL WORKERS IN WASHINGTON

2.1 Introduction

There are about 2.3 million agricultural workers employed in the US that grow, tend, harvest, and package the food people in the US eat.⁷³ An estimated 80% of agricultural workers are Hispanic or Latine, 73% are born outside the US, and half are undocumented.^{45, 74} These demographic factors put agricultural workers at a systemic social and economic disadvantage that perpetuates health inequities.⁷⁵ Agricultural workers are an integral part of our food system, yet they experience health and social inequities rooted in structural racism.

Agricultural exceptionalism excludes agricultural workers from major federal labor laws, like the right to unionize, minimum wage, and overtime pay and is a form of structural racism given that most agricultural workers have historically, and continue to be, predominantly ethnic and/or racialized groups.⁷⁶ Agricultural workers face several occupational health risks, including exposure to heat and high force, awkward posture, and repetitive work.⁷⁷⁻⁸² In addition, they disproportionately experience adverse work conditions like unstable work hours and minimal sanitation standards, as well as living conditions like crowded or substandard housing, barriers to health care, and lack of transportation that can lead to adverse impacts on health.⁴⁴⁻⁴⁶ In 2021, the agricultural industry had a fatal work injury rate of 19.5 per 100,000 full-time workers, much higher than the fatal injury rate for all industries of 3.6 per 100,000 full-time workers.^{83, 84} Many workplace injuries are unreported due to a lack of labor law protections, employer retaliation, lack of awareness of workers' rights, lack of workers' compensation in many states, fear of job loss,

and language barriers.^{45, 85, 86} Furthermore, agricultural workers often experience discrimination and mistreatment from their employers and/or supervisors due to their race, ethnicity, and immigration and documentation status that can further perpetuate inequities experienced by agricultural workers.^{51, 87, 88} These factors can also prevent agricultural workers from seeking support from their employer, supervisor, and community when they're injured at work.

Despite these risks and the importance of agricultural workers to our food system, workplace and social protections are often confusing and contradictory for agricultural workers, especially those that are undocumented immigrants. There are minimal laws to prevent exploitation and discrimination. In addition, it can be difficult for workers to navigate their rights given the complexity of federal, state, and local labor policies. Many agricultural workers are also subject to a complex system of immigration laws that excludes undocumented agricultural workers from working or receiving public benefits.⁸⁹ While as workers, they receive some protections from both national and state laws related to fair wages, workplace safety, and employment discrimination.⁹⁰ ⁹¹ Agricultural workers' documentation status can hinder both their access to health and safety information, as well as access to health services and public programs they may be eligible for in their state and local communities.⁵³ Anti-immigrant rhetoric and policies also cause fear of deportation or incarceration in immigration detention centers and reduce agricultural worker use of health care services and public programs that ultimately further perpetuate health inequities observed among the agriculture workforce .^{52, 53}

Agricultural work is not covered by many federal labor protections, including minimum wage, overtime pay, and permission to unionize. State-level labor protections for agricultural workers vary greatly.^{15, 92} For example, as of 2024, nine states have a state minimum wage law that includes all agricultural workers, 17 states have minimum wage laws that include some agricultural workers

(i.e. often exemptions for agricultural workers working at small farms), 19 states explicitly exclude agricultural workers from their minimum wage law, and the remaining six states don't have a state minimum wage law and default to the federal minimum wage law.¹⁶ Washington State, the context of this study, is among those making gradual legislative changes to increase protections for agricultural workers. In Washington, agricultural workers are covered by state overtime and workers' compensation laws, and some agricultural workers (exemptions for small employers) are covered in the minimum wage law.^{15, 93} Effective as of July 2023, Washington has also issued permanent heat protections to increase protection for outdoor workers from heat exposure.⁹⁴

Our conceptual model for this study is based on Sorenson's et al, 2021 framework on work, safety, health, and well-being with an emphasis on how sociopolitical and economic environments shape current laws and practices and thus impact the work environment and worker health. Our model also draws on Misra et al's, 2021 framework on structural racism and immigrant health (see Figure 2.1 below).⁵⁵⁻⁵⁷ Given that the majority of US agricultural workers are Latine (83%) and foreign born (75%), we use an intersectional lens to understand how structural racism manifests in the workplace, as well as in housing, education, economic conditions, health care, and criminal justice systems.^{57, 61} The three pathways outlined in the model are: 1) formal racialization via immigration policy and citizenship that affects access to material and health resources; 2) informal racialization via disproportionate immigration enforcement and criminalization (e.g. detention and deportation); and 3) intersections of economic exploitation and disinvestment.⁵⁷ These frameworks merge to highlight the historical and present exclusion of agricultural workers from labor laws, which affects both their physical (workplace conditions) and social (culture, economic, and political conditions) environments. These pathways can, in turn, impact access to knowledge and material resources available to agricultural worker communities.

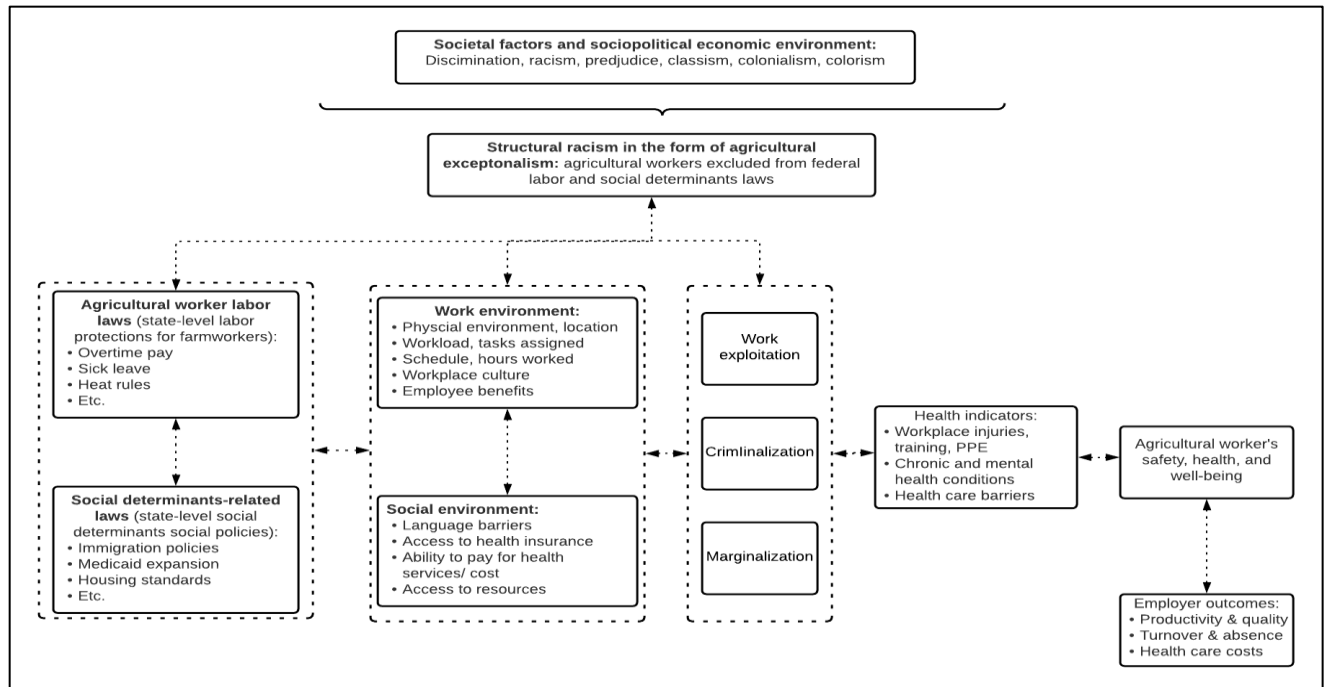


Figure 2.1 Conceptual model developed using Sorenson’s et al, 2021 work, safety, health, and well-being conceptual model and Misra’s et al, 2021 structural racism and immigrant health framework.

There are several qualitative studies that highlight agricultural worker issues in Washington. A recent qualitative study by Park et al, 2023, identified extreme weather conditions, like heat and wildfire smoke to be increasingly detrimental to agricultural workers in Washington, as well as lack of training and awareness on current safety rules.⁹⁵ Researchers also found mistrust among workers in regulatory agencies enforcing rules and holding employers accountable.⁹⁵ Another qualitative study in Washington found many issues with accessing care after a work injury, including lack of information in Spanish, lack of interpreters during medical appointments, as well as lack of consistent training provided by agencies to employers and health care providers to facilitate the workers’ compensation claim processes, all of which affect workers’ ability to get timely care after a work-related injury.⁹⁶ There is an additional

community-led study and survey which aims to understand the needs of farmworkers in Washington including health and safety in the workplace, wage and hour issues, use of social and government services, and harassment and retaliation.⁹⁷ These are all relevant and important issues that this qualitative study aims to build upon to address agricultural worker health.

In this study, we aimed to understand how labor laws impact agricultural workers' work environment, including their awareness of the laws and their implementation and enforcement at their workplace. We also sought to understand how these laws impact their experiences living in their community and using health care services. This study is innovative due to its focus on understanding agricultural workers' work and health concerns from their perspective, including how recent changes in labor laws affect them first-hand. Another unique aspect of this study is our inclusion of agricultural workers in diverse positions from those that work planting, harvesting, and tending to crops in the field to those that work in packing sheds or are in manager positions and work with various crop types. The inclusion of agricultural workers in various work types is important because Washington, like other states, produces many fruits, vegetables, and grains from cultivating, planting, and harvesting to packaging and processing these crops. Including agricultural workers in various positions and work types captures a more representative sample of agricultural workers in Washington and enhances our understanding of agricultural workers' work and health concerns more holistically.

2.2 Methods

Our qualitative study design used a combination of grounded theory and phenomenology qualitative methods.^{98, 99} Our research questions were guided by a conceptual framework (Figure 2.1) that led the development of the interview questions, and our aim was to explore these topics from the perspective of those affected, agricultural workers.⁹⁸ We followed community-based

participatory principles to ensure that community members were partners and that the research topic and questions would encourage capacity building in terms of sharing knowledge and skills.⁶² We drew on grounded theory in that the data that was collected helped generate further questions and emergence of theories, which were explored in both the data collection and analysis from the interviews and allowed for flexibility to see where the data led.¹⁰⁰ We used abductive methods in the analysis, by developing a codebook based on the interview guide and the first few interviews (deductive), and as more interviews were conducted, the codebook was edited and new codes were added based on what was coming up in the data (inductive).^{63, 64}

Setting

Washington State was selected for the study setting because of its large agricultural region and Latine agricultural worker community, diverse types of crops and agricultural jobs represented (from crop workers to those working in the packing sheds and with heavy machinery). The geographic location also allowed the research team to involve community members in the research process. Washington State ranks 13th among states with the highest number of Latinos, with 13.4% of the Washington population identifying as Latino and making it the second largest racial/ethnic group in the state.^{101, 102} Eastern Washington also ranks highest among nonmetropolitan areas with the highest employment in agricultural workers in the nation.¹⁰³

Our study was conducted in collaboration with worker advocates and leaders to ensure agricultural worker community perspectives were centered in the study. Agricultural Community Advisory Board (ACAB) members were recruited and selected through the research team's existing networks and included lawyers, directors, and researchers in Washington and the US, all of which work with agricultural workers in many capacities. The ACAB were involved in

various phases of the study including providing input on the overall purpose of the study, participant recruitment, data collection, analysis, and interpretation. The PI met with advisory board members periodically as needed, to provide study updates and get input on the agricultural worker interview guide.

Recruitment

Participants for this study were recruited through the existing networks of the ACAB and community organizations, such as the Pacific Northwest Agricultural Safety and Health Center,¹⁰⁴ Radio KDNA,¹⁰⁵ and the University of Washington College Assistance Migrant Program.¹⁰⁶ Recruitment flyers about the study were created in Spanish and English to distribute to partner organizations. Participants that were interested were contacted by the research team to schedule interviews. Inclusion criteria for the qualitative interviews for agricultural workers were: 1) 18 years of age or older, 2) self-report as an agricultural worker (i.e., field workers, packing shed workers, heavy machinery operators, supervisors/managers), 3) live and/or work in Washington State, and 4) speak Spanish and/or English.

Human Subjects Protections: The University of Washington Human Subjects Division determined this study to be exempt.

Demographic questionnaire

The agricultural worker demographic questionnaire consisted of 32 questions, including age, sex, years of experience in agricultural work, inquiries regarding work-related injuries, workplace conditions, health status, family composition, transportation mode, and access to medical care, health insurance, and other governmental programs, like Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and Supplemental Nutrition

Assistance Program (SNAP) benefits. Interviewers administered the questionnaires with the participants prior to beginning the interview.

Individual interviews

Interviews were conducted by University of Washington bilingual and bicultural undergraduate and graduate public health students from agricultural worker backgrounds. Interview were conducted in-person or through Zoom, depending on participant preference, in February-March 2023 and took approximately 30-45 minutes. In-person interviews were conducted in public libraries, community spaces, and/or participants' homes. Prior to each interview, the research team conducted a consent process that explained the purpose of the study, types of questions asked, and confirmed consent to record the interview. All interviews were recorded either on Zoom and/or with a voice recorder and were deidentified for confidentiality. Participants received a \$50 gift card for their time and contribution in the form of Walmart physical gift cards or Tango electronic gift cards, depending on preference.¹⁰⁷

The agricultural worker interview guide was codeveloped with the ACAB to assess how labor and social policies are experienced at agricultural workers' workplaces and in their social environment, specifically: 1) what their work environment is like, the type of work and health concerns they have in their work; 2) their experiences with accessing and receiving health care services; and 3) the type of services, policy changes, and/or governmental changes that they'd like to see in their community for their and their family's health and wellbeing. To understand the workplace environment, we asked participants what they liked about their work as well as the things that are difficult or worry them about their work. The interview guide allowed for interviewers to probe on topics as needed.¹⁰⁷

Data analysis

Demographic questionnaire data were summarized using descriptive statistics. Audio recordings of agricultural worker interviews, which were all conducted in Spanish, were transcribed in Spanish by an Artificial Intelligence (AI) transcription service, Trint,¹⁰⁸ and then quality checked by a research team member.^{98, 109} The analysis used abductive methods, by creating a preliminary codebook using the interview guide topics, and then incorporating new codes in our codebook with themes and topics that came up as we read through the qualitative data to ensure that we included emerging themes important to agricultural workers in our analysis.⁶⁴ The codebook developed included specific definitions as well as notes on when ‘to use’ or ‘not use’ the codes to allow for more consistent and systematic application of the codes to the data.^{98, 100} Our research team was bilingual and bicultural in Spanish and English, and we coded the qualitative data in the language the interviews were conducted to preserve the authenticity of participants’ voices. Dedoose qualitative software was used to code and analyze the data.¹¹⁰ Three research team members used an iterative process of co-coding multiple transcripts blindly and discussing each one to ensure intercoder reliability and refine the codebook. We assessed intercoder reliability until we reached a pooled Cohen’s kappa of at least 0.8 (good or substantial agreement).¹¹¹ After all the data were coded, the analysis consisted of reviewing coded excerpts to organize into themes and summarize the experiences and expertise of agricultural workers by the primary investigator and triangulation with the research team and ACAB for accuracy and equitable representation of results.⁹⁸ The goal was to be comprehensive while honoring the stories that participants shared with us.

2.3 Results

Participant characteristics

There were 32 agricultural workers that participated in the individual interviews from five counties in Central and Eastern Washington (see Table 2.1). All participants identified as Hispanic or Latine, with N = 31 being born in Mexico and one in California, N = 16 identified as female and N = 16 identified as male (equal balance across sex was unintentional). More than half (N = 25) of participating agricultural workers had 10+ years of experience working in agriculture.

Participants worked across many different positions in the agricultural field, including field work (N = 17), packing sheds (N = 11), heavy machinery (N = 2), pesticide application (N = 1), and as a general manager (N = 1). All participants worked in agriculture as their main occupation year-round. Those that did field work had variation in the type of tasks depending on the season, including planting, thinning, pruning, and harvesting tree fruit, predominantly apples and cherries. Those working in the packing sheds included work sorting and packing onions, potatoes, and tree fruit depending on the region in Washington. Work with heavy machinery included moving bins in the fields or packings shed, and/or applying pesticides in the fields. The general manager did a combination of field work, applying fertilizer, and irrigating depending on what is needed. Compared to the Department of Labor's National Agricultural Workers Survey (NAWS) Northwest 2019-2020 Demographic Characteristics, the participants in our study had a higher percentage of females (50% in our study vs. 38% in NAWS), higher average age (45.5 in our study vs. 39 in NAWS), and higher percentage of those born in Mexico (97% in our study vs. 74% in NAWS).³

Physically demanding work can lead to poor physical and mental health

Agricultural workers reported that the physical demands of their work, especially during the harvest time, took a toll on their physical and mental health. Sara (female, pseudonyms used for all participants) shared how physically demanding the work can be, *“Sometimes it’s just that you already feel like you can’t stand how physically heavy the work is...they [supervisor/employer] don’t even give you a break. And you already feel that you can’t take it anymore”*. Other examples mentioned by participants were having trouble stabilizing their ladder in the field when the ground was uneven or when the weather conditions increased the risk of slipping and falling. Ariana (female) shared, *“Apart from the bag [of apples] being heavy, the ladder is also big, high, and if you don’t position it well, you can fall and there are many risks, it’s very heavy [work].”*

Other participants spoke of experiencing pain in their bones and hands due to musculoskeletal repetitive motion, back and foot pain due to long hours standing, and tired eyes from sorting crops. These musculoskeletal symptoms were especially common among packing shed and warehouse workers. Kimberly (female) shared how hard it is to stand for long periods of time while they sort fruit: *“I think it affects us standing still for so long, we are sorting... Since I started working, varicose veins began to appear in my legs and many women have varicose veins due to standing for so long. Before there were stools and you could sit and sort at the same time. Since the pandemic began, they removed the stools. All day we’re standing... That has affected my health.”*

Many participants also expressed concerns with pesticide, chemical, and dust exposures both in terms of developing immediate symptoms like irritated and red eyes and inhaling dust, as well as concerns about chemical and pesticide exposure over time. Leo (male agricultural worker) thinks the chemicals can affect their health over time, *“I think that sometimes the*

chemicals they add to the are a little strong, right? I think that this not only affects me, but that affects all people over time.” Ariana (female agricultural worker) also shared her observations with chemicals causing irritation symptoms: “Yes, because sometimes they put, I don't know what chemicals or something on the potato, so that it doesn't rot or something like that, so that it lasts longer. Yes, and it causes a lot of allergies, like a lot of itching in the nose. In the eyes. I have seen a coworker whose eyes are very red. And she says that at home she feels different, normal. And here her eyes turn very red. I think it is an allergy”.

Mental health concerns were also reported among those who felt pressured to complete a certain amount of work each day or risk being fired, a common practice for those with packing shed and field work positions. Lorena (female agricultural worker) shared her experiences feeling pressured to meet the day's quota in the field: *“Yes, it worries me because they want us to do for example, like 90 trees, 3 per hour, but they want us to work hard during the day. And I'm worried about not meeting the quota, because then they say, that in three days if we don't do it [the 90 trees], or whoever doesn't come close to it, well, they'll let us go.”*

Correspondingly, Sara (female agricultural worker) who works in a packing shed also feels pressured and she wishes her supervisor would turn the speed of the assembly line down, *“People are already there, pushing their limits. So, we ask [the supervisor] “Hey, turn it [assembly line] down a little because people can't take it anymore.””* Additionally, Sara shared that even with workers pushing themselves to meet demand, *“They [supervisor] still scold you even when you are already stressed because you don't know what to do with so much produce.”* The stressful work environment impacts workers' health, in Jaime's (male agricultural worker) case, he shared that it impacted other chronic conditions he lives with, *“It [work] affects my health because it always keeps me stressed. I have always had a very high blood pressure and I*

have medication and all that and I prefer to change jobs rather than suffer a more serious illness or a stroke, even because of the stress that the supervisor puts on me.”

Agricultural workers face many barriers accessing health care and workers’ compensation

Agricultural workers reported varied experiences accessing health care, but most reported at least some negative experiences. Most participants mentioned various barriers they had when they received health care services, such as cost and lack of health insurance. Ana (female) shared her experiences using the sliding fee scale discounts at her local community health center:

“From what I have seen, many people who do not qualify, ... do not want to go to the doctor because they charge too much. And that's the problem that sometimes they [the sliding fee discount] don't pay for the consultation and the medicine. And sometimes it stops us from going to the dentist or getting checked.”

Other concerns mentioned were language barriers, particularly not having interpreters available during their medical appointments, and the lack of doctors in the rural areas where participants live. Julia (female) shares the difficulties she has getting medical appointments for her kids, *“Sometimes I make an appointment for my kids, ...and they call you that the doctor is not going to be there, and they cancel it. So, they move my appointment further away... There are not enough doctors.”*

Some participants mentioned differential treatment due to not speaking English and/or being an agricultural worker, *“The girls [receptionists] at the clinic are very rude, they don't see you as people, they don't take you seriously... I think because we are farmworkers or because I don't speak English”* (Martin, male).

The few that were satisfied with the medical and/or dental care they receive shared that they felt respected and listened to by their provider and interpreters were available.

Further, participants expressed a wide range of experiences when interacting with the Washington State Department of Labor and Industries (L&I) workers' compensation system. Some expressed that their injury claims were processed efficiently; others reported feeling confused and frustrated that their injury claim had closed while they still needed medical treatment for their injury. Sara (female) shared her experience navigating her workers' compensation claim and receiving medical care:

"I have been to the doctor and they have treated me very well, thank God. But the only bad experiences I have had is when I got hurt, when I told them that I was going to the doctor when my [workers' compensation] case was no longer open. When I told them that I was going to pay them with my money, they didn't want to treat me. Those were the bad experiences that I had and well they told me that I had to go to Labor & Industries, and then I went to Labor & Industries and well the case was closed and those experiences with the doctors were very difficult."

Another participant, Alex (male) also had their workers' compensation case closed before they felt they were well enough, *"They [L&I] just close the case, because of what the company's doctors are saying and they listen to them, but they don't listen to you. And that doesn't seem fair to me."* Overall, there are many barriers that contribute to agricultural workers receiving the primary health care and work-related care they need and deserve.

Agricultural workers are vulnerable to marginalization and mistreatment at work due to their race/ethnicity and immigration status.

Most agricultural workers experienced exploitation and marginalization while at work or had witnessed their coworkers being mistreated. Maribel (female) shared her experiences with verbal harassment at work:

“I have had harassment at work. A lot. Shouting from the boss. Disrespecting us by yelling. When he tells us something, he's not telling you, he's shouting it at you. Just as there is already a lack of respect. You can't tell him anything that's wrong because he scolds you, you get scolded, and he raises his voice at you. So that's why sometimes you hold back and don't say anything.”

A few participants mentioned that mistreatment differed between workers that lived in the United States and those that had H-2A temporary visas. Some participants mentioned that US agricultural workers are treated worse than H-2A workers, and others said the opposite, indicating that there is a perception and experience that H-2A status can affect how a worker is treated for either better or worse, depending on where you work. For example, Miguel (male), shared that when H-2A workers arrive for the season is when the company starts providing water for all workers, *“When the contracted ones [H-2A] arrive is when they provide water... the reality is that they don't treat us as well as them.”* Dalia (female) also shared, *“now that the contracted [H-2A] workers are coming, some ranches raise the salaries... when they [H-2A workers] leave, you go back to the minimum wage.”* On the other hand, Juliana (female) shared that she's seen H-2A workers be discriminated against, *“They don't treat them [H-2A workers] the same... they talk to them a bit harsher.”*

A few participants were deeply discontented by preferential treatment and nepotism from their supervisor to other workers, which contributed to feelings of marginalization that they and their coworkers experienced at work. Joaquin (male) shared his experience, *“If another person arrives and the supervisor likes them, they get preference, even if you have more time working there, and you do feel bad, but what can you do?”* Aside from nepotism and H-2A status, a handful of participants also mentioned that documentation status and ethnicity affected how they

were treated at work. David (male) shared his observations in how immigration and ethnicity affect their job security:

“If we work eight hours with 50 or 60 pounds of apples, eight hours outside, can you imagine. It's a long time, and there are people who hurt their backs... And I also saw a case of a woman that came and got hurt...The supervisor arrived [and said to the woman], 'you know there's no work for you anymore, you can go home now' and they do this more with people who don't have papers because with a citizen I don't think it's so easy for them to do it. With citizens they don't do that, they do it more with the ones who are Hispanic and immigrant.”

Another participant, Ariana (female) shared, *“The dream is legalization. Or at least permission to work.”*

Laws that are intended to protect agricultural workers may not be implemented as intended across employers

Participants also shared their experiences with recent changes to paid sick leave and overtime pay laws in Washington State.¹¹² Starting in 2018, all employers in Washington were required to provide paid sick leave to employees, including agricultural workers.¹¹² In 2021, overtime protections expanded to include all agricultural workers in Washington, with a gradual phase-in plan so all workers are paid overtime for all hours over 40 worked in a week by January 2024.¹¹³

A handful of participants felt unsupported in using their sick leave and were even retaliated against for using or asking about their sick leave hours. Sara (female) shared her experience in not being able to leave work to take care of her family:

“You also have to see that you also have a family, and you also care about your job... Sometimes you don't know what to do, do you pick your child or work? Because if they fire you, you don't

have a job, but your child is sick and needs to go to the doctor, and to have them [employer] tell you no, well you have to stay, what can you do?"

Peter (male) shared that it's not consistent in how their employer allows the use of paid sick leave, *"if we have the hours, yes [we can use them], but sometimes if they [employer] want to, they put them, and sometimes they don't, they don't give it to us."*

Additionally, Elias (male) shared his experience in feeling like his employer discouraged employees staying informed about paid sick leave benefits and his experience gaining the information from other sources:

"Well, the truth is that they almost don't want that as a worker's right. If the boss has never said, you know that you have the right, that after so many hours you have the right to go to the doctor or all that, no, they are silent, you find out from other people or from other ranches and that's how you find out the information...But other ranches also don't want to, some workers have to fight for their sick leave and if workers ask for it, they're almost fired for talking about it."

Despite the passage, phase-in, and implementation of the overtime pay law to include agricultural workers in Washington, employers have found ways to avoid paying agricultural workers overtime by reducing workers' weekly hours and/or hiring more workers to complete the work. Many participants expressed concerns with how employers handled the overtime pay changes. Instead of being paid more due to the expanded overtime pay benefits to agricultural workers in Washington, it led to being paid lower wages overall. Magdalena (female), as well as many others, had her hours reduced, *" they've [employer] already cut the hours, so we don't go over 40 hours and they no longer have to pay [overtime]."* Another participant, Kimberly

(female) also shared similar sentiments that her hours are also cut so she hasn't received overtime pay either, *"They [employers] prefer to give us a day off than to pay overtime."*

Participants also said that employers also started hiring more workers to avoid overtime pay. Andres (male) shared his financial concerns with the reduction in hours:

"But the disadvantage is that the employer figures out, if they did the work with ten workers before, they will hire 20 or 15 more workers, for what? To try to do the work that they did before with their ten workers working 50 or 60 hours, now they are going to do it with 15 workers only working 40 hours. So, I have heard from many people who work in agriculture, who say that right now they believe that they will not be able to survive with 40 hours a week because they have to pay rent, they have to pay bills, they have to pay gas, it is very high cost of living to survive with 40 hours of pay."

2.4 Discussion

This study aimed to describe the impact of labor and social policies on agricultural workers' work and health. Participants described physically demanding aspects of their work which led to injuries and other health concerns. Agricultural workers faced several barriers to accessing health services, such as cost, language, rurality, and navigating the workers' compensation system. They experienced marginalization and mistreatment based on their race/ethnicity, H-2A status, immigration status, and supervisor preferences. Participants also shared that recent laws intended to provide overtime pay, had led to less work and lower incomes overall. Our study was unique in its use of qualitative interviews with agricultural workers from across Washington and for documenting the impact of recent labor law changes.

Our findings aligned with other study findings in terms of the health effects of agricultural work. One recent qualitative study among agricultural workers in the Midwest found

similar health concerns with pesticide exposure, handling chemicals, and dangerous equipment,¹¹⁴ and a systematic review found that chemical exposures were a source of increased adverse health effects among agricultural workers.¹¹⁵ A more recent qualitative study focused on understanding many work-related factors impacting agricultural workers in Washington found that exposure to heat, smoke, and pesticides, impact physical health, and are risk factors for injuries and musculoskeletal disorders.⁹⁶ Another qualitative study found poor physical health, mistreatment and discrimination at work, substandard housing, and food insecurity can all lead to adverse mental health.⁸⁸

In addition to physical and mental health impacts, previous researchers have described the structural vulnerability of Latino migrant laborers, including agricultural workers. The factors that put agricultural workers at higher risk for mistreatment and exploitation at work - like race, ethnicity, documentation and immigration status- also make it difficult for agricultural workers to access social resources in their community, like health care services.¹¹⁶ Our findings confirmed the relationships in our conceptual model on the effects of work exploitation, and marginalization that not only put agricultural workers at risk for adverse health but also create additional barriers to accessing health care services.^{44-46, 56, 57} This was also illustrated when participants described the barriers in navigating the workers' compensation system, which aligned with a recent qualitative study in Washington in the perception of premature closing of workers' compensation claims as well as language access barriers in receiving care and submitting a claim.⁹⁶ These findings illustrate the need to address existing and well documented barriers to health care services, including worker's compensation for work-related injuries.

Previous studies have found that agricultural workers experience discrimination and mistreatment from their employers and supervisors due to their race/ethnicity, immigration

status.^{51, 88} In one study, workers reported being mistreated or bullied depending on their supervisor's mood or management style. This type of supervisor mistreatment and disrespect can impact workers' mental health by causing distress and anxiety; physical health can also be impacted when workers try to work faster despite their physical abilities. Previous research has found that immigration status and ability to speak English put workers at higher risk of being discriminated against by their employer.⁸⁸ This growing literature suggests the need for future research about the long-term health effects of marginalization and discrimination across the life course.

The experiences of marginalization and mistreatment agricultural workers shared were often exacerbated by lack of work authorization for undocumented immigrants. Agricultural workers that are undocumented and those with H-2A visas have even additional barriers to leaving a job where they are mistreated due to the barriers of supplying a new company with work authorization and their visa being tied to a certain employer, respectively. These are examples of ways that racialization and immigration policies contribute to exploitation of agricultural workers. Quesada et al describes how undocumented individuals are not only economically disenfranchised but criminalized and devalued in their individual and cultural worth as we allow the lack of legal and structural protections for agricultural workers to continue.^{86, 117, 118} The findings from this study confirm findings from previous studies, illustrating that more work needs to be done to prevent the mistreatment and exploitation of workers.

However, studies have assessed the implementation of recent labor law protections like overtime pay and/or sick leave for agricultural workers. Previous research has documented the potential impacts of overtime pay for US crop workers and the authors describe the trends in

hours worked per week by agricultural workers using NAWs 2009-2018 data.¹¹⁹ Agricultural workers in the northwest region (which includes WA along with MT, OR, ID, WY, NV, UT, and CO), found that 59.4 percent of crop workers worked on average 45.1 hours per week.¹¹⁹ However, our findings indicate that employers in WA are cutting workers' hours to remain at or under the phase-in threshold for overtime pay. Additionally, another study in New York, studied the impact of minimum wage and overtime thresholds among berry crop workers in New York and found that workers average 50 hours of work per week.¹²⁰ However, employers have been financially struggling with the decreasing phase-in overtime thresholds over the last few years and instead of paying overtime, many have resorted to not paying overtime and letting their crops drop and rot.¹²⁰ In response, the New York labor commissioner passed the Farm Employer Overtime Tax Credit that allows eligible farmers to apply for a tax credit for reimbursement for employee overtime hours paid.^{120, 121} Providing tax credits as well as working with agricultural workers and employers closely to ensure that agricultural workers are paid equitably for their labor, including overtime hours, while employers are still able to sustain their business will be important to find equitable solutions to the implementation of policies.

Our study had some limitations. While we were able to conduct interviews in English and Spanish, we were not able to include workers that speak indigenous languages from Central America. We used snowball sampling, and therefore we likely oversampled in certain geographic areas and work types in ways that may not be representative of Washington agricultural worker demographics overall. However, given that there aren't many qualitative studies that highlight agricultural workers in WA, it's a strength to include and represent many counties and workers that do various tasks and reveal similar challenges. Additionally, the research team collecting and analyzing the data were all undergraduate and graduate public health students from

agricultural worker backgrounds in WA, which enhanced the insight and understanding of the agricultural worker community of this study.

Table 2.1 Participant characteristics (N = 32)

Agricultural Worker Demographics and Work Characteristics	N (%)
Sex	
Female	16 (50.0%)
Male	16 (50.0%)
Age	
Mean (SD)	45.5 (7.6)
Median [Min, Max]	45 [27, 63]
Ethnicity	
Hispanic/Latine	32 (100%)
Indigenous background	
Yes	7 (21.9%)
No	23 (71.9%)
Prefer not to say	2 (6.2%)
Marital status	
Single	5 (15.6%)
Married/lives with partner	15 (46.9%)
Divorced/separated	7 (21.9%)
Other/prefer not to say	5 (15.6%)
Country of origin/ birthplace	
Mexico	31 (96.9%)
US (California)	1 (3.1%)
Household annual income	
Less than \$20,000	8 (25%)
\$20,000 to \$34,999	15 (46.9%)
\$35,000 to 49,999	5 (15.6%)
\$50,000 to \$74,999	3 (9.4%)
Prefer not to say	1 (3.1%)
Years of experience in agricultural work	
Mean (SD)	19.8 (10.1)
Median [Min, Max]	20 [1, 45]
Work type	
Packing shed - (sorting tree fruit, potatoes, onions)	11 (34.4%)
Field work (planting, thinning, harvesting tree fruit)	17 (53.1%)
Heavy machinery/pesticide and/or general manager	4 (12.5%)
Hours worked per week	
40 or less	5 (15.6%)
More than 40	27 (84.4%)

History of work injury	
Yes	20 (62.5%)
No	12 (37.5%)
Employer provided drinking water	
Yes	28 (87.5%)
No	4 (12.5%)
Employer provided restroom/portable restroom	
Yes	31 (96.9%)
No	1 (3.1%)
Employer provided handwashing station	
Yes	29 (90.6%)
No	3 (9.4%)
Training of pesticide in last 6 months	
Yes	21 (65.6%)
No	10 (31.3%)
Not applicable	1 (3.1%)

CHAPTER 3: AGRICULTURAL EXCEPTIONALISM: DEVELOPMENT OF A LABOR LAW EQUITY INDEX TO CAPTURE STATE VARIATION IN LEGAL PROTECTIONS FOR AGRICULTURAL WORKERS IN THE US

3.1 Introduction

Agricultural workers are an integral part of our food system. There are 2.6 million agricultural workers employed in the US that grow, tend, harvest, and package the food we eat.¹ An estimated 78% of agricultural workers are Hispanic or Latinx, 70% were born outside the US, and 45% don't have authorization to work in the US.³ Despite their important contributions to the economy and US food system, because such a large percentage of agricultural workers are racial/ethnic minorities they experience health and social inequities rooted in structural racism.^{1,}¹²² Agricultural exceptionalism is a form of structural racism that excludes agricultural workers from major federal and state worker protection laws in the US.^{76 15, 29} Up to the early 1900s, work conditions for agricultural workers were similar to most other industrial occupations, with low wages, child labor, long work shifts, and extremely hazardous conditions.⁸ In 1938, the Federal Fair Labor Standards Act (FLSA) was enacted in the US to guarantee workers a federal minimum wage and over-time pay, and to prohibit child labor.^{7, 123} However, agricultural and domestic workers (i.e. household workers) were excluded from the FLSA and the National Labor Relations Act (NLRA) of 1935, which was enacted to protect the rights of workers and employers to collective bargaining to address work conditions.^{124, 125} At the time, both agriculture and domestic industries largely employed Black workers.^{9, 10} These exclusions were the result of a political compromise with Southern Democrats who wanted to preserve racial segregation and exploitation.^{9, 10} In 1966, Congress extended the FLSA to apply the minimum wage to most agricultural workers and employers.¹³ Nonetheless, differences between the

protections of agricultural workers and other workers remained. For example, the minimum age for children working in agriculture was 12 years old as opposed to 16 years old which was the standard for other jobs.⁷ Another example is the FLSA exemption of small agriculture employers in minimum wage and overtime provisions, with legal language such as, “*Any employer in agriculture who did not utilize more than 500 "man days" of agricultural labor in any calendar quarter of the preceding calendar year is exempt from the minimum wage and overtime pay provisions of the FLSA for the current calendar year. A "man day" is defined as any day during which an employee performs agricultural work for at least one hour.*”¹⁷ This legal text provides an example of current federal minimum wage and overtime exemptions for agricultural workers at small employers and highlights the type of legal language we coded in this study.

There is also important variation across states in the protections offered to agricultural workers. For example, while most states have state minimum wages that are higher than the federal minimum wage of \$7.25,¹⁴ only seven states (Arizona, California, Colorado, Connecticut, Nevada, New York, and South Dakota) have minimum wages that are both higher than the federal minimum wage and inclusive of all agricultural workers.^{15, 16} An additional 13 states (Arkansas, Florida, Hawaii, Illinois, Maryland, Michigan, Minnesota, Missouri, Montana, New Mexico, Ohio, Oregon, and Washington) have minimum wages higher than the federal minimum wage and require *some* employers (small farm exemptions) to pay agricultural workers the state minimum wage.¹⁶ However, the variation in how states define small employers leads to complexities in understanding whether agricultural workers are entitled to a minimum wage in these states.^{15, 16} Similarly, overtime pay is an important protection for agricultural workers, considering the long hours they are required to work during the busy harvest months. The FLSA was never amended to provide overtime pay for agricultural workers,¹⁷ and only a few states

have laws that provide overtime pay to agricultural workers, including CA in 2016, CO and WA in 2022, and OR in 2023.¹⁸⁻²² Several other states - Hawaii, Maryland, Minnesota, and New York - also enacted overtime pay laws to include agricultural workers with restrictions (small farm exemptions or more hours required above the traditional 40-hour work week before qualifying).^{15, 18, 23-26 27} Legal epidemiology is a field of study that assesses laws as a factor that can cause, distribute, or prevent disease and injury and therefore affect population health.⁶⁵ For example, legal epidemiology methods have been used to build indices related to women's reproductive rights (Wallace et al.),¹²⁶ health and reproductive laws in relation to maternal and birth outcomes (Bossick et al.),¹²⁷ and examine structural xenophobia among immigrants (Samari et al.).¹²⁸ These indices standardize composite indicators and use different weights depending on the importance of the components that make up the various indices.¹²⁸ Our study sought to add to this literature in order to better understand the relationship between labor laws and occupational health. We assessed whether agricultural workers were included in benefits most other workers receive to understand how these laws may be perpetuating occupational health inequities. We focused on three labor protections: workers' compensation, minimum wage, and overtime pay.

3.2 Methods

Scope: We used legal epidemiology⁶⁵ and policy surveillance methods⁶⁶ - to create a longitudinal dataset of state statutes and regulations (hereafter, referred to as "laws") regarding labor protections for agricultural workers from 2001-2017 in 39 states. This seventeen-year time frame was selected because it allowed us to assess changes across multiple years. Previous studies have used a similar approach, including ten to twenty years to assess changes in laws over time.^{128, 129} We selected 39 states based on which states had the most data on agricultural workers in the National Agricultural Workers Survey (NAWS).⁶⁹ States with a low count or no

agricultural workers in the 2001-2017 NAWS data were excluded (Alaska, Hawaii, Maryland, Nevada, New Hampshire, North Dakota, Rhode Island, and South Dakota, Vermont, West Virginia, Wyoming). The three labor laws included in this study are: 1) workers' compensation, 2) minimum wage, and 3) overtime pay. Workers' compensation provides wage replacement benefits, medical treatment, and other benefits to workers who have been injured on the job.¹³⁰ Minimum wage is the state or federal (whichever is higher) minimum rate of pay per hour worked employers must pay employees.¹³¹ Overtime pay is the requirement for employers to pay employees a minimum rate of time and a half for each hour over 40 hours worked in a given week.¹³² In addition to exemptions for agricultural workers, there are some states with specific exemptions for youth working in agriculture. We did not capture exemptions in these three labor protections for youth.

Primary Data Collection: We collected legal text for the relevant state laws in place from January 1, 2001, to December 31, 2017. For each of the three legal benefits or protections — workers' compensation, minimum wage, and overtime pay—we reviewed multiple laws. We tracked amendments and effective dates for the time frame of interest to ensure that we included significant changes in these laws.

Data Collection Methods: We identified legal citations using Farmworker Justice's Interactive Maps.¹⁵ Then we pulled the legal text of the relevant laws from Thomson Reuters Westlaw (Westlaw), a legal research database.⁶⁷ We searched state legislative websites or Hein Online,¹³³ an online research platform for historical and legal documents, when Westlaw did not have the law or years of interest. Preliminary interpretation of the legal text was compared with Farmworker Justice Interactive Maps (for workers' compensation, minimum wage, and overtime pay) and the National Agricultural Law Center (for minimum wage and overtime pay), to

confirm consistent interpretation of labor laws across states and increase reliability in interpretation of the legal text.^{15, 16, 18}

Once relevant laws were identified for a given state, we created a master sheet (summarizing the relevant laws & amendments), amendment tracker (tracking changes in relevant laws in chronological order from 01/01/2001 to 12/31/2017 and types of changes made to the law), and legal text file (collecting the legal text of relevant laws during time period of interest from Westlaw) for each state and law included in the LLEI.

Coding

Development of Coding Scheme: We developed coding questions through an iterative process. A draft of the coding questions was developed by ECS, which was shared with the research team at the University of Washington (BB, HH, JS, RM), trainers at The Policy Surveillance Program, and CDC Public Health Law Program Fellowship Preceptors for feedback (AM, RH). To refine the coding scheme, researchers reviewed existing data and coding of relevant laws from sources including Farmworker Justice and National Agricultural Worker Law Center. The coding questions aimed to assess whether states had 1) a general law regarding specific worker protection, 2) included or excluded agricultural workers and to what extent (i.e. all agricultural workers included or if there are exemptions for certain agricultural workers), and 3) if applicable, any exemptions for agricultural workers (e.g., small employers, family working on farm). The final questions (Tables 3.3- 3.5) were added to the Public Health Law Information Portal (PHLIP), which is a web-based software platform used to code the law at CDC.⁶⁸ The researchers then used the legal text collected to answer the coding questions based on measurable aspects of the law expressly written in the text. Tables 3.3- 3.5 provide the coding questions along with specific rules used. Each state was coded independently by two researchers, and

coding progress, discrepancies, and validation were discussed and resolved based on the coding protocol.

Development of the Labor Law Equity Index (LLEI): Our numerical coding scheme (Tables 3.3- 3.5) was based on our conceptual framework and was guided by previous studies that have used legal epidemiology methods with similar coding schemes.^{126, 127, 134, 135} Each legal protection received a score from -1 to +2 for each state and year in the 17-year period where -1 = laws expressly excluded agricultural workers, 0 = no law for any workers or it was optional to include agricultural workers (i.e., neutral), +1 = some agricultural workers were included (e.g., small farm exemptions), and +2 = all agricultural workers were included or not expressly excluded in the law. To develop the index, the score from these three legal protections for each jurisdiction was totaled. The range of the index score was -3 to +6 for each state-year, with more positive scores indicating greater inclusivity and more negative scores indicating greater exclusivity. For states that had changes within the 2001–2017-time frame, the score for that law was the status of the law on January 1st of that year. In our preliminary analysis, we identified only five significant amendments in the three labor protections across the 39 states over 17 years. Due to the small change over time (13% of the states), we restricted our analysis to scores calculated for 2017.

Human Subjects Protections: The University of Washington Human Subjects Division determined this study to be exempt.

3.3 Results

Labor Law Equity Index Scores

In **Table 3.1**, we present the mean scores for all three labor protections. The mean LLEI score for all states was 1.05 (SD = 1.85), with a median of 1 (range = -2 to +5). Workers'

compensation had the highest mean score of 0.90 (SD = 0.85), meaning it was the most likely to include agricultural workers and overtime pay had the lowest mean score of -0.38 (SD = 0.67), meaning it was the least likely to include agricultural workers. **Table 3.2** presents the distribution of LLEI scores across states. Most states (N = 23, 59%) had LLEI scores higher than 0, indicating some level of inclusion for agricultural workers. Seven states (18%) had scores of 0, indicating neutral laws for agricultural workers. Nine states (23%) had negative scores, indicating exclusionary laws for agricultural workers. The states with the highest LLEI scores (most inclusive laws) were California with a score of 5; Arizona, Colorado and Oregon with a score of 4; and New Jersey, Minnesota, Massachusetts, Maine, Idaho, Connecticut with a score of 3 (see **Figure 3.1**). These are the states where all or some agricultural workers were provided workers' compensation, minimum wage, and/or overtime pay. Florida, Iowa, Montana, Washington, and Wisconsin had a score of 2 and Florida, Idaho, Illinois, Louisiana, Michigan, New Mexico, Ohio, Pennsylvania, Texas, and Utah scored 1, which indicates these are states that are minimally inclusive of agricultural workers. Alabama, Mississippi, Missouri, Nebraska, New Mexico, Oklahoma, South Carolina, and Virginia, all scored a 0, which indicate neutral laws towards agricultural workers. Arkansas, Delaware, Georgia, Nebraska, New York, North Carolina, and Tennessee all scored a -1, and Indiana, Kansas, Kentucky, and Missouri all scored the lowest with a -2. States with a negative score indicate states with the most exclusionary labor laws with respect to workers' compensation, minimum wage, and overtime pay for agricultural workers. Scores for all states are included in Table 3.6.

We also observed variation in LLEI scores across geographic regions (**Figure 3.2**). The geographic areas with less protective labor laws were concentrated in the Southeast and Central Midwest regions of the US. In these areas many states had LLEI scores ranging from -2 to 0,

indicating agricultural were expressly excluded from labor protections and also not expressly included either (neutral scores). The geographic areas with the most protective laws were in the West. In the Western regions, states had LLEI scores ranging mostly from 2 to 5. Northern and Southern bordering states or those around the perimeter of the Southeast and Central Midwest regions, tended to have LLEI scores ranging from 1 to 3.

Workers' compensation

All 39 states had workers' compensation laws, see Figures 3.3 and 3.4 for the workers' compensation coding results. Two states amended their workers' compensation laws within the 17-year time frame from 'optional' to include **some** agricultural workers, Nebraska (2004) and New Mexico (2017). Ten states included **all** agricultural workers in workers' compensation coverage, this means that agricultural workers were either expressly included or not expressly excluded in the law. Fifteen states included **some** agricultural workers in their workers' compensation laws. These are states that had exemptions for agricultural workers (e.g., small farm exemption among 14 states and family working on farm exemption among five states). Ten states neither included or excluded agricultural workers in their worker's compensation and were coded 0 or 'optional' for employers to opt in. Two states expressly excluded agricultural workers in their workers' compensation laws.

Minimum wage

Out of the 39 states, there were 34 states with minimum wage laws (scores for all states presented in Figures 3.5 and 3.6). The five states that did not have minimum wage laws were Alabama, Louisiana, Mississippi, South Carolina, and Tennessee. Seven states included **all** agricultural workers. Massachusetts' minimum wage laws included all agricultural workers, but the minimum wage dollar amount is lower than the minimum wage for other workers. Fourteen

states included **some** agricultural workers in their minimum wage laws. Exemptions for these states included, small farms, family working on farm, those paid piece rate, and those who commute daily from their permanent residence. The remaining ten states excluded agricultural workers from their minimum wage laws.

Overtime pay

Of the 39 states, 23 states had overtime pay laws (see Figures 3.7 and 3.8, for scores for all states). Sixteen states did not have an overtime pay law. None of the 23 states with overtime pay laws included **all** agricultural workers. Four states included **some** agricultural workers in overtime pay benefits, indicating exemptions for certain agricultural workers. Most of the exemptions for these four states included small farms, family working on farm, and other exemptions like salaried agricultural workers, those working with large bird farms, and those being paid piece-rate. Nineteen states had overtime pay laws that expressly excluded agricultural workers.

3.4 Discussion

This study assessed the inclusion of agricultural workers in three labor laws: workers compensation, minimum wage, and overtime pay. We developed a Labor Law Equity Index that scores states based on their labor laws. No states included all agricultural workers in the three protections and no states expressly excluded agricultural workers from all three protections. Most states had a workers' compensation law and also included agricultural workers. For minimum wage, most states had a minimum wage law and also included agricultural workers. However, it was less common for states to have an overtime pay law and include agricultural workers.

Most states had a positive LLEI score, which indicates that some or all agricultural workers were included in these three protections. Almost a quarter of the states had negative LLEI scores, which expressly excluded agricultural workers in these three labor protections. For example, Indiana's minimum wage law excluded agricultural workers from their definition of 'employee' and thus are excluded from minimum wage, “*Employee means any person employed or permitted to work or perform any service for remuneration or under any contract of hire, written or oral, express or implied by an employer in any occupation, but shall not include any of the following: (m) Persons engaged in agricultural labor.*” (Statute citation: IN ST 22-2-2-3). The exclusion of agricultural workers from definitions of 'employee' was common among states that excluded agricultural workers. The states that had an LLEI score of 0 were states with no minimum wage or overtime pay laws for any workers. These states, and states with lower state minimum wage laws, default to federal minimum wage of \$7.25 which hasn't changed since 2009.¹³¹ Many have argued that the federal minimum wage is not a livable wage, because it makes it difficult to afford basic necessities for health, e.g., food, housing, transportation, healthcare.¹³⁶ Research has shown that low incomes resulting from low minimum wages can have a negative impact on health, including lower life expectancies, higher morbidity and mortality.²⁷

There was also geographic variation in LLEI scores. The variation in LLEI scores across geographic regions indicate that agricultural workers that move across states for employment, may have different protections depending on where they are living and working. The geographic areas with less protective labor protections were concentrated in the Southeast and Central Midwest regions of the US. These are states in the US with large Latinx populations, many of whom were recruited by the agricultural industry to meet workforce demands.^{137, 138} The

geographic areas with the most protective laws were in the West and these are also the states that are more likely to have labor protections for agricultural workers overall. For example, California, Colorado, Minnesota, Oregon, and Washington have standards for workplace heat exposure.^{139, 140} While states in other regions (such as Texas and Florida) have enacted preemptive laws that block any local or city jurisdictions in those states from enacting heat protections.¹⁴¹ The variation in these labor laws across states may not be well understood by agricultural workers, especially those that do not speak English or are undocumented. Many agricultural workers who are undocumented do not receive important information on labor laws, due to the lack of Spanish or indigenous language materials, or anti-immigrant policies that restrict the dissemination of information.^{52, 53}

There were several strengths in this study. Our study is novel in its use of legal epidemiology methods to assess agricultural exceptionalism in state labor laws. This index was developed using established legal epidemiology methods.^{142, 143} We systematically coded three labor protections for agricultural workers. We also modeled the LLEI after other index measures that have been developed on related topics.^{135, 144} For the development of the LLEI, the team coded only legal statutes and regulations, and although we referred to secondary sources like Farmworker Justice and the National Agricultural Law Center to ensure consistent interpretation, the team used a rigorous coding protocol based on the text of the state laws. This systematic approach strengthens the consistency and reliability of our methods and results. The creation of this index will allow future researchers to assess the impact of a combination of laws on the health and well-being of agricultural workers.¹⁴⁵

Future research using the LLEI score can help us understand the legal and systemic factors that may be contributing to health disparities using state-level and national data.

Additionally, our results can be used and applied by other researchers interested in agricultural worker health and our methods can be replicated to build on this index or applied to other legal epidemiology topics to build our understanding in how laws impact health.

There are also some limitations to our study. The LLEI tracks these three laws up to 2017, but many states have amended their labor laws after 2017. California, Washington, Minnesota, and New York, enacted laws in the following years that provided overtime pay for all or some agricultural workers.^{15, 23, 24, 146, 147} Future research can build on the index to provide updated LLEI scores and historic scores for states that were excluded from our study. A second limitation is that this study is not able to accurately assess how the law is practiced or implemented based on a reading of the language of the law. Implementation studies and qualitative interviews are needed to further understand the enforcement and application of these labor protections.

Table 3.1 Descriptive statistics of labor protection scores and LLEI score across states	Mean (SD)		Median [min, max]	
Workers' compensation scores	0.90	(0.85)	1	[-1, 2]
Minimum wage scores	0.54	(1.07)	1	[-1, 2]
Overtime pay scores	-0.38	(0.67)	0	[-1, 1]
LLEI scores	1.05	(1.85)	1	[-2, 5]

Table 3.2 LLEI score distribution across sample

LLEI score	Count of states (%)	
6 (highest score)	0	(0)
5	1	(3)
4	3	(8)
3	6	(15)
2	5	(13)
1	8	(20)
0 (neutral score)	7	(18)
-1	6	(15)
-2	3	(8)
-3 (lowest score)	0	(0)

Figure 3.1 Labor Law Equity Index scores by state

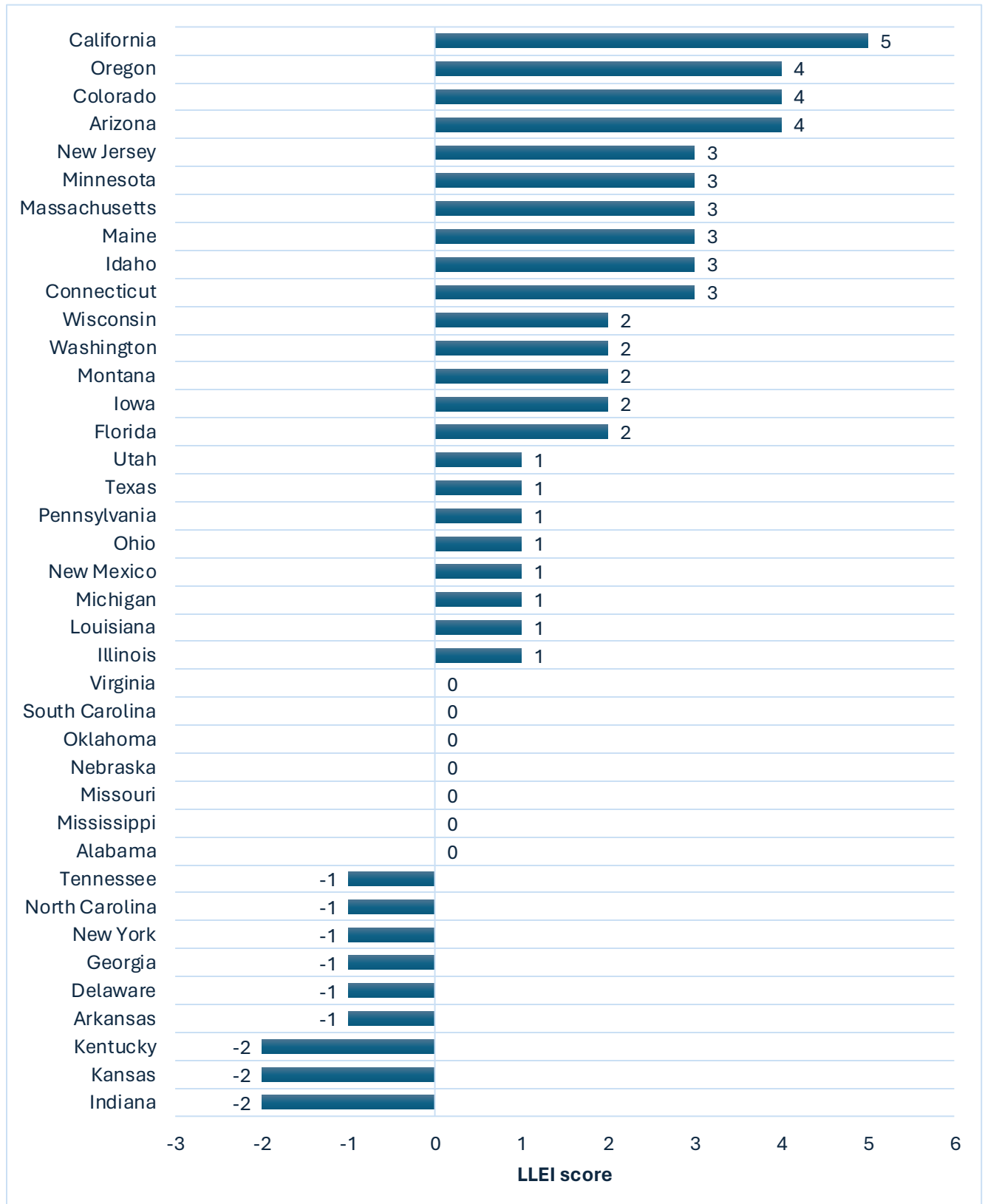
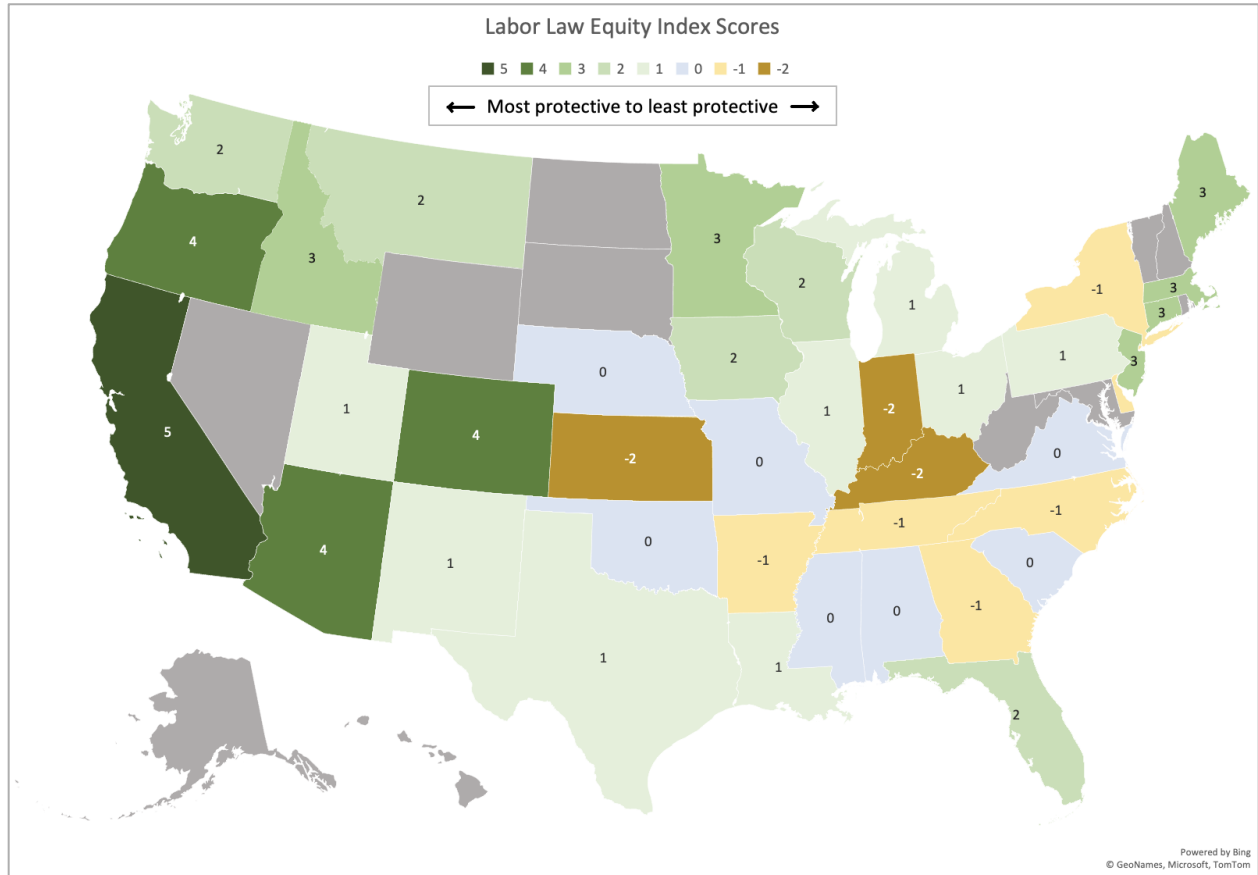


Figure 3.2 Map of the Labor Law Equity Index Scores



Note: The 11 grayed out states were not included in this study.

Table 3.3 Supplemental table: Workers' compensation coding questions

Question	Possible Answers (numerical score)	Question Type
1. Does the state have a workers compensation law?	Yes (1) No (0)	Binary-mutually exclusive
Note: For this coding question, code 'yes' if there is a law, and 'no' if there is no legal text/statute for this law. The research team has a good idea on which states have a worker comp law (all N=39 states) based on background research and using existing sources to verify.		
2. Does the workers compensation law include agricultural workers?	Yes, all agricultural workers included (2) Yes, some agricultural workers are included (1) Optional for employers to include agricultural workers (0) No, agricultural workers are excluded from WC law (-1)	Categorical - mutually exclusive
Note: For this coding question, code 'Yes all agricultural workers included' if there are no exclusion or exceptions of agricultural workers. Code 'Yes, some agricultural workers are included' if some ag workers are included, but there are exclusions or exceptions of certain agricultural workers. Code 'Optional for employers to include agricultural workers' if the statute/law has language that excludes ag workers/farm laborers, but there's also a way that employers can opt in to cover agricultural workers. Code 'No, agricultural workers are excluded from WC law' if the statute/law has language that excludes agricultural workers/farm laborers and there is not description or option for employers to opt in.		
2a. If selected "Yes, some agricultural workers are included," what is the exemption?	Small farms (specified by number of employees or payroll) Family working on farm Other	Categorical – select all that apply
Note: For this coding question, select 'small farms' if there are exclusions of ag workers by size of farm/employer as specified by number of employees, workdays, number of hours worked consecutively, or payroll (certain amount of money per year that is paid to employees). Select 'family working on farm' if there are exclusions specified by family members of farm owner/employer. Select 'other' to capture other types of exclusions aside from the two above. Please include a note that describes the type of exception or exclusion described in the statute.		

Table 3.4 Supplemental table: Minimum wage coding questions

Question	Possible Answers (numerical score)	Question Type
1. Does the state have a minimum wage law?	Yes (1) No (0)	Binary- mutually exclusive
Note: For this coding question, code ‘yes’ if there is a law, and ‘no’ if there is no legal text/statute for this law. The research team has a good idea on which states don’t have an overtime pay law (all N=6 states) from 2001-2005 and (N=5) from 2006-2017 (Florida implemented MW law in 2005) based on background research and using existing sources to verify. The following states are coded ‘no’ from 2001-2005: Alabama, Florida, Louisiana, Mississippi, South Carolina, Tennessee, and all but Florida, from 2006-2017.		
2. Does the state minimum wage law cover agricultural workers?	Yes, all agricultural workers included (2) Yes, some agricultural workers included (1) Agricultural workers included in MW law but lower wage (1) No MW law for any workers (0) No, agricultural workers explicitly excluded from MW law (-1)	Categorical- mutually exclusive
Note: For this coding question, code ‘Yes all AW included’ if there are no exclusion or exceptions of agricultural workers in the overtime pay law. Code ‘Yes, some agricultural workers are included’ if some agricultural workers are included, but there are exclusions or exceptions of certain agricultural workers. Exemptions for youth are not within the scope of this project. If there are exemptions for youth only, do not code as “Yes, some agricultural workers are included,” please code as “Yes all agricultural workers included.” Code “Agricultural workers included in MW law but lower wage’ if agricultural workers get paid minimum wage but it’s specified as a lower wage than other workers. Code ‘No MW law for any workers (including agricultural workers)’ if you answered ‘no’ to Q1 above. Code ‘No, agricultural workers excluded from OT law’ if the statute/law has language that excludes ag workers/farm laborers and there is not description or option for employers to opt in to paying agricultural workers overtime pay.		
2a. If selected “Yes, some agricultural workers are included,” what is the exemption?	Small farms (specified by number of employees or payroll) Family working on farm Other	Categorical – select all that apply

Note: For this coding question, select ‘small farms’ if there are exclusions of agricultural workers by size of farm/employer as specified by number of employees, workdays, number of hours worked consecutively, or payroll (certain amount of money per year that is paid to employees).

Select ‘family working on farm’ if there are exclusions specified by family members of farm owner/employer.

Select ‘other’ to capture other types of exclusions aside from the two above. Please include a note that describes the type of exception or exclusion described in the statute.

Table 3.5 Supplemental table: Overtime pay coding questions

Question	Possible Answers (numerical score)	Question Type
1. Does the state have an overtime pay law?	Yes (1) No (0)	Binary- mutually exclusive
Note: For this coding question, code ‘yes’ if there is a law, and ‘no’ if there is no legal text/statute for this law. The research team has a good idea on which states don’t have an overtime pay law (all N=17 states) based on background research and using existing sources to verify. The following states are coded ‘no’: Alabama, Arizona, Colorado, Delaware, Florida, Georgia, Iowa, Idaho, Louisiana, Mississippi, Nebraska, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Virginia.		
2. Does the state overtime pay law include agricultural workers?	Yes, all agricultural workers included (2) Yes, some agricultural workers are included (1) No OT law for any workers, including agricultural workers (0) No, agricultural workers excluded from OT law (-1)	Categorical- mutually exclusive
Note: For this coding question, code ‘Yes all agricultural workers included’ if there are no exclusion or exceptions of ag workers in the overtime pay law. Code ‘Yes, some agricultural workers are included’ if some agricultural workers are included, but there are exclusions or exceptions of certain agricultural workers. For example, more hours worked per week before agricultural workers are eligible for overtime pay benefits. Code ‘No OT law for any workers (including agricultural workers)’ if you answered ‘no’ to Q1 above. Code ‘agricultural workers excluded from OT law’ if the statute/law has language that excludes ag workers/farm laborers and there is not description or option for employers to opt in to paying ag workers overtime pay.		
2a. If selected “Yes, some agricultural workers are included,” what is the exemption?	Small farms (specified by number of employees or payroll)	Categorical – select all that apply

	Family working on farm	
	Other	
Note: For this coding question, select ‘small farms’ if there are exclusions of agricultural workers by size of farm/employer as specified by number of employees, workdays, number of hours worked consecutively, or payroll (certain amount of money per year that is paid to employees). Select ‘family working on farm’ if there are exclusions specified by family members of farm owner/employer. Select ‘other’ to capture other types of exclusions aside from the two above. Please include a note that describes the type of exception or exclusion described in the statute. For example, more hours worked per week before ag workers are eligible for overtime pay benefits.		

Figure 3.3 Supplemental figure: Workers' compensation scores by state - 2017

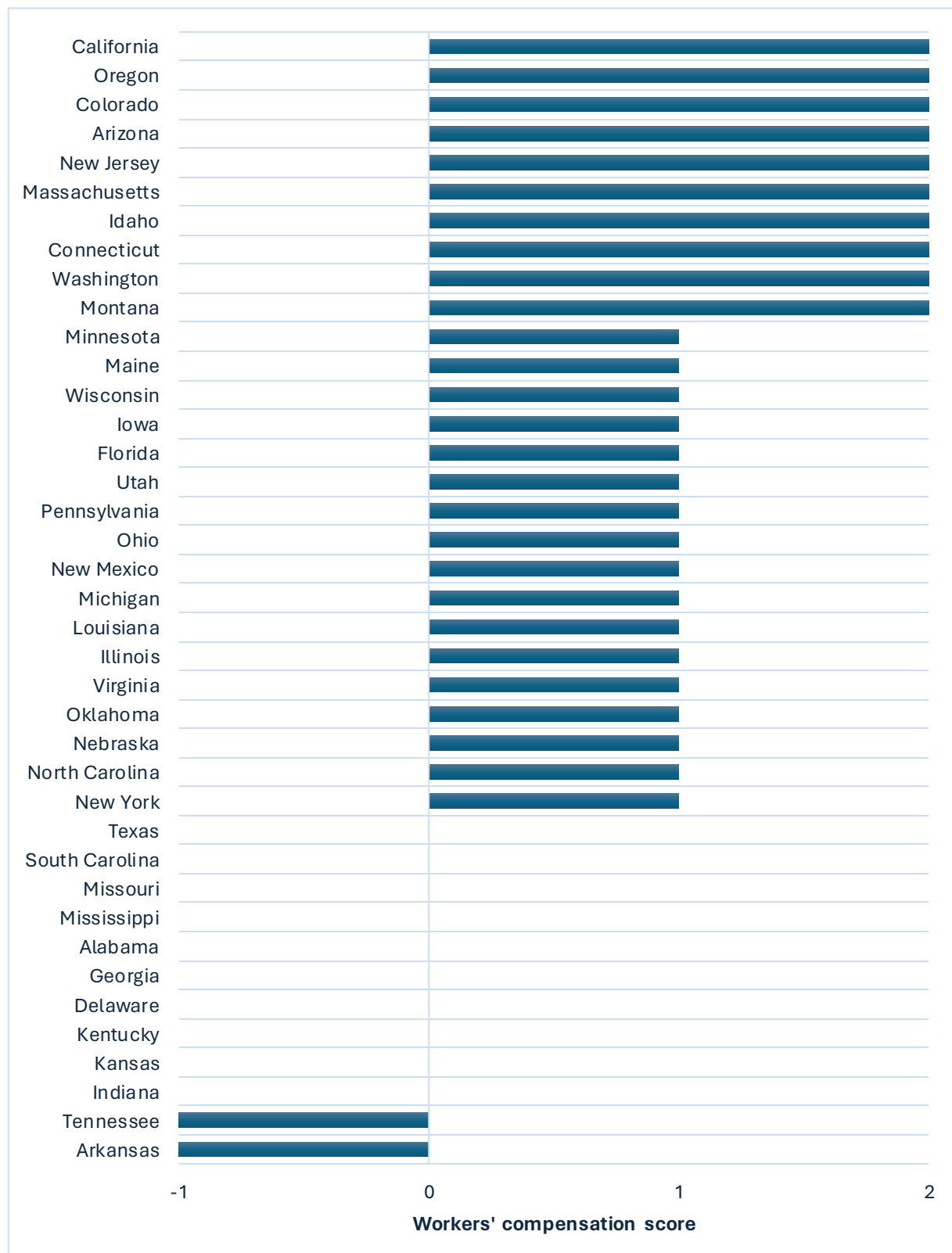


Figure 3.4 Supplemental figure: Workers' compensation score distribution - 2017

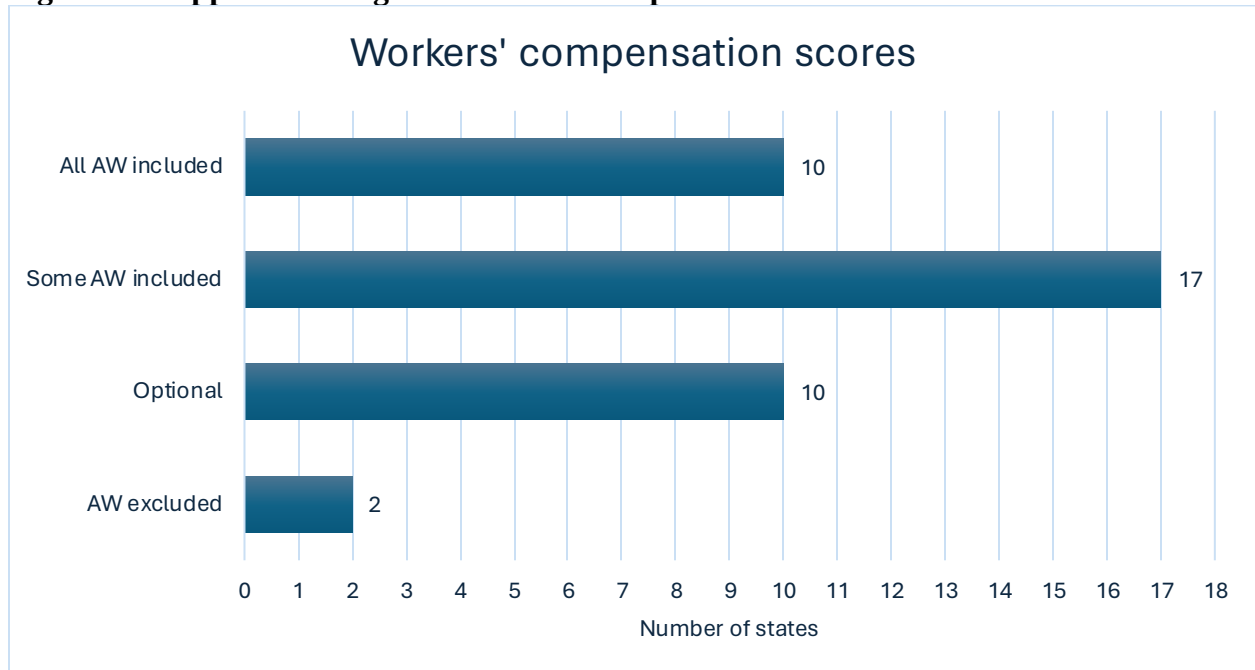


Figure 3.5 Supplemental figure: Minimum wage scores by state - 2017

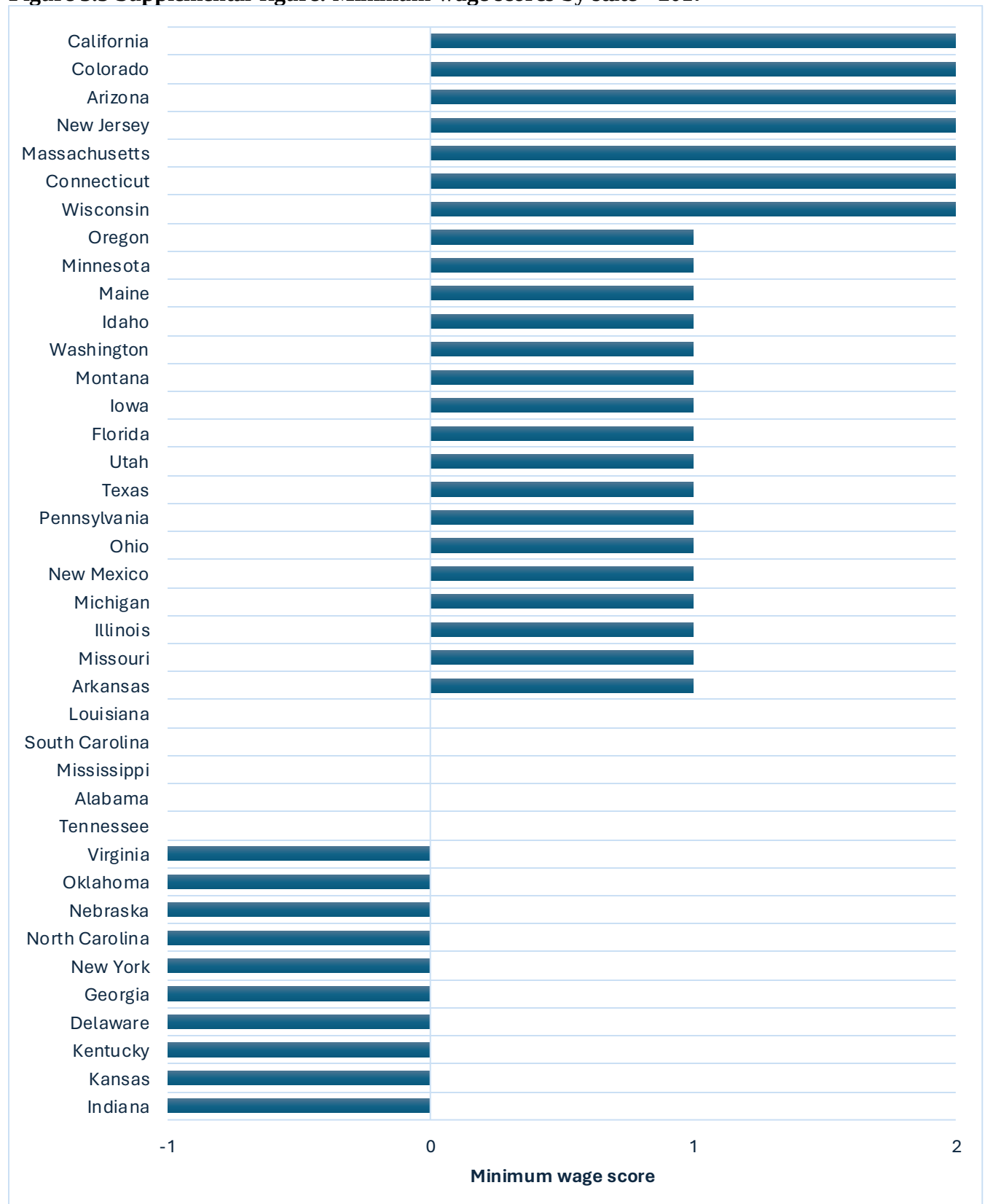


Figure 3.6 Supplemental figure: Minimum wage score distribution - 2017



Figure 3.7 Supplemental figure: Overtime pay scores 2001- 2017

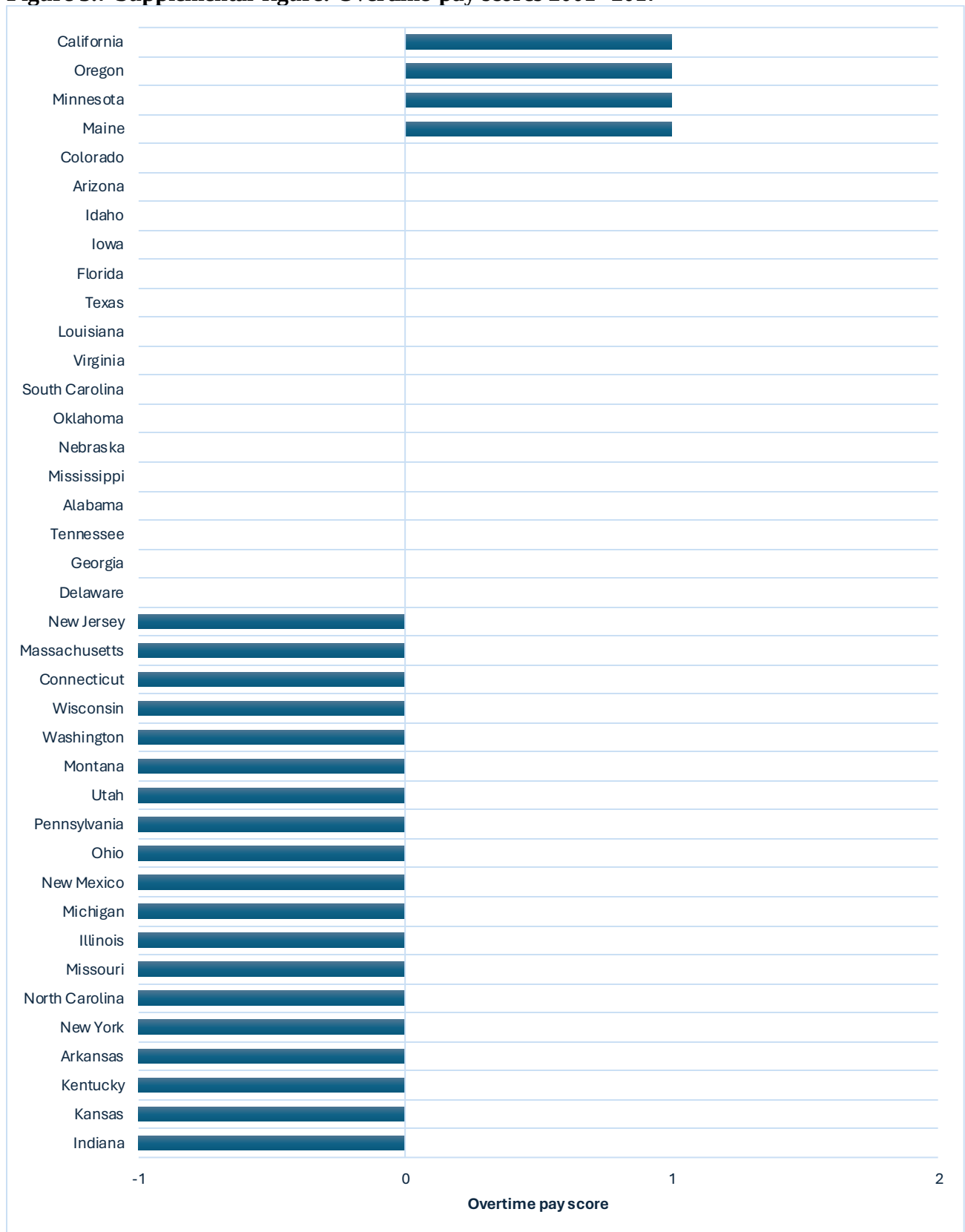


Figure 3.8 Supplemental figure: Overtime pay score distribution - 2017

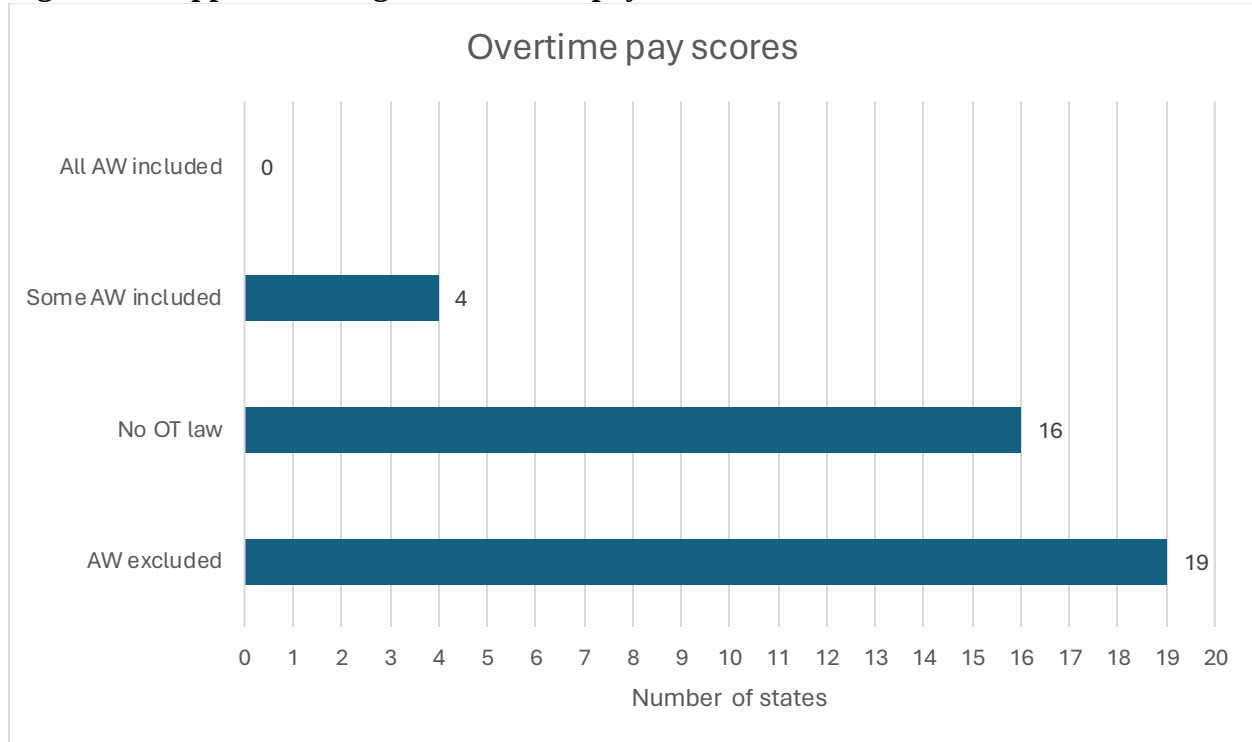


Table 3.6 Supplemental table: Labor Law Equity Index (LLEI) scores by state and law for 2001-2017

State	Workers' compensation	Minimum wage	Overtime pay	LLEI score
Alabama	0	0	0	0
Arizona	2	2	0	4
Arkansas	-1	1	-1	-1
California	2	2	1	5
Colorado	2	2	0	4
Connecticut	2	2	-1	3
Delaware	0	-1	0	-1
Florida	1	0	0	1
Florida* 2006-2017	1	1	0	2
Georgia	0	-1	0	-1
Idaho	2	-1	0	1
Idaho* 2002-2017	2	1	0	3
Illinois	1	1	-1	1
Indiana	0	-1	-1	-2
Iowa	1	1	0	2
Kansas	0	-1	-1	-2

Kentucky	0	-1	-1	-2
Louisiana	1	0	0	1
Maine	1	1	1	3
Massachusetts	2	2	-1	3
Michigan	1	1	-1	1
Minnesota	1	1	1	3
Mississippi	0	0	0	0
Missouri	0	-1	-1	-2
Missouri*				
2007-2017	0	1	-1	0
Montana	2	1	-1	2
Nebraska	0	-1	0	-1
Nebraska*				
2004-2017	1	-1	0	0
New Jersey	2	2	-1	3
New Mexico	0	1	-1	0
New Mexico*				
2004-2017	1	1	-1	1
New York	1	-1	-1	-1
North Carolina	1	-1	-1	-1
Ohio	1	1	-1	1
Oklahoma	1	-1	0	0
Oregon	2	1	1	4
Pennsylvania	1	1	-1	1
South Carolina	0	0	0	0
Tennessee	-1	0	0	-1
Texas	0	1	0	1
Utah	1	1	-1	1
Virginia	1	-1	0	0
Washington	2	1	-1	2
Wisconsin	1	2	-1	2

Note: See Table 3.7 for statute citations for states and laws. States with an asterisk (*) indicate a significant amendment within time frame of interest with years in which the changes apply based on our LLEI coding rules.

Table 3.7 Supplemental table: Labor Law Equity Index laws and citations

State	Statute citations
Alabama	AL ST 25-5-50 (a)
Arizona	AZ ST 23-901 (a); AZ ST 18-8; AZ ST 23-311 (8); AZ ST 23-362 Definitions(A)
Arkansas	AR ST 11-9-102 (A); AR ST 11-9-102 (iii); AR ST 11-4-203 (3 F-H); AR ST 11-4-203 (7); AR ST 11-4-211(b)
California	CA Labor Code 3351; CA Labor 3352; CA ST 1182.12; CA ST 1182.11; CA ST 11140 (1C)
Colorado	CO ST 8-40-201 (6); CO ST 8-40-202 (1a); CO ST 8-6-106; CO ST 8-6-101
Connecticut	CT ST 31-275 (9); CT ST 31-58 (e); CT ST 31-76i
Delaware	DE ST 19 § 2307 (b); DE ST 2306 (b); DE ST 901(3a)
Florida	FL ST 440.02
Florida* 2006-2017	FL ST 440.02; FL ST 448.110(3)
Georgia	GA ST 34-9-2.3; GA ST 34-9-2; GA ST 34-4-3 (b4)
Idaho	ID ST 72-212; ID ST 72-203; ID ST 44-1503/44-1504
Idaho* 2002-2017	ID ST 72-212; ID ST 72-203; ID ST 44-1504(6)
Illinois	IL ST 305/3 (19); IL ST 105/3 (d2); IL ST 105/4a(2C)
Indiana	IN ST 22-3-2-9(2); IN ST 22-3-2-9(4b-4d); IN ST 22-2-2-3(m); IN ST 22-2-2-3; IN ST 22-2-2-3(m)
Iowa	IA ST 85.1(3-4); IA ST 91D.1 (1b, 1d)
Kansas	KS ST 44-505 (a)(1); KS ST 44-505(b); KS ST 44-1202(e); KS ST 44-1202(e)
Kentucky	KY ST 342.660(1); KY ST 342.650(5); KY ST 337.010(2a1); KY ST 337.010(a1)
Louisiana	LA ST 1035(B)(1)
Maine	ME ST 39 § 102 (2 A-C); ME ST 39 § 401 (1 A-C); ME ST 663(3A); ME ST 663(3A)
Massachusetts	MA ST Ch. 152 § 1(4); MA ST 151 § 2A; MA ST 151 § 1A (19)
Michigan	MI ST 418.115 (d-e); MI ST 408.394; MI ST 408.394; MI ST 408.384a (4)(e)
Minnesota	MN ST 176.011 (b); MN ST 176.011 (subd 11-12); MN ST 176.041(Subd 1); MN ST 176.041 (Subd. 1a); MN ST 177.23 (Subd 7. 1-2); MN ST 177.23(7:1-2)
Mississippi	MS ST 71-3-5; MS ST 71-3-3; MS ST 71-3-3; MS ST 17-1-51
Missouri	MO ST 287.090(1-1); MO ST 287.090(2); MO ST 290.507; MO ST 290.505
Missouri* 2007-2017	MO ST 287.090(1-1); MO ST 287.090(2); MO ST 290.507; MO ST 290.505
Montana	MT ST 39-71-118 (1a); MT ST 39-71-118; MT ST 39-71 (d); MT ST 39-3-406(2)(h-I); MT ST 39-3-406(1)(h-I); MT ST 39-3-405(2)
Nebraska	NE ST 48-106 (2c-2d); NE ST 48-106 (6-7); NE ST 48-1202 (3)(a)
Nebraska* 2004-2017	NE ST 48-106 (2d-2e); NE ST 48-1202 (3)(a)

New Jersey	NJ ST 34-15-2; NJ ST 34-15-3; NJ ST 34-15-4; NJ ST 34-15-5; NJ ST 34.11-56a4; NJ ST 34:11-56a4
New Mexico	NM ST 52-1-6 (A-B); NM ST 50-4-21(12-13); NM ST 50-4-24(B)
New Mexico* 2004-2017	NM ST 52-1-6 (A); NM ST 50-4-21(12-13); NM ST 50-4-24(B)
New York	NY ST § 3(14-b); NY ST 651(5b); NY ST NY 142-2.2
North Carolina	NC ST § 97-13 (b); NC ST 95-25.14(2); NC ST 95-25.14(2)
Ohio	OH ST 4121.01(A1-2); OH ST 4111.14(B); OH ST 4111.03
Oklahoma	OK ST § 2 (b2); OK ST 197.4(e)(1)
Oregon	OR ST § 656.027; OR ST 653.020; OR ST 653.020(1)
Pennsylvania	PA ST § 463; PA ST 1301.201 (a); PA ST 333.105
South Carolina	SC ST 42-1-360 (4); SC ST 42-1-380
Tennessee	TN ST § 50-6-106
Texas	TX ST § 406.002; TX ST 62.160(a-c)
Utah	UT ST § 34A-2-103(5); UT ST 34-40-104(I); UT ST 34-28-1
Virginia	VA ST § 65.2-101 (2 g); VA ST 40.1-28.9 (1)
Washington	WA ST 51.12.020(6); WA ST 49.46.010 (3)(a); WA ST 49.46.130 (g)
Wisconsin	WI ST 102.04(2)(c); WI ST 104.01; WI ST 104.035; WI ST Ch. 104 (1d); WI ST DWD 274.04 (9); WI ST DWD 274.04

CHAPTER 4: EQUITY IN STATE LABOR LAWS AND HISPANIC AGRICULTURAL WORKER HEALTH INDICATORS: A CROSS-SECTIONAL STUDY USING THE NATIONAL AGRICULTURAL WORKERS SURVEY

4.1 Introduction

Work is where many adults spend the majority of their waking hours and is a critical social determinant of health.¹⁴⁹ Work shapes exposure to physical, social and chemical occupational hazards, as well as an individual's income and benefits, job security, and working hours, all of which can impact health throughout the life course.^{31, 32, 36-39, 150} For agricultural workers, their work is physically demanding and includes many risks, including pesticide, dust, and heat exposure, that are unique to the working conditions in this industry.¹⁵¹ Agricultural workers have historically been excluded from labor laws and health and safety regulations, referred to as agricultural exceptionalism, which leaves them even more vulnerable to work-related illness and injury.⁵ To appropriately intervene and address occupational health disparities among agricultural workers, it's important to understand the structural drivers that may further perpetuate the observed disparities.

Agricultural workers plant, cultivate, harvest, and prepare crops for consumption. Agricultural workers experience adverse health outcomes because their work is labor-intensive and due to harsh working conditions.⁴⁴⁻⁴⁶ For example, agricultural workers can face elevated exposure to heat leading to heat-related illness, repetitive motion leading to musculoskeletal pain or chronic disease, pesticide and chemical exposure leading to increased risk of acute and long-term conditions, as well as challenges including unstable work hours and lack of health insurance.⁴⁴⁻⁴⁶ Given the confluence of risks, the agricultural industry is among the most

dangerous. In 2015, the agricultural industry had the highest fatal work injury rate of 22.8 per 100,000 full-time workers, compared to an all-worker fatal injury rate of 3.4, and 573 total number of fatal work injuries in 2019, surpassed only by the transportation and warehousing industry.^{47, 48} These are likely underestimates considering workplace injuries often go unreported due to lack of labor law protections, employer retaliation, lack of awareness of workers' rights, lack of workers compensation in many states, fear of job loss, and language barriers.^{12, 13}

Labor laws are important for understanding occupational health disparities. The National Labor Relations Act (NLRA) in 1935 and the Fair Labor Standards Act (FLSA) enacted in 1938 were the first federal level labor laws in the United States to address working conditions.^{6, 7} The NLRA provided workers the right to organize without retaliation while the FLSA established a variety of protections and standards for workers, including the federal minimum wage and overtime pay as well as youth employment standards.^{7, 8} Agricultural workers, along with domestic workers or household cleaners, were expressly excluded from both the FLSA and the NLRA.⁸ At the time of these laws, Black workers disproportionately represented most agricultural workers and domestic workers, and Southern Democrats deliberately excluded these groups of workers in order to preserve racial segregation and exploitation.⁹⁻¹² This exclusion of agricultural workers from these federal labor laws is agricultural exceptionalism and this study aims to assess the association of state-level agricultural exceptionalism and work environment for agricultural workers.

Due to structural and interpersonal racism and limited legal protections leading to increased vulnerability to mistreatment, workers of minoritized racial and ethnic backgrounds and workers who are undocumented tend to face worse working conditions across industries in the United States.^{57, 152, 153} For example, Latine workers that are undocumented may have to

withstand unsafe and dangerous work conditions, out of fear of reporting these conditions to authorities and concerns about being able to find other work without authorization.¹⁵³ An estimated 78% of agricultural workers are Hispanic or Latine, 70% of agricultural workers are born outside the US, and 44% of agricultural workers are undocumented.³ There are documented differences in working conditions based on immigration status. Agricultural workers who are U.S. citizens have more secure and less physically demanding work than undocumented Latine workers.⁴ Even after accounting for years of experience, English speaking and literacy, employer, region, and crop, undocumented Latine and indigenous workers are paid less per hour than U.S.-born workers.⁴

Individual and organizational-level factors have been broadly studied as determinants of occupational health among agricultural workers and various interventions at these levels have tried to address risks faced by agricultural workers.^{50, 154} However, state-level policies also shape working conditions and represent an important opportunity for intervention. Previous studies have created indices or used legal epidemiology methods to understand the status of laws and their impact on health.^{127, 129, 155} However, few studies have assessed the impact of labor laws on occupational health and even fewer have focused on how agricultural exceptionalism in labor laws contributes to agricultural worker health.

In this study we aimed to address the gap in research by examining how the inclusion or exclusion of agricultural workers in three labor laws, workers' compensation, minimum wage, and overtime pay, were associated with agricultural worker health. We used the National Agricultural Worker Survey data (NAWS), an employment-based, random sample survey of US crop workers conducted by the US Department of Labor.⁶⁹ We examined the impact of laws on workplace injuries, injury severity, workplace sanitation, and pesticide training because these are

commonly used measures to assess occupational health and safety and work environment safety.⁷⁰⁻⁷² We hypothesized that more protective and inclusive labor laws would be associated with less injuries and safer work conditions.

4.2 Methods

Data source. National Agricultural Workers Survey (NAWS) is a cross-sectional and employment-based, random-sample survey of US crop workers conducted by the US Department of Labor since 1989.¹⁵⁶ The NAWS survey is the largest source of demographic and health information of agricultural workers across the US.¹⁵⁶ The purpose of the NAWS survey is to monitor the work conditions of agricultural workers but is also used for occupational injury and health surveillance. Agricultural workers are interviewed in-person at their workplace and data is collected directly from workers by researchers at JBS International, a private research firm that provides research assistance and services for policy analysis and program evaluation to government agencies.⁶⁹ Each year, 1,500 to 3,600 workers are interviewed from 12 regions in the US that are aggregated from 17 US Department of Agriculture regions.⁶⁹ Interviews are allocated proportionately to each region and different times of year based on the amount of farm labor in a given region to capture the seasonality of agriculture work.⁶⁹

Analytic sample. We used NAWS data that was collected from 2001-2017. These years were chosen because these were the years that consistently collected health indicator data. This 17-year time frame also allowed us to assess changes in labor laws and health indicators across multiple years. NAWs collects data on currently employed agricultural workers, both migrant and seasonal, who perform crop-related work. H-2A workers, those coming to the US with agricultural worker temporary visas, are excluded due to worker contracts. NAWS defines crop related workers using the North American Industrial Classification System (NAICS), a standard

classification system for business establishments. NAWS interviews workers in Crop Production (NAICS code 111) or as Support Activities for Crop Production (NAICS code 1151).⁶⁹ NAICS code 111 includes establishments like farms, orchards, groves, greenhouses, and nurseries who are doing the following tasks- growing crops, plants, vines, or trees. NAICS code 1151 includes supplying labor, dusting or spraying, cotton ginning, cultivating services, farm management serves, and vineyard cultivation. We excluded the following states due to low sample sizes: Maryland, North Dakota, New Hampshire, Rhode Island, Vermont, Wyoming, Nevada, South Dakota. There were no agricultural workers from Alaska, Hawaii, and West Virginia included in the 2001-2017 NAWS data and therefore these states were not included in this study. We also excluded agricultural worker participants under 18 and those that did not identify as Hispanic/Latine due to the scope of the project. The University of Washington Human Subjects Division determined this study to be exempt.

Measures

Workplace injury. Participants were asked whether they had an ‘*injury at work on US farm in the last 12 months.*’ Individuals who answered, ‘yes’ were then asked about nine specific types of workplace injuries within the last year. Participants were also asked, if they had any of their injuries were the following: scrape/abrasion, bruise/contusion, amputation/lost body part, sprain/strain/torn ligament/ traumatic rupture, broken bone/fracture/crushed/mangled, dislocation, cut/laceration/puncture/stab/jab, burn/blister scald, insect bite/sting, and other, with the response options of yes or no. Due to rare reporting of any workplace injuries, we combined these variables in to a binary indicator variable for those that reported at least one workplace injury.

Injury severity. For participants that reported a workplace injury, they were asked whether their injury met the following thresholds for severity: 1.) made you unable to work for at least 4 hours, 2.) made you unable to work as hard as you normally do for at least 4 hours, 3.) made you seek medical treatment, including first aid and, 4.) made you have to take strong medicine to allow to keep you working. We combined these four severity questions to a binary indicator variable for those that reported any level of severity.

Workplace sanitation - water. Participants were asked, ‘Does your employer provide clean drinking water and disposable cups every day?’ We created an indicator variable for those the responded their employer provided water and/or disposable cups. *Workplace sanitation - toilet.* Participants were asked, ‘Does your employer provide a toilet?’ We created an indicator variable for those that responded yes.

Workplace sanitation - handwash station. Participants were asked, ‘Does your employer provide water to wash hands?’ We created an indicator variable for those that responded yes.

Personal protective equipment pesticide training. Participants were asked if ‘in the last 12 months while working for your current employer did you receive training or instructions in the safe use of pesticides through video, audio cassette, classroom lecture, written material, informal talks, or by any other means?’ We created an indicator variable for those that responded yes.

Labor Law Equity Index (LLEI). The LLEI was developed using legal epidemiology methods to code and score three labor protections - workers’ compensation, minimum wage, and overtime pay laws - for how inclusive these protections were for agricultural workers from January 1, 2001, to December 31, 2017. Higher LLEI scores indicate more protective and inclusive laws for agricultural workers and lower or negative scores indicate laws that are less protective and exclude agricultural workers. The range of the LLEI scores were from -2 (less protective) to 5

(more protective), and there were five states that had changes within the time frame of interest. For states with zero changes within 2001-2017, they received the same LLEI score for all 17 years. For states with an amendment to any of these three labor protections, scores were updated for the relevant years.

Covariates

Demographic. Demographic characteristics included age in years, sex (female or male), work authorization (citizen, green card, other work, or unauthorized), indigenous background (yes or no), and race (Black, Native American, White, or Other). These covariates were selected based on prior literature that found associations between these demographic factors and agricultural worker health.^{51, 157-161}

State-level demographics. State-level variables were included to address endogeneity factors that are often associated with types of laws implemented in states.¹⁶² These included the percentage of Latinos residing in the state (2010 US Census Bureau),¹⁶³ the unemployment rate (Bureau of Labor Statistics),¹⁶⁴ governor party political affiliation (Democratic, Republican, or Independent),¹⁶⁵ and whether the state had Medicaid expansion from 2014 (yes, expanded Medicaid or no, did not expand Medicaid).¹⁶⁶

Data analysis

We conducted descriptive statistics for all variables to describe our sample and the state-level covariates. Descriptive statistics included frequencies (n), percentages, means, standard deviations, and distribution of variables. We also assessed correlations between variables to identify issues of multicollinearity. Unadjusted bivariate logistic regression models were conducted to assess the association between the LLEI and each workplace health indicator. Adjusted multivariable logistic regression models with 95% confidence interval (CI) estimated

the odds of each workplace health indicator - injury reporting, injury severity, provision of water, toilet, and handwash station, while controlling for covariates. Covariates for adjusted logistic regression models included age, sex, work authorization, indigenous background, race, state percentage of Latine population, state percent unemployment rate, governor party political affiliation, and Medicaid expansion in 2014. All analyses were conducted using R and RStudio Version 2024.04.0+735.¹⁶⁷ We conducted the analysis using the survey package for R to account for the complex and multi-stage sampling design.^{168, 169}

4.3 Results

Participant characteristics

Table 4.1 describes demographic characteristics of the Latino participants in the sample (N = 30,833). The mean age was 36.4 (standard deviation = 12.5), most were male (74%) and unauthorized for work (61%). In terms of workplace health indicators, very few participants reported an injury (1%), but of those that reported an injury most (over 90%, on average) reported at least some level of severity (see **Table 4.2**). The most common injury reported was a ‘sprain/strain/torn ligament/traumatic rupture’ (41.5%), followed by ‘cut/laceration/puncture/stab/jab’ (16.6%), ‘bruise contusion,’ (14.2%), and ‘broken bone/fracture/crushed/mangled’ (8.7%). Nearly all participants reported that their employer provided water (94.6%), a toilet (96.8%), and a hand wash station (96.8%) every day, in addition, most participants received pesticide training in the last 12 month (75.4%).

State-level characteristics

There was a wide range in the number of participants from each state from N = 3 (Maine) to N = 13,711 (California) (see **Table 4.3**). For state-level percent of Hispanic/Latine populations, the overall average was 25.5% but ranged from 1.3% (Maine) to 46.3% (New

Mexico. The average unemployment rate was 6.7% and ranged from 0.1% (Pennsylvania & South Carolina) to 7.6% (Michigan). Nineteen out of the 39 states expanded Medicaid in 2014, and about half of participants were in states with Democratic governors (50.1%) or Republican governors (49.8%), and 0.1% were in a state with Independent governors (Minnesota).

Multivariable Analyses of Workplace Health Indicators

Results from unadjusted and adjusted logistic regression models are presented in **Table 4.4**. There was not a statistically significant association between LLEI scores and reporting an injury or injury severity in unadjusted or adjusted models. There were significant associations between LLEI scores and employer provision of water, toilet, water for handwash station, and pesticide training in both unadjusted and adjusted models. Adjusted models showed that every one-unit increase in the LLEI score was associated with 19% higher odds of being provided water (aOR = 1.18, p-value <0.05), 49% higher odds of being provided a toilet (aOR = 1.49, p-value < 0.001), 38% higher odds in being provided a handwash station (aOR = 1.38, p-value < 0.001), and 19% higher odds of receiving pesticide training (aOR = 1.19, p-value < 0.001).

4.4 Discussion

In this study, we assessed how LLEI score, or the overall inclusion of agricultural workers in three labor protections – workers’ compensation, minimum wage, and overtime pay, was associated with workplace injuries and conditions using cross-sectional data from NAWS. We predicted that higher LLEI scores would be associated with fewer injuries and greater provision of water, toilet, and handwash station at work.

We found that higher LLEI scores are associated with increased workplace sanitation, or the provision of water, toilet, and a handwash station, as well as the provision of pesticide training. Although, the LLEI did not include laws that specifically address workplace sanitation or

training, our hypothesis was driven by occupational health frameworks that describe how laws and policies shape work and community environments and therefore influence health in a myriad of ways, including physical and psychosocial occupational exposures, income and access to benefits.^{56, 170} The Occupational Safety and Health Administration (OSHA), a result of the Occupational Safety and Health Act of 1970, does have standards on sanitation and personal protective equipment training (1910.141 and 1910.30)^{171, 172} These standards apply to all agricultural employers that have at least eleven employees.¹⁷³ The US Environmental Protection Agency (EPA) requires employers to provide pesticide training to agricultural workers and pesticide handlers in the 2015 Agricultural Worker Protections Standard.¹⁷⁴ Given that there are federal standards that require sanitation and pesticide training yet there were still differences in the reporting of sanitation and pesticide training among agricultural workers with different LLEI scores in our sample, indicates there are likely compliance or enforcement issues. Further research may be needed to understand the enforcement and implementation of these OSHA workplace sanitation standards and EPA pesticide training requirements. Our results may suggest that the states with higher LLEI scores may be states that are following OSHA sanitation standards and EPA pesticide training requirements.

For injury reporting and injury severity, we did not find a statistically significant association with the LLEI. The number of workplace injuries reported was very low, suggesting that workers may have underreported injuries in this survey. Additionally, injury reporting was only administered some of the years we included in our time frame (1999-2004, 2008-2010, and 2014-2015) and this also likely contributes to the low rates of injury reporting. A study found strong correlation with psychosocial and physical safety, where workers that felt their employer discourages injury reporting were more than twice as likely to experience a work injury.¹⁷⁵

Additionally, there are documented factors that contribute to the underreporting of injuries among agricultural workers.⁸⁵ Some examples include, fear of job loss or deportation, limited English proficiency, limited access to health care, ineligibility for workers' compensation benefits depending of the state worker is living and working in, and constraints with conducting workplace investigations across state agencies.⁸⁵ These are some of factors that may explain the low injury reporting (about one percent) in our sample.

The study has many strengths. We introduced agricultural exceptionalism as a form of racism experienced by agricultural workers and tested a measure that captures this form of structural racism. The study assesses state-level and work environment and health indicators for agricultural workers. By using the LLEI as a tool, we can also assess the association of multiple laws which is important as many times it's not a sole law but a combination of laws that can affect health.¹⁴⁵ We combine LLEI and NAWS, multiple years of nationally representative data, to understand more about what is written in laws and how that translates to agricultural workers' experiences. This study is also innovative and rigorous as it is merging legal epidemiology and occupational health research, especially in furthering our understanding of how laws shape workplace environments and workers' benefits.

This study has several other limitations. NAWS data only includes agricultural workers actively employed in crop work at the time of the interview and thus susceptible to healthy worker bias. Healthy worker bias, in a study like this, will tend to skew results towards the null because our data only includes workers that are healthy and well enough to work, excluding workers with worse health conditions or injuries that are unable to work.¹⁷⁶ The NAWS data also excludes H-2A workers and this is a specific agricultural worker population of interest considering the increasing number of H-2A agricultural workers over the last few decades and

that the employer-specific visas can put H-2A workers at greater risk for exploitation depending on their employer.^{177, 178} Additionally, although this was an explanatory study, there are also causal inference limitations to address for future research. This is an observational study that uses multiple years of cross-sectional data, and this limits our ability to make causal inferences between the LLEI and the health indicators we assessed.

There are several directions for future research. Future studies can use similar methods to build the LLEI to include more updated years and states that were excluded from this study in order to gain a more holistic idea of the status of these laws more recently. It would also be relevant and important to include H-2A workers in future research by collecting H-2A worker survey data and/or working with NAWS to expand their data collection efforts to include this group of agricultural workers. We would also be interested in assessing the association of each of these labor laws separately with work indicators that align with each of these laws more directly to capture how some of these laws are being implemented. An example is to look at minimum wage laws with income and reported work hours to understand if income reported by workers aligns with minimum wages in those states or looking at workers' compensation laws and if workers reported whether they would be provided workers' compensation if they got hurt. These are variables available in the NAWS data and are more direct measures that could assess if what is written in state laws is what workers are reporting at their work. We would also like to explore whether there are differences across different worker groups, including race, indigenous background, and work authorization (i.e. documentation status).^{57, 152, 153} Additionally, our study methods provide an example of how future research can explore how labor laws impact other groups that are differentially excluded from labor laws, like domestic or household workers, for

example, especially in studying how labor laws that continue perpetuating systemic racism are related to health.

Table 4.1 National Agricultural Workers Survey Characteristics of Hispanic Participants

Variable	Weighted		Unweighted (N = 30, 833)	
Age (years) – mean (sd)	36.44	(12.48)	36.97	(12.40)
Count %				
Sex				
Female	7,181	25.8	6,047	19.6
Male	20,711	74.3	24,786	80.4
Race^{a,b}				
Other	18,245	65.8	19,851	64.4
White	7,676	27.7	8,716	28.3
Native American	1,727	6.2	1,971	6.4
Black/African American	100	0.4	124	0.4
Indigenous				
Indigenous	3,064	11.0	3,342	10.8
Not indigenous	24,828	89.0	27,491	89.2
Work authorization^a				
US citizen	3,351	12.1	3,619	11.7
Green card	7,159	25.9	8,189	26.6
Other work authorization	344	1.3	381	1.2
Unauthorized	16,757	60.7	18,361	59.6

Note:

^a Counts and proportions may not equal 100% due to rounding and/or missing data.

^b Includes only those that identify Hispanic/Latine. Asian and Native Hawaiian/PI Race and ethnic groups were excluded due to small cell sizes.

Table 4.2 National Agricultural Workers Survey Workplace Health Indicator Reported by Hispanic Participants

Dependent variables	Weighted		Unweighted (N = 30, 833)	
	Count	%		
Injury reported in the last year				
Yes	268	1.0	397	1.3
No	27,624	99.0	30,436	98.7
Count of injuries reported				
0	27,624	99.0	30,436	98.7
1	253	0.9	374	1.2
2	9	0.0	18	0.1
3	6	0.0	5	0.0
Injury type reported				
Sprain/strain/torn ligament/traumatic rupture	120	41.5	150	35.3
Cut/laceration/puncture/stab/jab	48	16.6	82	19.3
Bruise/contusion	41	14.2	56	13.2
Broken bone/fracture/crushed/mangled	25	8.7	46	10.8
Other	19	6.6	29	6.8
Dislocation	13	4.5	17	4.0
Scrape/abrasion	11	3.8	28	6.6
Burn/blister/scald	6	2.1	9	2.1
Insect bite/sting	6	2.1	8	1.9
Reported injury severity level				
Unable to work for at least 4 hours	245	94.2	353	90.8
Unable to work as hard you normally do for at least 4 hours	244	93.8	371	95.4
Sought medical treatment, including first aid	230	88.5	371	95.4
Took strong medicine to allow you to keep working	245	94.2	261	67.1
Employer provides water every day				
Yes	26,361	94.6	28,864	93.6
No	1,518	5.4	1,961	6.4
Employer provides toilet				
Yes	26,986	96.8	29,650	96.2
No	892	3.2	1,163	3.8
Employer provides water for hand wash station				
Yes	26,987	96.8	29,636	96.1
No	892	3.2	1,171	3.8
Received pesticide training in the last 12 months				
Yes	20,983	75.4	23884	77.5
No	6,838	24.6	6,891	22.4

Note: Counts and proportions may not equal 100% due to rounding and/or missing data.

^aCategories are not mutually exclusive. Percentages calculated use the denominator of number of participants reported any level of injury severity (N = 260 and N = 389, for weighted and unweighted, respectively).

Table 4.3 State-level Covariates & National Agricultural Workers Survey Hispanic Participants by State

State	Number of participants in analytic sample	State-level Percent Hispanic/ Latine	State-level Percent Unemployment	Medicaid Expansion (Yes/No)	Governor Political Party Affiliation		
					Democratic	Independent	Republican
		%			%		
Alabama	48	3.9	6.9	No	0.0	0.0	100.0
Arizona	885	29.6	6.1	Yes	38.5	0.0	61.5
Arkansas	101	6.4	5.8	Yes	39.6	0.0	60.4
California	13,711	37.6	7.3	Yes	59.6	0.0	40.4
Colorado	163	20.7	5.5	Yes	92.6	0.0	7.4
Connecticut	53	13.4	6.9	Yes	50.9	0.0	49.1
Delaware	36	8.2	5.0	Yes	100.0	0.0	0.0
Florida	3,163	22.5	5.5	No	0.0	0.0	100.0
Georgia	659	8.8	6.0	No	35.5	0.0	64.5
Idaho	927	11.2	5.5	No	0.0	0.0	100.0
Illinois	764	15.8	6.4	Yes	58.0	0.0	42.0
Indiana	178	6.0	5.6	No	34.3	0.0	65.7
Iowa	15	5.0	6.1	Yes	100.0	0.0	0.0
Kansas	33	10.5	5.5	No	54.5	0.0	45.5
Kentucky	44	3.1	8.5	Yes	88.6	0.0	11.4
Louisiana	78	4.2	6.2	No	28.2	0.0	71.8
Maine	3	1.3	4.9	No	100.0	0.0	0.0
Massachusetts	102	9.6	5.2	Yes	12.7	0.0	87.3
Michigan	942	4.4	7.6	Yes	43.7	0.0	56.3
Minnesota	34	4.7	4.3	Yes	50.0	50.0	0.0
Mississippi	49	2.7	6.4	No	57.1	0.0	42.9
Missouri	83	3.5	5.8	No	100.0	0.0	0.0
Montana	34	2.9	4.3	No	87.5	0.0	12.5

Nebraska	25	9.2	3.6	No	0.0	0.0	100.0
New Jersey	421	17.7	6.0	Yes	27.1	0.0	72.9
New Mexico	180	46.3	6.6	Yes	22.2	0.0	77.8
New York	663	17.6	7.1	Yes	50.7	0.0	49.3
North Carolina	935	8.4	6.8	No	75.2	0.0	24.8
Ohio	503	3.1	6.2	Yes	8.5	0.0	91.5
Oklahoma	41	8.9	4.4	No	0.0	0.0	100.0
Oregon	1,048	11.7	7.2	Yes	100.0	0.0	0.0
Pennsylvania	637	5.7	0.1	Yes	48.0	0.0	52.0
South Carolina	116	5.1	0.1	No	0.0	0.0	100.0
Tennessee	167	4.6	6.0	No	43.1	0.0	56.9
Texas	1,252	37.6	5.9	No	0.0	0.0	100.0
Utah	48	13.0	3.7	No	0.0	0.0	100.0
Virginia	73	7.9	5.1	No	57.5	0.0	42.5
Washington	2,527	11.2	6.4	Yes	100.0	0.0	0.0
Wisconsin	118	5.9	5.9	No	44.1	0.0	55.9
Overall sample	30,833	25.5	6.7	19/39	50.1	0.1	49.8

Table 4.4 Unadjusted and Adjusted Logistic Regression Models Estimating Associations Between LLEI and Workplace Health Indicators

Workplace health indicators	LLEI b	Odds Ratio (OR)	Standard Error (SE)	95% Confidence Intervals (CIs)
Unadjusted results				
Injury reported in last year	-0.023	0.98	0.037	(0.91 – 1.05)
Injury severity reported in last year	0.001	1.00	0.039	(0.93 – 1.08)
Employer provision of water	0.202	1.22	0.030	(1.16 – 1.30)***
Employer provision of toilet	0.316	1.37	0.036	(1.28 – 1.47)***
Employer provision of handwash station	0.232	1.26	0.035	(1.18 – 1.35)***
Received pesticide training in the last year	0.126	1.13	0.025	(1.08 – 1.19)***
Adjusted results				
Injury reporting	0.101	1.11	0.08	(0.94 – 1.30)
Injury severity	0.145	1.16	0.083	(0.98 – 1.36)
Employer provision of water	0.170	1.18	0.059	(1.06 – 1.33)*
Employer provision of toilet	0.399	1.49	0.054	(1.34 – 1.66)***
Employer provision of handwash station	0.322	1.38	0.054	(1.24 – 1.53)***
Received pesticide training in the last year	0.173	1.19	0.039	(1.10 – 1.28)***

Note: Adjusted models are include age, sex, race, indigenous background, work authorization, state-level percent unemployment, state-level percent Latine, state governor affiliation, and Medicaid expansion.

* p-value < 0.05

** p-value < 0.01

*** p-value <0.001

CHAPTER 5. CONCLUSION

This dissertation study focused on understanding 1.) how labor laws impact agricultural workers' work environment, including their awareness of laws and their implementation and enforcement in and outside of work using qualitative methods, 2.) the extent of state-level agricultural exceptionalism and developing a Labor Law Equity Index using three labor protections: workers' compensation, minimum wage, and overtime pay, using legal epidemiology methods and 3.) how labor laws are associated with health, specifically in how the Labor Law Equity Index, or the inclusion of agricultural workers in three labor laws, are associated with agricultural worker health indicators using quantitative research methods.

For Aim 1 (chapter 2), we conducted 32 agricultural worker interviews from across five counties in Central and Eastern WA. We found four main themes including: physically demanding work can lead to poor physical and mental health; agricultural workers face many barriers accessing health care and workers' compensation; agricultural workers are vulnerable to marginalization and mistreatment at work due to their race/ethnicity and immigration status; and laws that are intended to protect agricultural workers may not be implemented as intended across employers. Overall, our findings offer insight and opportunities to intervene and implement changes to improve occupational health and safety of agricultural workers. Future research and intervention efforts can focus on addressing physical demands of work and supplying training for supervisors to avoid mistreatment and nepotism. Other efforts may include education and outreach to ensure agricultural workers can access health care services and finding ways for employers or the state to provide affordable health insurance options. Additionally, it's also important to raise awareness on how to submit workplace complaints and provide information on what workers' protections against retaliation are. Our findings also suggest that state

policymakers may need to address overtime and sick leave laws not being implemented as intended across employers. States and other industries that are looking to implement similar laws for agricultural workers should identify alternative solutions so that agricultural workers can benefit equitably from these policy changes.

For Aim 2 (chapter 3), we found the mean LLEI score for all states was 1.05 (SD = 1.85), with a median of 1 and range of -2 to +5 out of a theoretical score of -3 to +6. Workers' compensation had the highest mean score of 0.90 (SD = 0.85), meaning it was the most likely to include agricultural workers and overtime pay had the lowest mean score of -0.38 (SD = 0.67), meaning it was the least likely to include agricultural workers. Most states had LLEI scores higher than 0, indicating some level of inclusion for agricultural workers. Seven states had scores of 0, indicating neutral laws for agricultural workers. Nine states had negative scores, indicating exclusionary laws for agricultural workers. There were zero states that included all agricultural workers in all three protections (LLEI score = 6) and zero states that expressly excluded all agricultural workers in all three protections (LLEI score = -3). This aim fills a gap in understanding to what extent agricultural workers, who are largely Hispanic/Latinx, born outside of the US, and lack authorization to work, are differentially treated from other workers in state labor laws.¹⁴⁸ Overall, the LLEI can serve as a means to examine how the legal environment shapes health and similar methodologies can be applied for other occupations and industries.

For Aim 3 (chapter 4), for our NAWs analytic sample, the mean age was 36.4 (standard deviation = 12.5), most were male (74%) and unauthorized for work (61%). There was not a statistically significant association between LLEI scores and reporting an injury or injury severity. There were significant associations between LLEI scores and employer provision of water, toilet, water for handwash station, and pesticide training for both unadjusted and adjusted

models. This exploratory study indicates there is an association between labor laws and agricultural workers' workplace sanitation and provision of training. The LLEI is composed of workers' compensation, minimum wage, and overtime pay state laws that mimic exclusionary language for agricultural workers from federal labor laws enacted in the 1930s. This state-level agricultural exceptionalism leaves a legacy of systemic racism that continues to marginalize a group of workers that are essential to our food system. Our findings suggest there may be implications for these laws shaping agricultural workers' work environment. Not only is further research needed to understand the mechanisms in which labor laws are impacting work environment and health, but there's also a need for enforcement to ensure these policies are being implemented and followed as intended. Every worker in every industry deserves basic human rights like provision of drinking water, toilet, and handwash station, and training in order to safely conduct their job. With labor protections and laws varying tremendously across states, it's important to ensure all workers, especially workers of color, those working low-wage jobs, and those continually experiencing greater occupational health risks, are safe and well. This is an opportunity for policymakers to make informed decisions of the ways in which labor protections are affecting agricultural workers.

Overall, this dissertation used mixed methods to understand agricultural workers' experiences with labor laws, the extent in which they are included or excluded in three labor protections and understand the association of labor laws and agricultural worker health outcomes. The mixed methods used in this dissertation complemented one another. In our first aim, we interviewed agricultural workers in WA to understand their work concerns, how their work is related to their health, and experiences with labor protections from their own perspectives. We used our learnings from the interviews in deciding the labor protections to

focus on in the development of the LLEI in Aim 2. Lastly, in Aim 3, we assessed the association of the LLEI with agricultural worker health indicator data to understand trends in state-level labor protections and health of agricultural workers across the US.

By using mixed methods, this research aimed to highlight historically excluded voices of agricultural workers to further understand the role of laws in agricultural workers' health. The focus of this research is to understand the connections between labor laws and health, especially with respect to agricultural workers' work and community environments from the perspectives of those most affected, workers themselves. Existing qualitative studies with agricultural workers highlight discrimination and adverse work and housing conditions,^{88, 179-181} however, in this study, we aim to highlight how agricultural worker experience laws and how laws affect their work and community environment. In developing the LLEI, we sought to build a measure to assess the collective inclusion of agricultural workers in three state-level labor laws. The LLEI can help address the gap in knowledge about the role of labor laws in agricultural workers' health. Despite the significant role that labor laws can play in providing safer work conditions, there is currently limited literature that assesses labor laws and workers' health, much less focus specifically on agricultural workers. This isn't surprising considering researchers estimate that 77% of nonfatal injuries and 79% of deaths remain unreported, contributing to the lack of accurate and complete agricultural worker data.^{182, 183} Many workers, including agricultural workers, are excluded in either the law or practice from labor protections that lead to unregulated and unsafe workplaces and thus worsen health disparities.¹¹⁷ This is the first index to assess labor laws' inclusion of agricultural workers. Additionally, this study allows for the assessment of associations between labor laws and health indicators. The creation of an index allows us to look

multiple laws because many times it's not a sole law but a combination of laws that affect health.¹⁴⁵

Future directions of this research include building the index to include more years, states, and labor protections. Additionally, we can look at other health indicator data from the National Agricultural Workers Survey to further our understanding in how these laws may shape observed occupational health inequities. It would also be vital to conduct evaluation and qualitative research studies to understand how what is written in laws is being implemented or practiced in the workplace. Furthering this work can provide an opportunity for public health researchers and practitioners to contribute to the adoption, monitoring, and enforcement of labor laws to advance labor standards and keep people safe.⁵⁸

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VITA

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