



# Essential, Precarious, and At Risk:



Washington Workers in High Hazard, Low-Reward Jobs

**Mike Mulcahy** Working Title Research

**David West** Washington Labor Education and Research Center

**Marissa Baker** Assistant Professor, Environmental and Occupational Health Sciences, UW

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# Executive Summary

Public attention this year has been focused on Washington's "essential" workers. This research project began by developing a new research model to study both the economic status and COVID hazards facing essential workers. The study results demonstrate that the COVID risk problem is larger than just the "essential" workforce. We identified 55 occupations with over 900,000 workers that are both hazardous and economically precarious – occupations that combine low wages or inadequate benefits with high SARS-CoV-2 hazard scores.

## Essential, Precarious, and At Risk: Washington Workers in High Hazard/Low-Reward Jobs

This report by the Washington State Labor Education and Research Center and is the first comprehensive analysis of Washington workers by both economic status and potential SARS-CoV-2 workplace hazards.

- **The High Hazard/Low-Reward Workforce is Heavily Female**

Women constitute two-thirds (66.5%) of workers in these occupations, an estimated 600,000 workers, much higher than their 47.9% share of the overall labor force. And women represent over 80% of the labor force in 17 of the 55 key occupations we identify—nearly double their share of the overall workforce.

- **The High Hazard/Low-Reward Workforce is Disproportionally Non-White**

Workers of color constitute about 35% of workers in these 55 precarious, hazardous occupations, while their share of Washington's total workforce is only about 30%. Black workers are highly overrepresented, 43% higher than their share of the total workforce, with about 52,000 workers in these occupations.

- **The High Hazard/Low-Reward Workforce is Also Washington's Essential Workforce**

Workers in essential occupations account for about 629,000 (70%) of these high hazard/low-reward workers, and about 2.3 million workers (71%) of the overall Washington workforce.

- **Forty-One Percent of Washington's Workforce**

About 1.4 million workers—are in high COVID hazard occupations.



## The Ten Largest High Hazard/Low-Reward Occupations

(and their numbers in Washington<sup>1</sup>)

- **Retail Salespersons** • 107,560
- **Fast Food and Counter Workers** • 97,240
- **General Office workers/Clerks** • 74,460
- **Cashiers** • 66,200
- **Home Health Aides** • 61,470
- **Customer Service Reps** • 56,760
- **Waiters and Waitresses** • 55,090
- **Teaching Assistants** • 40,040
- **Nursing Assistants** • 34,200
- **Information & Records Clerks** • 29,540

The workers in the 10 biggest high hazard/low reward occupations account for about 622,560 workers in Washington, about 75% of all workers in these 55 high hazard/low reward occupations.

## Recommendations

The report recommends policymakers focus on the high hazard, low reward workforce by addressing: 1) the risk of exposure to SARS-CoV-2 in the workplace, and 2) economic precariousness, including lack of health insurance, which can increase the chances of infection, transmission and medical complications.

## Key Recommendations

- **Airborne Transmissible Disease (ATD) Standard**

Washington should follow the lead of states that have enacted ATD standards for their workplaces, instead of relying on voluntary guidance.

- **Workplace Coronavirus Disclosure, Testing and Tracking**

Support comprehensive notification of positive workplace COVID tests, targeted workplace testing, and prioritize workplace follow-up tracking.

- **Safety Committees**

Promote and widely enforce the requirement that workplaces with more than 11 employees have safety committees to involve workers in identifying and preventing COVID risk factors.

- **Economic Security**

Ensure that all Washington at-risk/precarious workers have affordable access to health insurance, hazard pay, paid leave for quarantine periods, and childcare to reduce stress and ensure prompt care.

<sup>1</sup>See Table A.1 in the Methods Appendix for the complete list of 55 detailed occupations.



# Introduction

The first cases of COVID-19 (caused by the novel coronavirus<sup>1</sup>, or SARS-CoV-2) in Washington state were reported in late-January in Snohomish County. By the end of February, nearly 300 cases had been recorded, 86 of whom were hospitalized, and at least 46 people had died as a result of COVID-19. Although early cases, hospitalizations and deaths were concentrated among the elderly, by March county health departments in Washington and other states were reporting increasing numbers of COVID-19 cases among working age people – in particular, among workers in industries deemed “essential.”

This research project began as a study of Washington’s “essential” workforce and occupations. These are workers deemed critical to ensuring public safety and continuity of critical societal functions, and early in the pandemic were the only workers permitted to leave their house for work. Initially it was these essential workers who were at increased risk of contracting COVID-19 due to increased interactions outside the home. However, in June 2020 when the phased re-opening of Washington began, many other “nonessential” workers were allowed to return to workplaces, making other factors important in understanding occupations at increased risk of contracting and transmitting

*“Some of the hardest-hit industries include health care and health care support, food processing, essential retail industries, public transportation, and protective service and security industries.”<sup>2</sup>*

<sup>1</sup>This paper uses SARS-CoV-2 (also known as novel coronavirus) when referring to exposure, and COVID-19 when referring to the disease resulting from infection with the SARS-CoV-2 virus.

<sup>2</sup>See Table A.1 in the Methods Appendix for the complete list of 55 detailed occupations.

COVID-19 at work. Moreover, recognizing that the COVID-19 pandemic can take a toll both physically and economically, understanding which workers are economically precarious is another needed dimension to fully characterize worker risk during COVID-19.

To explore the intersection of these dimensions of risk, we identified occupations which are economically precarious AND have workplace characteristics putting the worker at increased risk for exposure to SARS-CoV-2. For all sets of occupations considered, we investigated the demographic distribution of the workers, recognizing that many groups have been disproportionately affected by COVID-19 due to both work and nonwork factors.

By focusing on two dimensions of risk at work (exposure to SARS-CoV2, and economic precarity), we are able to understand which workers are the most susceptible to both adverse health and economic outcomes related to the pandemic, and which occupations and workers should be prioritized for regulatory and other interventions. For example, some high-risk occupations offer very good wages and benefits. Here, we focused on those occupations that are not considered high status—occupations that employ workers for low wages with few or no benefits; we also focused on occupations with work characteristics that can promote the spread of an infectious disease, and which are less adaptable to working from home during a pandemic. Many of these workers are women and people of color who regularly face additional forms of disadvantage and discrimination both at and outside of work. Other recent national studies have come to similar conclusions about the demographic makeup of this at-risk workforce , but here we include additional dimensions of work in assessing hazard of exposure to SARS-CoV-2, making this work especially unique in scope.

## Precarious - adjective

pre·car·i·ous | \ pri-'ker-ē-əs

### Definition of precarious

1: characterized by a lack of security or stability that threatens with danger

2: dependent on chance circumstances, unknown conditions, or uncertain developments

Source: Merriam-Webster

## Precarious Work and Precarity

Throughout this report we use the terms “precarious,” “precariousness” and “precarity” to describe the state of workers who receive low wages and insufficient work-provided benefits, thus increasing reliance on government-provided benefits. Precarious work is a term typically used to describe workers in a non-standard or temporary work arrangement who are performing work that is “uncertain, unstable, and insecure and in which employees bear the risks of work (as opposed to businesses or the government) and receive limited social benefits and statutory protections.”<sup>3</sup> Thus, while there are myriad characteristics of precarious work, in this report we focus on a sub-set of economic indicators.

## High Hazard Occupations

We use the term “high hazard occupations” to identify those occupations in which workers have a high risk of exposure to SARS-CoV-2, due to workplace characteristics or work activities that require close interaction with others, exposure to infection or disease, or exposure to other high hazard activities.

<sup>3</sup>Research in the Sociology of Work Volume 31: Precarious Work: Edited by Arne L. Kalleberg and Steven P. Vallas (2018)



Excerpt from New York Times  
March 18, 2020

## They Clean the Buildings Workers Are Fleeing. But Who's Protecting Them?

*Janitors are going into offices to battle the invisible germs that threaten public health, sometimes without adequate protection or information about what they are facing.*

By John Eligon and Nellie Bowles

"On March 10, about 10 janitors who clean Amazon's Seattle headquarters as contractors were exposed to an unfamiliar cleaning solution that sent some spilling into the street coughing, said one of the janitors. A similar incident had happened about a week earlier.

Ismaham Ali, 29, a shop steward at Amazon who has been cleaning the company's offices for the past four years, said her crew was given an unfamiliar, high-powered disinfectant to use.

Until then, she said, they had been using mostly gentle green cleaning products. But on that day earlier this month, Ms. Ali said, "They just said, 'Hey guys, corona's scary, use this.'"

Another janitor who leads chemical safety trainings for janitors who work at Amazon said the new disinfectant was Virex II 256.

"They didn't say be careful or anything," Ms. Ali said. "They didn't mention anything." Ms. Ali said that within an hour of using the new cleaning compound, her face became hot and her eyes red. Her eyes and skin began to burn, she said, and she developed a rash on her face. She said that there was a sheet with safety instructions but that she did not understand them all. The next day, she said, the crew was given additional training, along with eye protection.

An Amazon spokesperson confirmed that several janitors had been sickened earlier this month but said there had been no further complaints."



# Purpose

**The purpose of this report is to provide a better understanding of these intersecting economic, demographic and workplace factors during a time of crisis in the U.S. In this report, we:**

- Compare workers in essential occupations in Washington to the overall Washington workforce; summarize demographic characteristics (gender; race/ethnicity; citizenship) of the essential workforce and overall workforce;
- Develop a measure of economic precarity and analyze the precarity of major demographic groups [e.g. women, workers of color, non-citizens (workers without U.S. citizenship<sup>4</sup>)], within the overall workforce;
- Develop a hazard index to characterize high SARS-CoV-2 hazard occupations, and investigate the demographic distribution for the high hazard occupations (i.e. the occupations with the highest risk of exposure to SARS-CoV-2 at work) compared to the workforce as a whole;
- Analyze the demographics of workers in specific occupations that are associated with
  - High risk of exposure to SARS-CoV-2
  - Economic precariousness
- Provide possible solutions and recommendations, based on our analyses

<sup>4</sup>The American Community Survey (ACS) defines "non-citizens" as "respondents who indicated that they were not U.S. citizens at the time of the survey." The term "non-citizens" does not distinguish between those who are residing in the country with or without legal permission.

## Methods

We created a dataset of 694 occupations, derived from the Labor Market Information (LMI) 2019 list of essential occupations in Washington (Cook 2020)<sup>5</sup>. These are occupations used by the U.S. Census Bureau and roughly correspond to the detailed Standard Occupational Codes (SOC codes) utilized by the Bureau of Labor Statistics (BLS) in collecting monthly statistics. We used common SOC codes to integrate this list with measures of hazard exposure to SARS-CoV-2 at work, demographics, and economic measures (wages, uninsured rates, percent of workers receiving SNAP<sup>6</sup> benefits and cash assistance).

The LMI dataset of essential occupations for Washington includes 3,318,510 workers; after merging this list with data on demographics and economic status, the 694 occupations in our dataset employ 3,310,491 workers, or about 99.7% of the LMI estimate of the state workforce. All of the analyses in this report were done at the level of these detailed occupations. When we discuss demographics, economic status, health insurance, government assistance, wages, and SARS-CoV-2 exposure hazard, we are referring to rates for occupations or groups of occupations; when we refer to workers, we are referring to the workers employed in these occupations.

## Essential Industries, Occupations and Workers

Washington state was one of the epicenters of the initial COVID-19 outbreak in the U.S. On March 23rd, Washington State Governor **Jay Inslee** issued an Executive Order requiring all residents to stay at home, in accordance with public health directives, to slow the spread of SARS-CoV-2, the virus that causes COVID-19. However, this order included a list of "Essential Critical Infrastructure Workers" listing industry sectors and workers (occupations) deemed "essential" to the continuing functioning of the state's critical infrastructure and society. Workers on this list were asked to continue working despite potentially increasing their risk of exposure to the virus.



<sup>5</sup>See Methods Appendix 1: Dataset

<sup>6</sup>Supplemental Nutrition Assistance Program, USDA-FNS

## Janitors' Toxic Exposure Leads to Emergency Meetings, New Training

When COVID-19 hit, cleaners at Amazon and other Seattle office buildings were told to "hit it hard" and keep the virus out of their buildings. Cleaning staff were given strong chemicals and told to work overtime. Unfortunately, nobody provided the cleaning crews with proper equipment and directions to safely work with the chemicals. To make matters worse, another cleaning crew was brought in at the same time to spray the building interior with a powerful hospital-grade disinfectant and exposed the cleaners to toxic fumes from the mix of chemicals. Chaos resulted as janitors had to leave the buildings immediately after experiencing skin and eye reactions.

After calls and texts from janitors poured into SEIU Local 6's offices, the union called for emergency meetings with contractor ABM resulting in new protocols and Safety Data Sheets being distributed to all workers.



Amir Kalabic (pictured above), a Local 6 shop steward who previously trained on safely using disinfectants at Swedish Hospital, took the lead in training other janitors how to use the new chemicals.

Because they are essential workers, the janitors have been working continuously, often with overtime, since the beginning of the pandemic. In addition to all the normal occupational hazards of janitorial work, they know their own health and their families' health is at risk with coronavirus at work.

While some tech companies paid their cleaning contractors to send home older or vulnerable workers with pay, Amazon and most large Seattle-area companies have not.

*"Everyone is scared," said ABM janitor Ismahan Ali, telling a Reuters reporter, "we just keep going, let's do what we can."*\*

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Local 6 recently won a new contract extension providing for stronger safety protections for the next year. Union staff now regularly check on the protective equipment, training and supplies used by the Amazon janitors.

## Domestic Cleaners: No Protections?

With more office workers working from home, domestic workers are cleaning homes that may be serving to quarantine workers who may have been exposed to the virus, said Rocío Alejandra Ávila, the National Domestic Worker Alliance's California State Policy Director in an interview with Reuters.

Domestic workers often have to supply their own gloves and other safety gear. They are excluded from OSHA protections, a policy stemming from discrimination against black workers, who dominated domestic work in the 1930-50's when many labor laws were written. Undocumented cleaners aren't eligible for Washington's affordable health insurance plans are not usually offered paid sick leave.

\*Reuters Jonnelle Marte 3/19/20

## Tri-Cities Nurses Spread the Alarm over PPE With Video



Adam Halvorsen, a nurse at Kadlec Regional Medical Center in the Tri-Cities, knows dangerous work. As a Iraq War Marine veteran, paramedic and firefighter, he's used to hazardous situations, but before COVID-19 he felt he always had the equipment he needed. This year, Kadlec, like most other hospitals, was not prepared for the coronavirus, and Halvorsen worried for himself and his co-workers.

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## Which Industries and Economic Sectors Include "Essential Workers" in Washington?

The following economic sectors/industry groups are included in the Washington State Executive's list of essential industries for Washington:

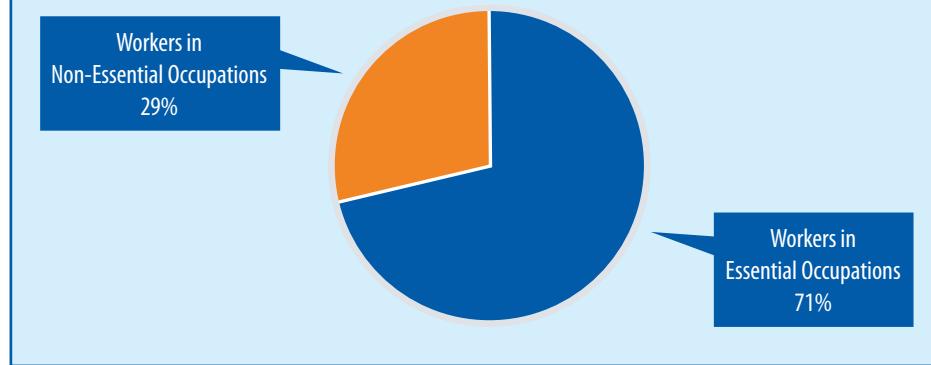
- Public Health and Health Care
- Emergency Services Sector
- Food and Agriculture
- Energy Waste and Wastewater
- Transportation and Logistics
- Communications and IT
- Critical Manufacturing
- Hazardous Materials
- Financial Services
- Chemical industry
- Real Estate and Mortgages
- Mortuary, Funeral, Embalmer, Cemetery Services and Essential Functions
- Community-Based Government Operations

In each of these economic sectors, many, if not all the occupations in the sector are considered "essential". This means that these are occupations that are needed to maintain operations for the essential sectors necessary to protect the health and well-being of Washingtonians.

## Which Occupations are Considered "Essential"?

Out of 694 occupations in our dataset, 415 are essential occupations, as designated by LMI and by Governor Inslee.<sup>7</sup> These occupations employ about 2,358,614 workers in Washington state. Nearly 71% of all the workers in our dataset work in essential occupations (**Figure 1**).<sup>8</sup>

**Figure 1: Workers in Essential Occupations as Share of All Workers in Washington**

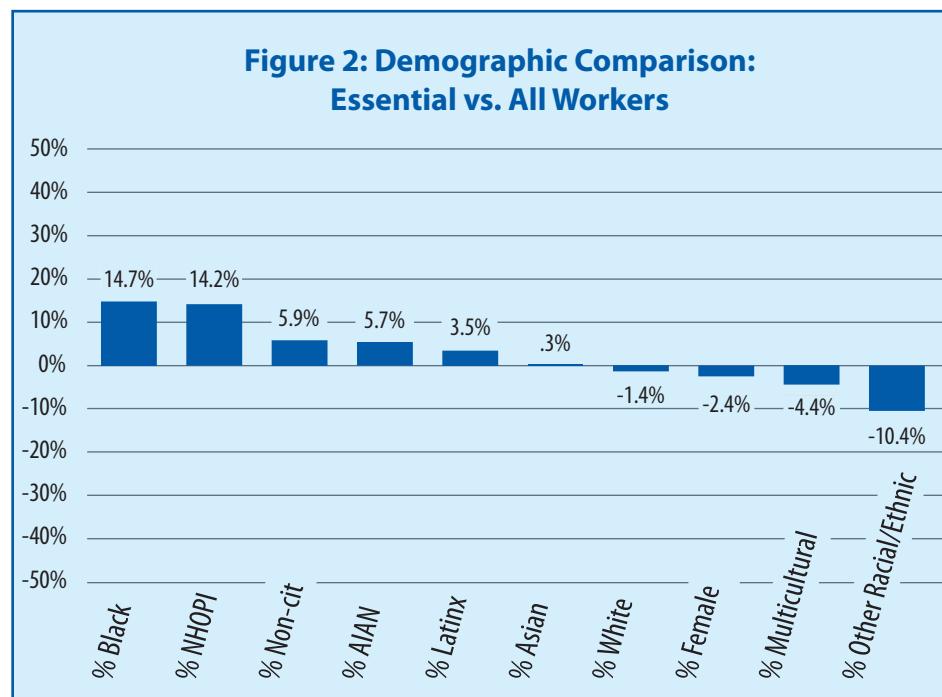


<sup>7</sup>See methods appendix.

<sup>8</sup>Throughout this report, unless noted, all references to workers and working conditions, and all statistics, refer only to workers in WA State. We use the expressions "essential occupations" and "essential workers", though the units of analysis in this report are detailed occupations.

## Who are the Workers In these Essential Occupations?

**Figure 2** compares the essential workforce to the Washington workforce as a whole, on gender, race/ethnicity and citizenship status, as defined by the US Census. Percent over/underrepresentation compares the demographic distribution of the essential workforce to the Washington workforce as a whole. For example, Black workers represent about 3.9% of the Washington workforce, but about 4.5% of the essential workforce. This is 15% higher than their share of the total workforce.



As seen in **Figure 2**, Black workers and Native Hawaiian/Other Pacific Islanders (NHOPPI) workers are the most highly overrepresented among these workers, followed by non-citizen workers, and American Indian and Alaskan Natives (AIAN) and Latinx workers; people of “other” race/ethnicities<sup>9</sup> are most underrepresented, along with multiracial people, and female workers. But none of these differences exceeds 15%.

In general, essential workers are at increased risk for contracting and transmitting COVID-19 due to their increased interactions with the potentially-exposed public. However, the economic precarity of workers can also influence their risk profile during the pandemic, with highly compensated essential workers with secure employments (e.g. physicians) likely having a different experience than more precarious essential workers. In the following section, we discuss this additional dimension of worker risk related to the COVID-19 pandemic.

<sup>9</sup>Races and ethnicities not listed separately by the Census Bureau.

Halvorsen did know how to make videos—he previously made videos for his union’s 2019 contract campaign. He started sending videos of nurses at Kadlec talking about coronavirus to his union, the Washington State Nurses Association (WSNA), which soon got national attention through the American Nurses Association (ANA).

Halvorsen was featured on MSNBC this spring, and then joined other providers and Senator Patty Murray in asking the federal government to help protect people working on the front lines of the coronavirus pandemic.

*“Nurses and health care workers are stepping up to meet the needs of patients in the face of this pandemic,” said Halvorsen. “But we are going to get sick. We are going to die. That is a hard truth to swallow, and it isn’t right. We are calling on the federal government and private businesses to do everything possible to step up and make more protective equipment available.”*

The national attention generated by Halvorsen and many front-line health care workers eventually did lead to more PPE for Kadlec and other hospitals. In June, WSNA and other providers were also successful in getting Washington State to adopt stronger national PPE use and cleaning guidelines. Halvorsen and his fellow workers were back in the thick of the battle with coronavirus by summer 2020, as Eastern Washington was experiencing the highest infection rates and virus outbreaks in Washington State.

## “Self-Help” for Front Line Workers

In late April, as hospital specialty clinics across the state started to open for general patients, receptionists and other front-line workers at Harborview Medical Center in Seattle were asking management to install plexiglass barriers for infection protection but getting no response.

They asked their union leader, Paula Lucaszek, a plumber on the main campus of the UW for help. Paula explains what happened next. “I was chatting with other members about the lack of barriers and other PPE in a phone call on April 26th. One of them threw out the idea that we should just create our own plexiglass barriers and install them. Leanne Kunze volunteered to go to the hardware store, and we agreed to meet in three hours at Harborview. We went to the emergency room and set up this plexiglass barrier. The workers were thrilled.

These are the frontline workers and at this point, it was mostly COVID cases coming in and they felt they needed some protection. There weren't enough masks available. After we set it up, they just kept saying thank you, thank you, even though they knew it wasn't permanent. We set it up there in the ER and we set it up at another clinic in Harborview. They stayed up for several days before management noticed. Two days later, they took it down, but our coalition started meeting with the hospital and demanding plexiglass barriers.

We figured we had a good case since the Governor had stated that if they wanted to open the hospital to do elective surgeries, they had to show they had PPE, including plexiglass barriers. So, we entered negotiations with the UW and they finally agreed to set up barriers at 101 sites. They had previously set them up in food service, so we knew they could do it. Sounds like a lot but the important thing to know is that means there was one plexiglass barrier at each of the five Harborview buildings, four barriers at the UW Medical Center, and they have another 80 clinics within the hospitals, and then Northwest Hospital with hundreds of clinics.

We really need more barriers. Our members are the lowest paid workers at the hospital—the janitors, food service, medical assistants and similar jobs. We needed PPE – had to come to work every day and we were scared for our families.”

## Occupations and Precarious Economic Status

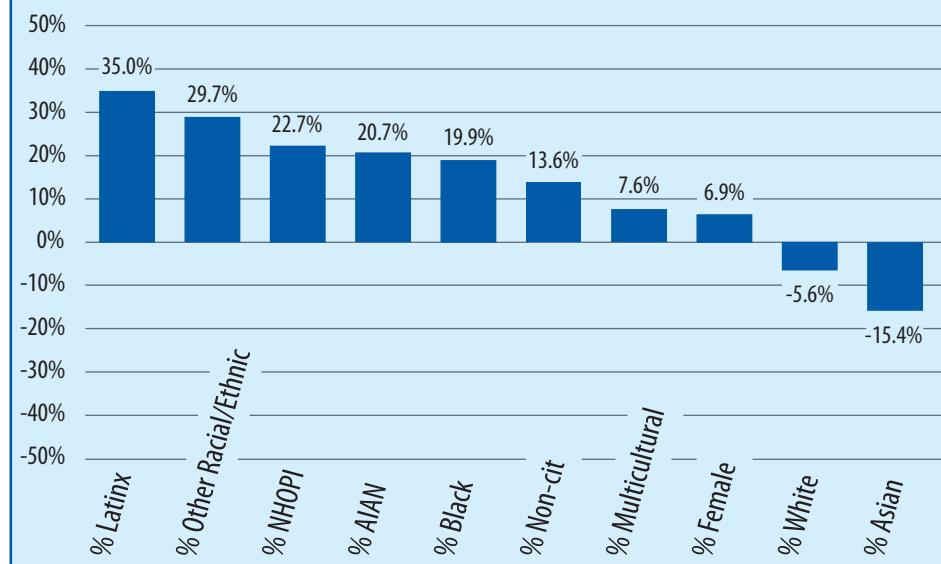
The COVID-19 pandemic has reminded us how quickly family and household economic stability can change, since economic stability is dependent on working. How precarious are Washington workers? To answer this, we investigated four measures which indicate economically precarious conditions relative to all occupations in our dataset:

1. Median hourly wage<sup>10</sup>
2. Percent of workers who do not have access to health insurance
3. Percent of workers participating in the Supplemental Nutrition Assistance Program (SNAP)
4. Average amount of other need-based government assistance

For wages, we designate an occupation (and its workers) to be precarious if the median hourly wage for the occupation is below \$27.08 (the living wage threshold for a household with 1 adult and one child in Washington).<sup>11</sup> If an occupation was in the most precarious 25% of all occupations for health insurance, SNAP, other assistance—we considered the occupation precarious for that measure. If an occupation rated precarious for two or more of these four measures, we designated that occupation to have a precarious workforce overall. Out of the 694 occupations in our data set, we designated 230 precarious occupations.

Using this definition, 1,817,792 workers – about 55% of the workforce in Washington – are employed in precarious occupations. Not all workers in these occupations face high levels of individual economic precarity – but they all work in occupations characterized by a high percentage of precarious workers. **Figure 3** compares workers in economically precarious occupations to the whole workforce.

**Figure 3: Demographic Comparison: Economically Precarious Workers to All Workers**



<sup>10</sup>ACS-PUMS and WA ESD Occupation-Wages data. See Methods Appendix.

<sup>11</sup>MIT Living wage calculator.

The pattern of over/underrepresentation in **Figure 3** reveals a familiar pattern of economic inequality in the U.S. workforce: women, non-citizens, Blacks, Latinx and other races/ethnicities are overrepresented in precarious occupations. Men, whites and Asians are underrepresented among precarious occupations using our definition. In comparison to **Figure 2** (all essential workers), over and underrepresentation in the precarious workforce is more pronounced, as shown in **Figure 3**.

## Occupations and the Risk of Exposure to SARS-CoV-2

As our analysis of essential workers indicates, most workers have to continue to work during a pandemic; they face varying levels of risk for contracting and transmitting COVID-19 depending on their working conditions, job tasks and characteristics, access to personal protective equipment, and whether or not they can work from home. Utilizing O\*NET<sup>12</sup> data from the Bureau of Labor Statistics, we calculated a SARS-CoV-2 hazard score, based on the 10 occupational activities and workplace contexts listed below; we use these 10 measures to calculate a hazard index, characterizing risk of exposure to SARS-CoV-2 at work.<sup>v</sup>

For each occupation, we weighted<sup>vi</sup> (adjusted) the scores of the SARS-CoV-2 hazard dimensions (below), in two ways: first, we judged the risk of exposure to SARS-CoV-2 to be greater in occupations where use of PPE is less routine, so we weighted the ten dimensions in the Hazard Index upward, based on the frequency of use of PPE. Second, we weighted the resulting ten dimensions downward, depending on whether the occupation could be relocated to work from home. We used the importance of using a computer at work to construct the relocatability weight. The reason for applying this weight is because those who could work from home would face inherently less risk than those in occupations that could not be done from home, regardless of other work activities that may increase risk of COVID-19.

### Key Dimensions in SARS-CoV-2 Hazard Index

1. Physical proximity
2. Deal with external customers
3. Face-to-face discussions
4. Contact with others
5. Exposure to disease / infections
6. Work with team or group
7. Deal with physically aggressive people
8. Assisting/caring for others
9. Performing for/working directly with the public
10. Use of common or specialized safety equipment (gloves, masks, hazmat suits)

## Childcare During COVID-19: Making it Up as You Go Along



Some essential workers faced the early stages of COVID-19 with little guidance. Billie Quiring runs Billie's Busy Kids, a family childcare in Granite Falls licensed to care for 57 kids. With little timely guidance from state agencies, she began by asking most parents to keep their kids at home, offering care only to the families with essential workers, and placing some of her 14 employees on unemployment. Given the low pay available for childcare workers, workers on furlough actually got a raise with the \$600 federal unemployment payments.

After consulting with her employees, she initiated special safety measures for the center, including extra sanitizing, added gloves, masks and other PPE, changed the food service, banned wearing shoes, did family health checks and limited the number of staff entering classrooms.

After two months, she began adding more kids and staff—especially medically-vulnerable families.

What changes does Quiring think need to happen to protect vulnerable childcare workers and the families they serve? She would like to offer hazard pay and longer paid sick leave to keep her employees well. She and her childcare providers union, SEIU 925, are advocating for the state to raise rates to make that possible.

<sup>12</sup>Occupational Information Network (O\*NET), sponsored by the U.S. Dept. of Labor/Employ. & Train. Admin.

Our approach with the SARS-CoV-2 hazard index is similar to the approach we use to measure economic precarity: we coded an occupation “high hazard” on each hazard dimension if it scores high (above 75th percentile). We added up the “high hazard” scores to create a total occupational hazard score. The total hazard score ranges from 0 (not high hazard on any dimension) to 10 (high hazard on all dimensions). We also use a second measure of hazard – the average score for all 10 dimensions. We designated an occupation to be high hazard if its mean hazard score is above the 75th percentile of the distribution of mean hazard scores for all occupations, or if its additive hazard score is above the 75th percentile of the distribution of additive hazard scores.

Based on this approach, we identify 197 high hazard occupations (out of the 694 occupations in our dataset). These occupations experience relatively high risk of exposure to SARS-CoV-2 at work, after weighing for remote work and use of safety gear. These high hazard occupations are held by 1,395,216 workers in Washington – about 41% of the labor force.

## Which Workers Face the Greatest Risk of Exposure to SARS-COV-2?

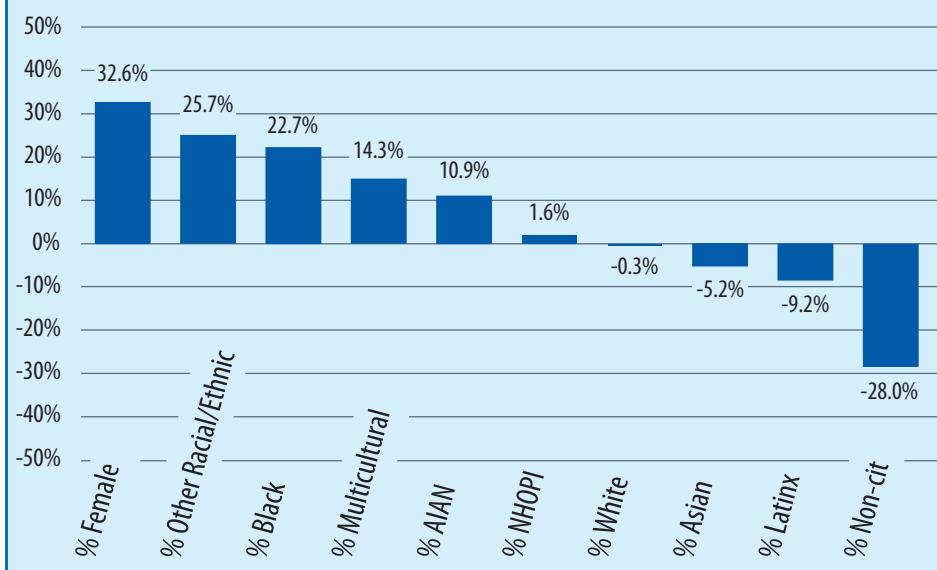
In **Figure 4** we report basic demographic differences between workers in high hazard occupations, and the entire workforce.

## Women Workers: Higher SARS-COV-2 Exposure

Women bear a disproportionately large risk of exposure to SARS-CoV-2 at work. Women constitute 47.6% of the total workforce but represent 63.1% of the workforce in high hazard occupations— they are thus overrepresented by 32.6%. Workers in the “other” racial/ethnic category are overrepresented by 25.7%, and Black workers by 22.7%.

In contrast, workers classified as non-citizen are underrepresented in this high hazard group of occupations, by an estimated 28%. This could be because this group includes larger numbers of tech workers on visas/green cards. Latinx workers are underrepresented among high hazard workers at a rate of about 9.2%. But these data sources don’t count workers who are considered “independent contractors,” or paid off the books in cash, categories that include large numbers of Latinx workers who are working in potentially high hazard jobs, including construction, restaurant work, meat processing, and agriculture.

**Figure 4: Demographic Comparison:  
Workers in High Hazard Occupations vs. All Workers**



## Overlapping Economic Precariousness and Risk of SARS-CoV-2 Exposure

While early in the pandemic essential workers were frequently thought to be the most at-risk for adverse outcomes related to COVID-19, as Washington began its phased re-opening and many non-essential workers began to return to the workplace, risk for SARS-CoV-2 extended outside of essential occupations. With both essential and many non-essential workers resuming work, the occupations most susceptible to adverse effects related to the COVID-19 pandemic are those experiencing both high economic stress and high risk of exposure to SARS-CoV-2 due to their work activities and characteristics.

We now turn to the intersection of the hazard and precarity vectors described above – which occupations and workers experience both high economic stress and increased risk for exposure to SARS-CoV-2?

***Of the 694 occupations in our dataset, 55 occupations were both precarious and high hazard. These occupations employ about 901,310 workers.***

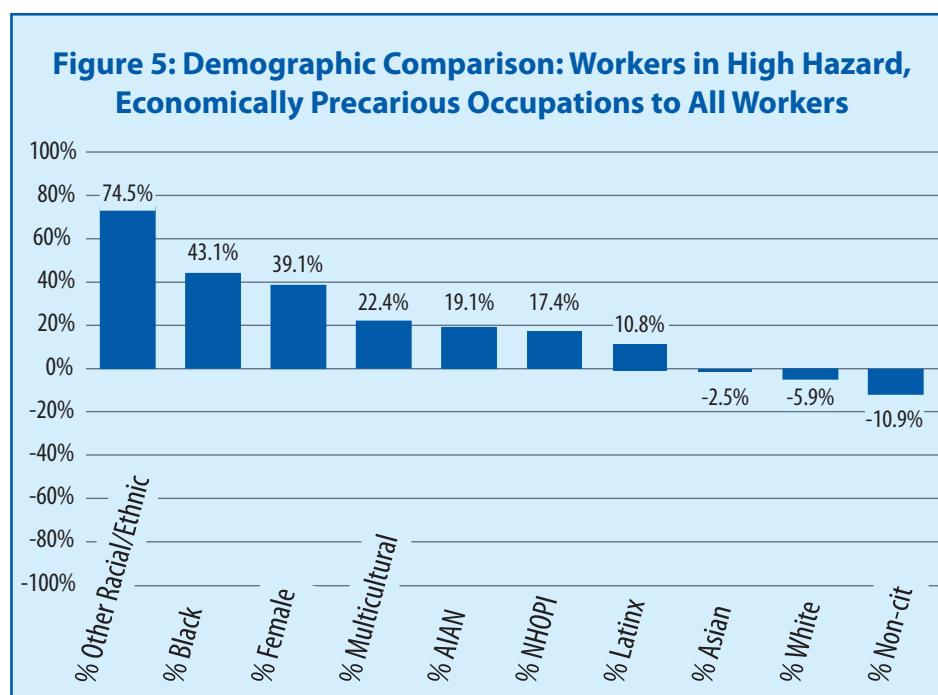
**Figure 5** shows how gender, race/ethnicity and citizenship categories are over/underrepresented in high hazard, economically precarious occupations, compared to the overall workforce.

## Women Workers, Workers of Color Overrepresented in High Hazard, Low Reward Work

About 600,000 women work in these occupations - about two-thirds of all workers in economically precarious, high hazard occupations, much higher than their share of the overall labor force. This overrepresentation in the workforce is a key factor in the current situation faced by working mothers, including those in multi-generational households in Washington. Workers in the “other” racial/ethnic category are the most overrepresented in this group of workers, by an estimated 75%, compared to their share of the entire workforce. Black workers are also highly overrepresented, at a rate of 43.1%. Multi-racial, AIAN, NHOPI, and Latinx workers are also highly overrepresented among workers in high hazard, economically precarious occupations.

### High Hazard, Economically Precarious Occupations

**Table 1** below presents the 55 occupations in our dataset that are economically precarious and SARS-CoV-2 hazardous, grouped into 26 of the U.S. Census Bureau’s “Minor Occupational Groups” (3-digit SOC codes).<sup>13</sup>



## High Hazard, Economically Precarious Occupations

**Table 1** below presents the 55 occupations in our dataset that are economically precarious and SARS-CoV-2 hazardous, grouped into 26 of the U.S. Census Bureau's "Minor Occupational Groups" (3-digit SOC codes).<sup>13</sup> Farmworkers and ag production workers in Washington have been at the center of several COVID-19 outbreaks in Washington but are not on the list of high-hazard precarious occupations in **Table 1** or **Appendix Table A.1**. This is due in part to the fact that many of these workers are not fully represented in the ACS occupational surveys.

**Table 1: Hazardous, Precarious Occupations at the Minor Occupational Group Level**

Occupational Group Title	Total wkr	% Female	% Non-Citizen	% White	% Black	% AIAN	% Asian	% NHOP	% Other	% Multirac.	% Latinx
Retail Sales Wkrs	192070	58.2%	8.0%	62.5%	3.8%	1.0%	10.0%	1.0%	0.8%	4.7%	16.1%
Food & Beverage Serving Wkrs	172640	66.9%	5.8%	65.1%	3.7%	1.4%	9.2%	1.6%	0.3%	6.3%	12.3%
Information & Record Clerks	96960	63.2%	6.9%	65.2%	6.9%	1.3%	10.1%	0.5%	0.1%	5.4%	10.5%
Home Health Personal Care Aides, Nursing Assistants, Orderlies, Psychiatric Aides	95670	83.9%	10.0%	63.0%	13.3%	1.5%	7.1%	0.8%	0.3%	4.0%	9.9%
Other Office & Administrative Support Wkrs (e.g. Office Clerks)	74460	75.9%	6.0%	71.1%	5.9%	0.6%	10.6%	0.8%	1.1%	2.4%	7.5%
Other Educational Instruction & Library Occupations (e.g. Teaching Assistants)	40040	83.3%	4.9%	77.1%	1.3%	1.5%	6.3%	0.1%	0.1%	4.6%	8.9%
Other Healthcare Support Occupations (e.g. Medical Assistants, Massage Therapists)	24510	89.5%	5.6%	63.5%	3.9%	0.4%	10.8%	0.4%	0.0%	5.9%	15.0%
Supervisors of Sales Wkrs	24310	50.5%	6.6%	78.2%	1.2%	0.3%	9.2%	0.8%	0.0%	3.8%	6.4%
Supervisors of Food Preparation & Serving Wkrs	24100	53.7%	6.7%	66.8%	0.0%	0.0%	4.6%	0.0%	0.0%	10.8%	17.7%
Counselors, Social Wkrs, & Other Community & Social Service Specialists	23080	59.4%	4.3%	62.8%	10.2%	9.0%	5.4%	0.0%	0.9%	7.1%	4.6%
Motor Vehicle Operators	19260	7.8%	21.9%	41.6%	38.0%	0.3%	11.0%	0.0%	0.4%	3.1%	5.6%
Other Food Preparation & Serving Related Wkrs	19010	68.8%	13.5%	66.6%	1.6%	0.4%	9.5%	0.0%	0.0%	5.9%	15.8%
Health Technologists & Technicians	18450	77.2%	3.2%	68.2%	3.9%	0.3%	16.7%	0.0%	0.2%	4.4%	6.2%
Preschool, Elementary, Middle, Secondary, & Special Education Teachers	16970	97.1%	9.6%	67.4%	2.1%	2.3%	6.0%	0.0%	0.0%	3.0%	19.1%
Personal Appearance Wkrs (e.g. Skin Care Wkrs)	11010	95.2%	6.0%	71.6%	0.3%	0.8%	8.1%	0.2%	0.0%	8.1%	10.9%
Cooks & Food Preparation Wkrs	9290	38.4%	19.2%	52.0%	5.6%	1.0%	8.9%	0.8%	0.6%	3.6%	27.5%
Entertainment Attendants & Related Wkrs	9200	40.5%	17.2%	53.7%	0.9%	2.9%	34.4%	0.9%	0.0%	1.8%	5.4%
Material Recording, Scheduling, Dispatching, & Distributing Wkrs	6660	40.2%	8.2%	71.9%	1.7%	0.3%	13.3%	0.2%	0.8%	5.4%	6.4%
Animal Care & Service Wkrs	4720	88.6%	6.9%	69.2%	2.4%	1.4%	12.8%	1.5%	0.0%	5.9%	6.9%
Other Construction & Related Wkrs (e.g. Highway Maintenance Wkrs)	3200	3.0%	3.5%	82.0%	3.0%	0.9%	0.0%	0.0%	0.0%	8.2%	6.0%
Other Protective Service Wkrs (e.g. Lifeguards, Ski Patrol)	2910	46.3%	4.1%	67.6%	7.9%	0.6%	2.8%	0.1%	0.0%	8.6%	12.5%
Other Management Occupations (e.g. Food Service Mgrs)	2760	57.4%	4.2%	64.5%	4.9%	1.1%	6.9%	1.8%	0.0%	7.8%	13.0%
Other Transportation Wkrs (e.g. Aircraft Service Attendants)	2030	11.7%	6.2%	68.3%	0.0%	4.4%	1.0%	3.4%	2.1%	3.3%	17.5%
Financial Clerks	1100	42.7%	5.9%	72.9%	3.3%	4.9%	2.4%	0.0%	0.0%	1.0%	15.5%
Art & Design Wkrs	60	45.5%	7.1%	81.7%	1.8%	0.0%	6.6%	1.3%	0.0%	3.7%	4.9%

<sup>13</sup>For a table of demographic characteristics for all 55 detailed occupations, see Appendix Table A.1. Table 1 is a more compact presentation of the data shown in greater detail in Appendix Table A.1.

## Age and Household Size of High Hazard, Economically Precarious Workforce

Now that we have identified a group of high hazard, economically precarious occupations, we further investigate two other factors that are related to the COVID-19 risk: age and household size. Age is associated with greater risk of becoming seriously ill as a result of exposure to SARS-CoV-2. Also, a larger household size results in more potential household members in which to transmit the virus.

This high hazard, economically precarious workforce is significantly younger than the workforce as a whole. The weighted average age of workers in these occupations is 37.3 years old, compared to 41.5 for the workforce as a whole. But the “average age” in an occupation hides considerable variation in the age of workers in the occupation. We estimate that there are still close to 100,000 workers who are  $\geq 55$  years old in these occupations in Washington. The fact that they are still working in these occupations has to increase their risk of contracting COVID-19, a situation deserving further attention and study.

Household size is also a factor. The weighted average household size for this group of workers is larger than the workforce as a whole: 3.2 people per household, compared to an average household size of 3.0 people for the workforce as a whole. The subsets of workers we’ve analyzed – workers in economically precarious occupations (3.2), and workers in high hazard occupations (3.1) have a slightly higher average household size than the workforce as a whole, resulting in a significantly larger average household size for workers in the 26 minor occupational groups in **Table 1**. This does not cover the housing situations of many farmworkers and ag production workers in Washington, who have been at the center of several COVID-19 outbreaks, but are not fully represented in the ACS housing surveys.

There are nine occupations in **Table 1** for which the average household density is more than one standard deviation (0.49) above the total workforce mean of 3.0. Together, these occupations employ about 142,000 workers. Among these occupations, fast food/counter workers are by far the most numerous, accounting for 70% of this group. The remaining 30% is divided between counter/rental clerks, pharmacy techs, dining/cafeteria workers, childcare workers, and couriers/messengers.





# Conclusions & Policy Recommendations

This report estimates that Washington has as many as 900,000 workers in occupations that are economically precarious and at-risk and finds that these workers are disproportionately women and workers of color.

We have identified these occupations to focus discussion of workplace safety and economic security policies, to help policymakers seeking to design a safe and inclusive economic recovery:

- Which workers are in high hazard, precarious occupations?
- What policies can be targeted to support these workers?

We highlight the areas where public and private sector leaders can act boldly to build safer workplaces and address the precarious economic situation of too many Washington workers. By providing essential and at-risk workers with baseline economic and hazard protections, we are demonstrating to these workers that their contributions to the state's economy are valued and take steps to better withstand the continuing shock of COVID-19 and prepare for future shocks.

We have recommended policies that can be implemented at the state level, in tandem with community-based prevention strategies, to protect these vulnerable workers, ensure policy equity, and institute protection systems that will help prevent continuing workplace disease outbreaks.

# Policy Recommendations

We have identified two vectors of threats to workers: 1) the risk of exposure to SARS-CoV-2 in the workplace, and 2) economic precarity, including lack of health insurance, which can increase the chances of infection, transmission and medical complications. For employees in both hazardous and economically precarious occupations, we must address both sides of the problem. Unless Washington addresses both elements of this pandemic economy, we risk holding back Washington's recovery. We begin by addressing the workplace hazards.

## Addressing Workplace Hazards

### Workplace Coronavirus Disclosure, Testing and Tracking

Washington should 1) require notification of positive COVID tests to both state health and workplace safety agencies and creation of a publicly available and searchable state registry to track new workplace outbreaks; 2) provide occupational cluster-related testing in case of outbreaks and require routine testing for workplaces with a high-risk of COVID-19 transmission; 3) require quarantining of exposed workers with paid leave, especially for older or vulnerable workers, 4) prioritize follow-up tracking of workplace COVID cases through contact tracing; 5) Track industry and occupation (using coding schema like SOCs and NAICs) for all cases of COVID-19 presented in hospitals.

### Protective Standards

Washington State Department of Labor & Industries can issue an emergency temporary standard for up to 120 days. At the conclusion of 120 days, the standard can be re-filed if the permanent rulemaking process has begun, or if conditions have changed.<sup>1</sup> Therefore, the strongest temporary standard would be coupled with a permanent standard. CalOSHA has an Airborne Transmissible Disease (ATD) Standard<sup>2</sup>, a standard which Washington state currently lacks, but should prioritize both as a temporary standard and a permanent standard. In the CalOSHA standard, companies must have a written exposure control plan, implement training, engineering controls, work practice controls, provide appropriate personal protective equipment including respiratory protection, and offer medical services such as contact tracing, employee notification, and medical evaluations provided for those that were exposed.

The standard also ensures that an employee's position, earnings, seniority, and benefits must be maintained even if removed from their job due to exposure or infection.

### Funding for Health and Safety

For Labor and Industries (L&I) to continue to enforce, regulate, and write protective standards for workers, the agency's funding needs to be a budget priority. During the COVID-19 pandemic it became apparent how important the workplace is to public health and disease transmission. This must be recognized through the Washington state budgeting process, and L&I must be given increased money to expand their ability to protect all of Washington's workers.

### Enforce Health and Safety Committees Requirement

Washington law requires employers with more than 11 people working at the same time and the same location to set up a workplace safety committee. Safety meetings must be held at least monthly and include employee representatives. This law should be widely publicized and enforced.

### Promote worker organizing and "self-help" strategies

Striking agriculture workers in Yakima demonstrated this spring that self-help strategies can produce safety improvements. Members of the Federation of State Employees at UW Medical Center used another self-help strategy when they installed their own plexiglass barrier at Harborview Hospital this spring after requests to management failed to produce protective barriers. Shortly thereafter, management had barriers installed as requested by employees.

With some workplaces failing to protect workers, worker organization and self-help strategies are even more important. Employees must not face retaliation for talking to co-workers or agencies about safety problems, and efforts to block self-help actions by workers should be treated as attempts to block unionization.

## **Workforce Training and Placement Safety Standards**

When evaluating placement options for trainees and unemployed workers. Washington's Workforce Development system does not evaluate employers for workplace hazards. The Workforce Training Board and local Workforce Development Councils should ensure that especially those whose first language is not English, are not placed in unsafe workplaces in essential industries.

## **Vaccine for Essential Workers**

Washington should prioritize precarious at-risk workers, especially vulnerable workers in a higher health risk group (e.g. older, with pre-existing conditions), for eventual coronavirus vaccine distribution during the next 18 months.

## **Addressing Economic Insecurity**

We have demonstrated that economically precarious workers are likely to face infection hazards at work. Workers in an economically precarious occupation are more likely to have to work when they are sick, and less likely to report unsafe working conditions due to a power imbalance in the workplace. They are more likely to live in crowded conditions, where the risk of infection is higher. Any COVID-related agenda that doesn't address economic precarity is going to leave many workers at risk. Our recommendations below include proposals on income, housing, healthcare access and childcare—the largest challenges for the most vulnerable workers.<sup>15</sup>

## **Health Care Security**

All workers at-risk should get the care they need during this crisis, including those who are uninsured or under-insured, regardless of their immigration status. We must use public programs to provide no-cost health care coverage for all not tied to employment.

## **Hazard Pay**

We have demonstrated that large numbers of frontline workers are facing economic insecurity and crisis. Some Washington unions were able to negotiate temporary hazard pay increases and some employers voluntarily offered pay increases, mostly temporary. An across-the-board hazard pay requirement for economically precarious at-risk workers would be the fastest and most direct solution, and help solve the housing, insurance and childcare dimensions of the crisis.

## **Eviction Controls**

Many at-risk workers and/or their housemates have been laid off, furloughed, or had their hours shortened at some point during the pandemic, resulting in unpaid rent. When current eviction controls expire, there will be large numbers of evictions, more crowding in unsafe housing conditions and more homelessness. Washington needs to either continue the eviction controls or provide more emergency housing assistance during the pandemic.

## **Support for Childcare**

Many childcare providers in Washington have closed their doors and the remainder are struggling to survive the pandemic. Policymakers must commit robust funding to help these providers and ensure at-risk workers have access to reliable, safe, healthy, and high-quality childcare. We must develop childcare options for workers with COVID-related health issues, or who must quarantine due to infection exposures. These childcare facilities must meet Center for Disease Control, Labor & Industries and Office of the Superintendent of Public Instruction standards to protect both the children and the childcare workers.

## **Paid Sick Leave and Hazard Pay for Gig Workers**

App-deployed workers including Uber, Instacart and Amazon Flex drivers are helping quarantined Washington residents make it through this crisis. Most gig workers are not covered by paid sick leave, even if their work is controlled or directed by the company that hires them. Washington policymakers should adopt Seattle's recent legislation extending paid sick leave and hazard pay to independent contractors.

<sup>15</sup>For a list of national recommendations, see <https://www.warren.senate.gov/newsroom/press-releases/elizabeth-warren-and-ro-khanna-unveil-essential-workers-bill-of-rights#:~:text=An%20Essential%20Workers%20Bill%20of%20Rights%20must%20include%20no%20cost%20to%20the%20employee>. See also New York City legislation: <https://gothamist.com/news/city-council-proposes-essential-workers-bill-rights-includes-hazard-pay-sick-leave>

## Notes

<sup>i</sup>WA State Coronavirus Response – Essential Business. <https://coronavirus.wa.gov/what-you-need-know/safe-start>

<sup>ii</sup>WA Dept. of Health, Confirmed COVID Cases Report, updated July 23, 2020.

<sup>iii</sup>See for example Newman (2020), Blau (2020), Ryo (2020) and McNicolas (2020).

<sup>iv</sup>American Community Survey (ACS) subject definitions (2014) [https://www2.census.gov/programs-surveys/acs/tech\\_docs/subject\\_definitions/](https://www2.census.gov/programs-surveys/acs/tech_docs/subject_definitions/)

<sup>v</sup>This section using O\*Net data builds on Doubleday et al. 2018.

<sup>vi</sup>Baker 2020; see “Methods Appendix: 2. Weights”

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# Methods Appendix

## Contents

1. Dataset
2. SARS-COV-2 Exposure Hazard Measures and Weights
3. Descriptive Statistics for Main Variables
4. Table A.1

### 1. Dataset

The dataset used for this report was constructed by integrating 4 publicly available existing datasets:

1. We started with the LMI dataset on essential workers.  
<https://www.lmiontheweb.org/more-than-half-of-u-s-workers-in-critical-occupations-in-the-fight-against-covid-19/>
  - a. We revised the LMI dataset, by adding some detailed occupations not coded essential in the LMI data, but coded essential in the WA Executive's list of essential workers.  
<https://coronavirus.wa.gov/what-you-need-know/safe-start>
2. We combined the LMI data with COVID-19 hazard data, which we created using data from O\*NET Online. <https://www.onetonline.org/>
  - a. ONET publishes data measuring a wide range of aspects of detailed occupations.
  - b. We selected 11 aspects of work in the ONET datasets that relate to conditions conducive to the spread of COVID-19
  - c. then created our COVID-19 hazard measure based on detailed occupations' scores on those 11 dimensions.
  - d. We linked these COVID-19 hazard data to the LMI data
3. We combined the Essential Occupations/Workers & COVID-19 dataset with demographic and socio-economic data (DESD) from the ACS-PUMS 2018 <https://data.census.gov/mdat/#/>
4. We combined the Essential Workers-COVID-19-DSED dataset with WA Dept. of Economic Security data on earnings by occupation. <https://www.esd.wa.gov/labormarketinfo/occupations>

The shared unit of analysis for these datasets is the detailed occupation (6-digit Standard Occupational Classification code). What we say about workers in Washington is based on ecological analyses of the demographics and characteristics (vulnerabilities, hazards, essential status) of occupations.

This produced a dataset of 694 detailed occupations with complete data on all of the variables of interest in our study:

- Detailed occupation (6-digit SOCs, coded for to allow aggregation to 2-digit major occupational group level).
  - Number of workers in the occupation in Washington
  - Essential Occupation status
  - Demographics of workers
    - Sex
    - Citizenship
    - Race/ethnicity
  - COVID-19 hazard
  - Socio-Economic Vulnerability

To create this dataset, we sometimes had to combine some detailed occupations from one dataset to match a single detailed occupation in another dataset. In cases where we combined detailed occupation data from dataset A to allow the link to dataset B, we calculated employment-weighted means, and used the weighted mean for the value in dataset B.

Three of the four measures of economic precarity (% receipt of SNAP, % uninsured and cash assistance), our demographic measures (sex, race/ethnicity, citizenship), and our measures of household size and average age for the occupation – are drawn from ACS-PUMS 2018.

The Cook 2020 LMI data on essential occupations were accessed here:

<https://www.lmiontheweb.org/more-than-half-of-u-s-workers-in-critical-occupations-in-the-fight-against-covid-19/>

The ACS-PUMS 2018 data were accessed here:

<https://data.census.gov/mdat/#/>

The WA ESD occupational wage data were accessed here:

<https://www.esd.wa.gov/labormarketinfo/occupations>

For the industry case studies, in the absence of a state-level industry-occupation employment matrix, we used the national matrix (accessed here). These are national-level estimates, summarizing state-level variations, but are likely to be sufficiently representative of the situation in Washington for the purposes of this report.

## 2. Weights

### 2a. SARS-CoV-2 Exposure Hazard Measures and Weights

We used data from O\*NET to create the COVID-19 hazard measures. The O\*NET datasets of occupational descriptions were not created to measure exposure to COVID-19; to create our measure, we searched the O\*NET datasets for measures of job characteristics that have clear implications for the hazard of exposure to a highly contagious droplet-borne virus. We combined measures of importance of 1) general and 2) specialized safety equipment to create a single measure of frequency of use of safety equipment. We reverse-coded this measure, creating higher scores for more infrequent use of safety gear. Occupations were coded as high hazard with regard to safety gear if their score on frequency of use of safety gear was above the 75th percentile for the distribution. From the 10 individual hazard dimensions, we created an additive index and a mean-based index of hazard of exposure to SARS-CoV-2:

- 1. Additive SARS-CoV-2 Hazard Index:** We assigned each occupation a score of "1" for each hazard with a score above the 75th percentile (and a "0" if the occupation scored below the 75th percentile on that hazard). Each occupation's total hazard index score was the sum of these 0/1 scores, resulting in a total that ranged from 0 (if the occupation scored below the 75th percentile on all hazards) to 10 (if the occupation scored above the 75th percentile on all hazards). A score of four marks the 75th percentile of the distribution of the additive hazard index; occupations with an index score of four or higher are highly hazardous.
- 2. Mean SARS-CoV-2 Hazard Index:** For each occupation, we calculated the overall mean score for all 10 of the above hazard dimensions. We coded occupations with a mean hazard score of 67 or higher as highly hazardous. A score of 67 is one standard deviation above the mean for all occupations.

We used 2 weights in the creation of our COVID-19 hazard measures.

#### *Weights for Relocatability*

To attempt to account for the possibility of remote work by essential workers (Baker 2020), we used the O\*NET measure of importance of using a computer at work. Remote work is more likely for workers in occupations where they rely on the computer to do their job, so we applied a computer weight to the 10 COVID-19 hazard measures.

$$\text{Computer weighted hazard score cwhs1-10} = \text{hs1-10} - \sqrt{[(\text{cov13}/100) * \text{hs1-10}]}$$

For example: General and Operations Managers' hazard score #1 (working in close physical proximity to others) is 60.44. We use their score on the "importance of computer at work" (= 79) to weight their hazard score #1. The weighted hazard score for physical proximity

$$\begin{aligned} &= 60.44 - \sqrt{[(79/100) * 60.44]} \\ &= 60.44 - 6.91 = 53.54 = \text{relocatability-weighted proximity score for general managers} \end{aligned}$$

Compare the effect of the weights for preschool teachers. Their score on the use of computers is 32, and their score on physical proximity (hs1) is 84.6. the weighted hazard score for physical proximity

$$\begin{aligned} &= 84.6 - \sqrt{[(32/100) * 84.6]} \\ &= 84.6 - 5.2 = 79.4 = \text{relocatability-weighted proximity score for preschool teachers} \end{aligned}$$

#### *Weights for Safety Equipment Routines*

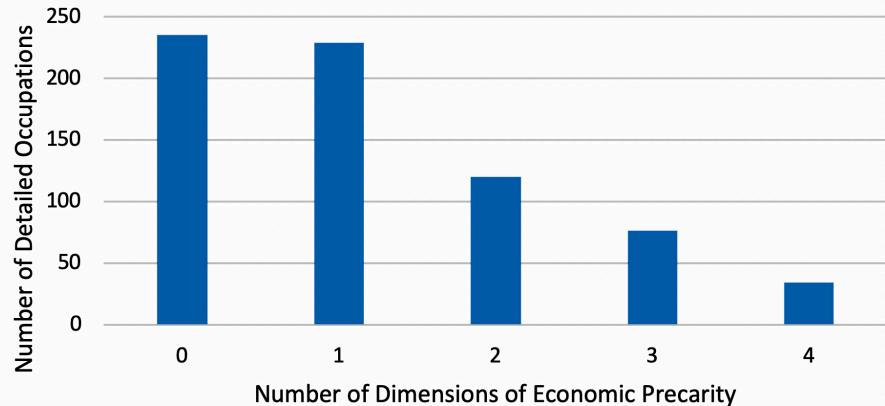
We also weighted COVID-19 hazards by the score on the safety gear measure. We reason that, in occupations where the use of PPE is routine, workers are more likely to have access to PPE in the context of an epidemic. The weighting approach for safety gear follows the approach used for potential for remote work.

#### **2b. ACS-PUMS Measures**

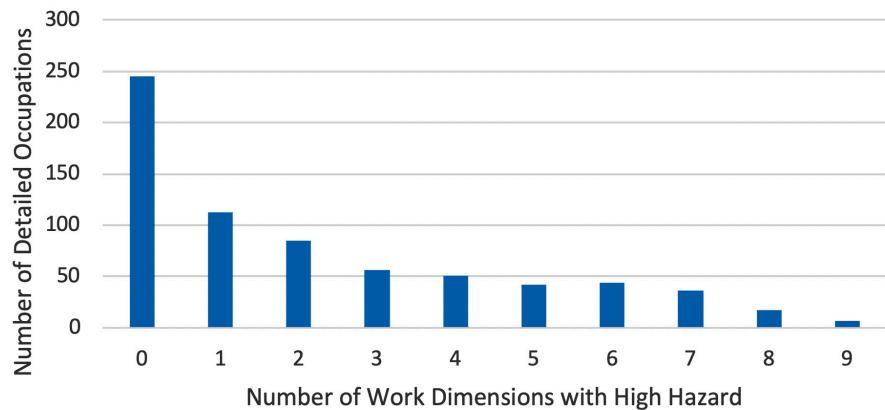
To measure demographic characteristics and economic precarity, we used data from the American Community Survey-Public Use Microdata Sample. The ACS surveys a small sample of the population, and produces estimates for the entire population based on the small sample. Therefore, particularly for small occupational or demographic groups, these estimates may differ widely from actual population counts, and different population estimates would be generated if a different population sample had been used. We downloaded and used the ACS-PUMS data with PUMS person-weights (and household weights in the case of cash assistance and SNAP). We acknowledge the sampling error associated with the ACS-PUMS data, we also feel this is the most comprehensive and current data source for investigating demographic distributions within and between occupations, and therefore we accept this level of sampling error in exchange for increased representativeness of the survey results.

### 3. Distributions of Measures of Economic Precarity and SARS-COV-2 Hazard

Appendix Figure A.1: Frequency Distribution of Economic Precarity Index



Appendix Figure A.2: Frequency Distribution of Additive SARS-COV-2 Exposure Hazard Index



**Table A.1: High Hazard, Highly Precarious Occupations at Detailed Level**

Detailed Occupation Title	Total Workers	% Female	% Non-Citizen	% White	% Black	% AIAN	% Asian	% NHOPPI	% Other	% Multirac.	% Latinx
Retail Salespersons	107560	54.4%	4.8%	68.8%	3.7%	0.5%	8.8%	0.7%	0.0%	5.5%	12.1%
Fast Food & Counter Wkrs	97240	67.2%	1.7%	69.4%	3.7%	1.9%	7.6%	2.6%	0.5%	7.5%	6.8%
Office Clerks, General	74460	75.9%	6.0%	71.1%	5.9%	0.6%	10.6%	0.8%	1.1%	2.4%	7.5%
Cashiers	66200	75.2%	9.2%	59.1%	4.5%	2.2%	11.5%	1.8%	0.0%	4.2%	16.8%
Home Health & Personal Care Aides	61470	81.5%	9.6%	65.7%	13.3%	2.1%	5.7%	0.4%	0.5%	3.5%	8.9%
Customer Service Representatives	56760	62.8%	6.9%	66.3%	8.1%	0.7%	7.2%	0.7%	0.1%	5.7%	11.2%
Waiters & Waitresses	55090	69.8%	12.7%	57.8%	3.3%	0.8%	14.2%	0.3%	0.0%	4.6%	19.1%
Teaching Assistants, Exc. Postsecondary	40040	83.3%	4.9%	77.1%	1.3%	1.5%	6.3%	0.1%	0.1%	4.6%	8.9%
Nursing Assistants	34200	88.0%	10.9%	58.3%	13.4%	0.4%	9.5%	1.4%	0.0%	5.1%	11.9%
Information & Record Clerks, All Other	29540	59.5%	9.1%	64.3%	4.4%	2.4%	15.8%	0.0%	0.0%	6.2%	6.8%
First-Line Supervisors of Retail Sales Wkrs	24310	50.5%	6.6%	78.2%	1.2%	0.3%	9.2%	0.8%	0.0%	3.8%	6.4%
First-Line Supervisors of Food Preparation & Serving Wkrs	24100	53.7%	6.7%	66.8%	0.0%	0.0%	4.6%	0.0%	0.0%	10.8%	17.7%
Passenger Vehicle Drivers, Exc. Bus Drivers, Transit & Intercity	16760	7.0%	23.6%	37.3%	43.7%	0.0%	12.3%	0.0%	0.5%	2.8%	3.5%
Medical Assistants	15780	89.7%	5.6%	57.5%	6.1%	0.6%	9.4%	0.0%	0.0%	8.0%	18.4%
Bartenders	14840	54.3%	6.9%	70.2%	0.0%	0.0%	2.2%	1.0%	0.0%	6.2%	20.4%
Counter & Rental Clerks	11930	20.4%	24.6%	31.6%	0.0%	0.0%	16.0%	0.0%	12.3%	0.0%	40.1%
Preschool Teachers, Exc. Special Education	11610	97.1%	9.6%	67.4%	2.1%	2.3%	6.0%	0.0%	0.0%	3.0%	19.1%
Community & Social Service Specialists, All Other	10600	55.2%	3.1%	59.9%	12.2%	15.3%	6.9%	0.0%	0.0%	5.7%	0.0%
Counselors, All Other	9880	65.0%	5.8%	66.5%	7.6%	0.5%	3.5%	0.0%	2.0%	9.0%	10.8%
Dining Room & Cafeteria Attendants & Bartender Helpers	9590	48.5%	20.8%	55.1%	0.5%	0.9%	16.6%	0.0%	0.0%	5.8%	21.1%
Hosts & Hostesses, Restaurant, Lounge, & Coffee Shop	9420	89.5%	6.1%	78.3%	2.8%	0.0%	2.3%	0.0%	0.0%	6.1%	10.5%
Hairdressers, Hairstylists, & Cosmetologists	9390	94.9%	6.5%	69.5%	0.3%	0.9%	8.4%	0.2%	0.0%	7.8%	12.8%
Cooks, Institution & Cafeteria	9290	38.4%	19.2%	52.0%	5.6%	1.0%	8.9%	0.8%	0.6%	3.6%	27.5%
Medical Dosimetrists, Medical Records Specialists, All Other Health Techs	8650	70.2%	1.2%	76.3%	1.6%	0.0%	16.9%	0.0%	0.4%	0.2%	4.6%
Pharmacy Technicians	7150	80.2%	4.6%	66.6%	7.0%	0.7%	19.0%	0.0%	0.0%	0.0%	6.7%
Childcare Wkrs	6840	93.5%	10.8%	66.1%	3.0%	0.5%	5.5%	0.0%	0.1%	4.8%	20.0%
Gambling Dealers	5700	41.5%	27.1%	41.3%	0.0%	4.6%	48.5%	1.4%	0.0%	0.0%	4.1%
Parts Salespersons	5480	7.4%	20.8%	48.7%	8.2%	0.0%	2.6%	0.0%	0.0%	6.3%	34.3%
Food Servers, Nonrestaurant	5470	65.2%	5.1%	50.6%	16.5%	2.4%	8.7%	0.0%	0.0%	1.7%	20.1%
Kindergarten Teachers, Exc. Special Education	5360	97.1%	9.6%	67.4%	2.1%	2.3%	6.0%	0.0%	0.0%	3.0%	19.1%
Hotel, Motel, & Resort Desk Clerks	5270	68.1%	0.0%	73.1%	4.6%	1.2%	13.3%	2.4%	0.0%	0.0%	5.4%
Massage Therapists	5060	83.0%	9.7%	70.7%	0.0%	0.0%	13.7%	2.2%	0.0%	1.3%	12.2%
Animal Caretakers	4720	88.6%	6.9%	69.2%	2.4%	1.4%	12.8%	1.5%	0.0%	5.9%	6.9%
Dispatchers, Exc. Police, Fire, & Ambulance	4110	46.2%	9.8%	87.6%	0.0%	0.5%	4.8%	0.0%	1.2%	3.4%	2.4%
Veterinary Assistants & Laboratory Animal Caretakers	3670	97.3%	0.0%	79.6%	0.0%	0.0%	12.5%	0.0%	0.0%	3.4%	4.6%
Eligibility Interviewers, Government Programs	3610	88.0%	0.0%	38.8%	12.4%	2.2%	5.7%	0.0%	0.0%	2.0%	38.9%
Ushers, Lobby Attendants, & Ticket Takers	3370	38.9%	0.0%	75.2%	2.5%	0.0%	10.0%	0.0%	0.0%	4.9%	7.5%
Food Service Managers	2760	57.4%	4.2%	64.5%	4.9%	1.1%	6.9%	1.8%	0.0%	7.8%	13.0%
Community Health Wkrs	2600	55.2%	3.1%	59.9%	12.2%	15.3%	6.9%	0.0%	0.0%	5.7%	0.0%
Motor Vehicle Operators, All Other	2500	12.8%	10.5%	70.6%	0.0%	2.2%	2.0%	0.0%	0.0%	5.5%	19.7%
Lifeguards, Ski Patrol, & Other Recreational Protective Service Wkrs	2420	50.5%	4.1%	67.0%	7.9%	0.0%	2.9%	0.0%	0.0%	9.4%	12.9%
Highway Maintenance Wkrs	2350	4.1%	4.8%	86.5%	4.1%	1.3%	0.0%	0.0%	0.0%	0.0%	8.1%
Aircraft Service Attendants & Transportation Wkrs, All Other	2030	11.7%	6.2%	68.3%	0.0%	4.4%	1.0%	3.4%	2.1%	3.3%	17.5%
Library Assistants, Clerical	1780	72.4%	7.8%	71.0%	8.5%	0.0%	7.2%	0.0%	4.1%	4.0%	5.1%
Postal Service Clerks	1630	31.6%	6.1%	38.9%	0.0%	0.0%	34.3%	0.0%	0.0%	7.7%	19.1%
Skincare Specialists	1620	97.1%	3.1%	84.0%	0.0%	0.0%	6.2%	0.0%	0.0%	9.8%	0.0%
Ophthalmic Medical Technicians	1360	100.0%	0.0%	32.4%	0.0%	0.0%	16.7%	0.0%	0.0%	50.9%	0.0%
Psychiatric Technicians	1290	83.1%	12.0%	61.5%	6.4%	0.0%	3.0%	0.0%	0.0%	8.1%	20.9%
Gambling Cage Wkrs	1100	42.7%	5.9%	72.9%	3.3%	4.9%	2.4%	0.0%	0.0%	1.0%	15.5%
Couriers & Messengers	920	28.7%	4.8%	60.0%	12.5%	0.2%	13.9%	1.7%	0.0%	9.9%	1.7%
Gambling Change Persons & Booth Cashiers	900	75.2%	9.2%	59.1%	4.5%	2.2%	11.5%	1.8%	0.0%	4.2%	16.8%
Septic Tank Servicers & Sewer Pipe Cleaners	850	0.0%	0.0%	69.3%	0.0%	0.0%	0.0%	0.0%	0.0%	30.7%	0.0%
Gambling Surveillance Officers & Gambling Investigators	490	25.3%	3.9%	70.4%	7.8%	3.5%	2.3%	0.7%	0.0%	4.8%	10.6%
Gambling Service Wkrs, All Other	130	41.5%	27.1%	41.3%	0.0%	4.6%	48.5%	1.4%	0.0%	0.0%	4.1%
Artists & Related Wkrs, All Other	60	45.5%	7.1%	81.7%	1.8%	0.0%	6.6%	1.3%	0.0%	3.7%	4.9%
<b>Total / weighted percentages</b>	<b>901310</b>	<b>66.5%</b>	<b>7.6%</b>	<b>65.3%</b>	<b>5.8%</b>	<b>1.3%</b>	<b>9.4%</b>	<b>0.8%</b>	<b>0.4%</b>	<b>5.1%</b>	<b>12.0%</b>

## About the Authors:

**Michael Mulcahy** (PhD Sociology, University of Arizona) does sociological research with Working Title Research. Before creating WTR, he was an associate professor in the sociology department at Central Washington University. His research focuses on economic and social inequalities and organizing for change at work, in schools and communities, at local, national and transnational levels.

**David West** is the Research Analyst for the Washington State Labor Education and Research Center at South Seattle College. He collaborates with labor and community organizations to evaluate key issues facing Washington's workforce, with a focus on low-wage work. He has a background in public policy focusing on labor standards, precarious work, health care and economics. He received his BA in Economics from the University of Wisconsin and his MPA from the Evans School of Public Policy and Governance at the University of Washington.

**Marissa Baker** is an Assistant Professor in the Department of Environmental and Occupational Health Sciences, in the University of Washington School of Public Health. She also serves as the Industrial Hygiene program director for the Northwest Center for Occupational Health and Safety. Her research has centered on using traditional and novel methods for occupational exposure assessment in a variety of workplaces, and utilizing existing data sources to estimate the burden of occupational exposures and outcomes. She received her PhD in Environmental and Occupational Hygiene and MS in Exposure Sciences, both from the University of Washington, and her BA from Northwestern University.



## About the Washington Labor Education and Research Center

The mission of the Washington State Labor Education and Research Center is to deliver high-quality education, training programs and research relevant to the working women and men of Washington State. The Labor Center builds the skills, confidence and knowledge workers need to improve their work lives and their communities, and promote a just economy through collective action. As a unique program within higher education in the state, we use the best practices of adult education and applied research to serve our dynamic and diverse labor force, including the new Rights at Work Washington website ([www.RightsatWorkWA.org](http://www.RightsatWorkWA.org)).

The Washington State Labor Education and Research Center  
South Seattle College Georgetown Campus  
6737 Corson Ave S, Seattle, WA 98108, Building B Room 106  
Phone: 206.934.6671 • [georgetown.southseattle.edu/erc/](mailto:georgetown.southseattle.edu/erc/)