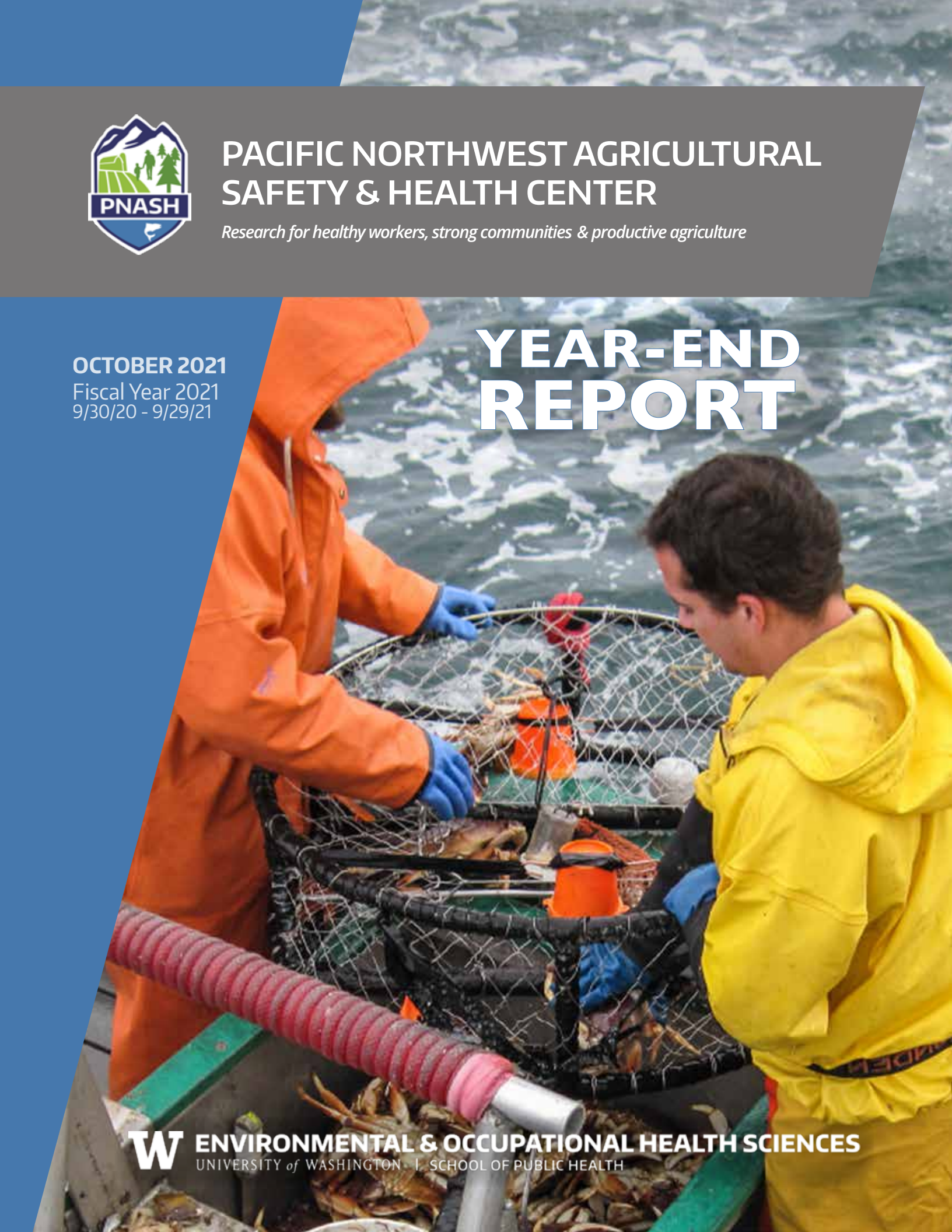
PACIFIC NORTHWEST AGRICULTURAL SAFETY & HEALTH CENTER

Research for healthy workers, strong communities & productive agriculture

YEAR-END REPORT

OCTOBER 2021
Fiscal Year 2021
9/30/20 - 9/29/21



ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

TABLE OF CONTENTS

PACIFIC NORTHWEST AGRICULTURAL SAFETY & HEALTH CENTER

OUR MISSION

The Pacific Northwest Agricultural Safety and Health (PNASH) Center conducts research for healthy workers, strong communities & productive agriculture.

✓ PROMOTING SAFE WORKPLACES

✓ PARTNERING WITH WORKERS, EMPLOYERS & COMMUNITIES

YEAR 5 REACH & IMPACT

6 Core Projects

5 Pilot Projects

5 External Projects

9 Regional Commodities

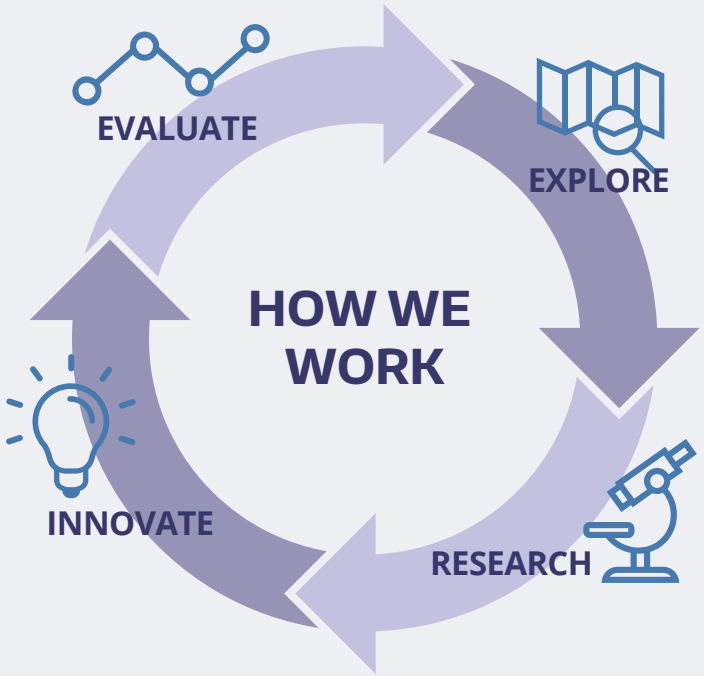
13 Research Publications

22 Workplace Safety Tools

2020-21 YEAR END REPORT

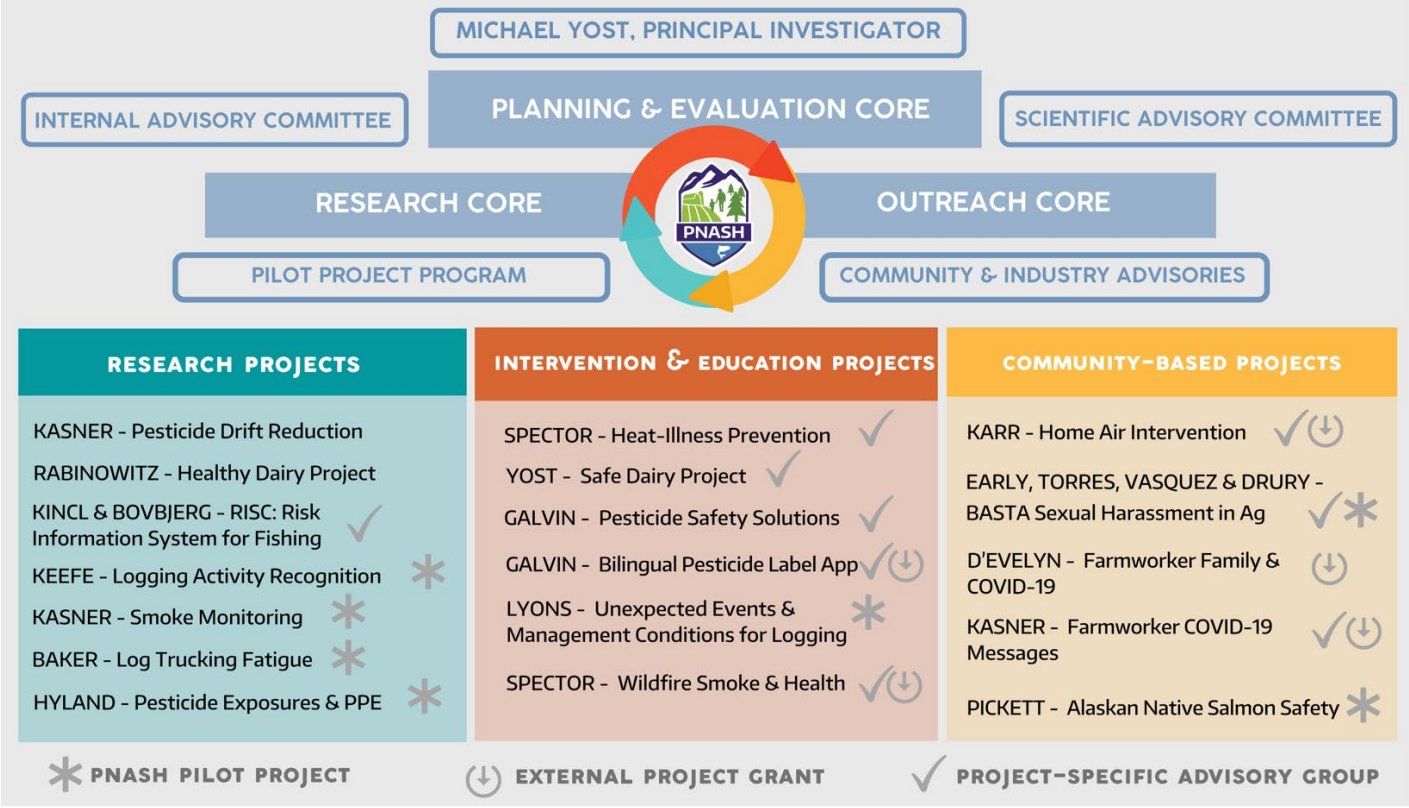
This report provides an overview of the PNASH Center's progress and preliminary finding for Year 5 of our 6 year cycle. Over the next year, we will be focused on finalizing the research findings and resources. Contact us if you are interested in sharing these with your networks and communities.

Thank You to our partners, advisors, and research participants. Your collaboration makes our work possible and ensures it is relevant and meaningful for ag communities.



Planning and Evaluation Core

The Planning and Evaluation Core provides the infrastructure and support for the entire Center and assists in the implementation and evaluation of individual project and program objectives. Our fifth year's activities have focused on response to the COVID-19 pandemic, new physical location and online systems, coordination across the NIOSH Ag Centers, piloting multi-center contribution analysis with NIOSH, and strategic planning for our new Year 6 and next cycle.



Organization & Advisories

In Year 5, we refreshed the **PNASH Internal Advisory Committee** membership with two new members: Drs. Elena Austin and Laurel Kincl.

Elena Austin, ScD , Assistant Professor, University of Washington

Dr. Austin is a new faculty to UW Department of Environmental Health and a significant leader at PNASH over the last five years. Her projects include Dairy Safety, Data Visualization (pilot), and Nitrates & Well Water (pilot). In 2021, Dr. Austin also became the new Project PI for the Pilot Project Program, replacing Dr. Catherine Karr.

Laurel Kincl, PhD, CSP, Associate Professor, Oregon State University

Dr. Laurel Kincl is an Associate Professor at Oregon State University's School of Biological and Population Health Sciences. She is PI of PNASH's RISC Fishing project and a leader for PNASH and the nation in commercial fishing safety research.

Scientific Advisory Committee

The **PNASH Scientific Advisory Committee** met in Year 5, providing valuable feedback that shapes our Year 6 and next 5-year cycle's priorities. Current members Linda McCauley, Kent Anger, and Howard Kipen were asked to continue in their roles. All accepted.

Stakeholder advisory activities are shared under the Outreach Core and each project (see org chart below for our affiliated advisories). Each met this last year, following up on progress and engaging our stakeholders in future planning.

Center Administration

Year 5 brought significant change to the Center's operations and realization of long-term projects, including:

- Move of PNASH's Seattle home office to the new Hans Rosling Center, the new home of the UW School of Public Health and UW's campus-wide Population Health Initiative. Take a virtual tour of the Hans Rosling Center for Population Health.
- Managing COVID-19 safe work practices for our teams in the field and in the office, including innovative remote solutions and modified return-to-work practices.
- Launch of a new online 'Print and Ship' ordering system for our PNASH products, for our most popular training collections. See blog post.
- Production and release of a new PNASH 'About Us' Video presenting our mission and showcasing our PNASH people and projects.

Evaluation Program

PNASH's evaluation program ensures that our efforts are relevant, feasible, and sustainable; that they reflect the best science and practice; and that they are consistent with our ultimate goal of reducing exposures, injuries, and illness.

Currently, PNASH is collaborating with NIOSH in a pilot of the Contribution Analysis approach on three topics that have strong cross-center reach: heat-related Illness, ROPs, and animal handling. Ms. Harrington is the chair of the contribution analysis pilot on the topic Heat-related Illness. In Year 5, this inter-agency project developed a new logic model format for multi-site evaluation and offered case approaches for supporting evidence tables.

PNASH internal evaluation accomplishments include an update to our program and outcome monitoring tools: PNASH's custom 'HARVEST" database for PI reporting; Logic Model Template, Outcomes Table, and PNASH Evaluation Guide. This suite of tools was completed to harmonize with the new objectives and tools drafted by NIOSH in Burden, Need, and Impact and Contribution Analysis.

Additionally, the Evaluation Program has been assisting projects through developmental evaluation sessions, in identifying outcome measures and evaluation strategies. These are integrated into projects' research-to-practice plans and supported through the Evaluation Program and Outreach Core.

Planning has also taken place for three new evaluation efforts in Year 6:

- Refreshing PNASH Ag Health Indicators system in conjunction with Dr. John Flunker.
- Through support of our Outreach Core, we are piloting three Learning Management Systems (LMS) with PNASH trainer users our new curricula.
- Piloting Open Data Kit (ODK) systems to improve harmonization of data in field studies.

Cross-Center Collaboration

PNASH staff and faculty collaborate with NIOSH and the ten other NIOSH-funded Agricultural Centers through regular Center Director meetings, the Agricultural Center Evaluation, Communication, and Outreach (ECO) group, and special events and workgroups.

Cross-Center Collaboration (cont.)

PNASH is serving a two-year term as the coordinating center for the NIOSH AgFF Directors. This group of 42 leaders of NIOSH AFF and Ag Centers coordinate on national issues and cross-center initiatives. Meetings take place monthly by video conferencing at this time (normally two in-person meetings each year). In FY20-21 we introduced a new topical panel discussion, facilitating planning around topics of surveillance research.

New Awards

Jody Early, PhD, MS, Professor, University of Washington – Bothell

Creating Safer and More Equitable Workplaces for Latinx Farmworkers: Developing and Validating the First Spanish Sexual Harassment and Workplace Climate Survey for Agriculture$22,000, UW Bothell Scholarship | Research and Creative Practice (SRCP) Seed Grant

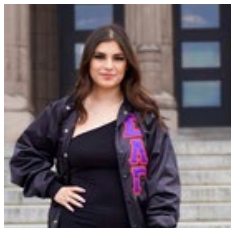
This pilot study will develop the first Sexual Harassment and Workplace Climate Survey in Spanish that is tailored for farmworkers and for Spanish-speaking adults with lower literacy skills using existing instruments.

Supporting Students

Every year, the PNASH Center is fortunate to have talented and passionate students involved in our research. We would like to express our gratitude to these students and recognize their academic achievements, inspiring stories, and professional accomplishments.

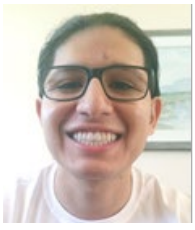
PNASH coordinates with multiple training and pathway programs for student support and research funding to work with PNASH projects. For Year 5 this included Undergraduate Research Experiences in Environmental Health (SURE-EH). Through a NIEHS training grant and other UW support, we can provide meaningful student internships with PNASH. NIOSH's Education and Research Center (ERC) offers training grant support, including the Occupational Health at the Human-Animal Interface OHHAI training program. We would like to express our gratitude to these students and recognize their academic achievements, inspiring stories, and accomplishments. To learn more about student research, visit the PNASH Celebrating Students blog post.

Our Students



Aylin Laguna Cruz
BS Student, Medical Anthropology & Global Health
Pesticide Labels Now™ App

Emelin Delgado
BS Student, Medical Anthropology & Global Health, Class of 2022
SURE EH Student; Heat Illness Prevention Among Agricultural Workers



Eric Gabino
BS Student, Health Studies/Global Health, Class of 2021
Evaluating Effectiveness of Heat Stress Prevention Education on Agricultural Worker Knowledge

Shraddha Malla
BS Student, Public Health/Global Health, Class of 2021
Mental Health in Farmworkers

Our Students (cont.)

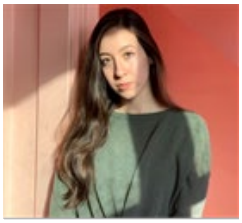
Aarti Tandon
BS Student, Food Systems, Nutrition, and Health, Class of 2021
SURE EH Student; Bilingual Pesticide Safety Project

Madeline Benoit
MPH Student, One Health
Evaluate the Efficacy of Training Materials Among Dairy Workers Who Speak English as a Second Language (Partnership with the Idaho Dairymen's Association)

Dennise Drury
MPH Student, Environmental and Occupational Health, Class of 2020
Sexual Harassment Prevention for Farmworkers

Maria Blancas
PhD Student, School of Environmental and Forest Sciences, Class of 2021
MPH Community-Oriented Public Health Practice; PHI Project; Bullitt Foundation Award

Jared Egbert
MPH Student, Occupational and Environmental Medicine
Heat Illness Prevention Among Agricultural Workers



Diana Marquez
MS Student, Industrial Hygiene, Class of 2021
Heat Illness Prevention Among Agricultural Workers

Solaiman (Abeer) Doza
PhD Student, Environmental and Occupational Health, Oregon State University
Risk Information System for Commercial Fishing

Yoni Rodriguez
PhD Student, Occupational Hygiene
Pesticide Drift Exposure Among Tree Fruit Workers in the Yakima Valley

Pauline Trinh
PhD Student, Environmental and Occupational Hygiene
Healthy Dairy Worker Study

Eloise Zimbelman
PhD Student, Forest, Rangeland and Fire Sciences, University of Idaho, Class of 2021
Evaluation of Wearable-based Activity Recognition Modeling Applications for Logging Safety

New to Our Research Team

Maria Blancas, PhD, Research Coordinator

Dr. Blancas joins us as a researcher under the mentorship of Dr. June Spector, focusing on heat and smoke projects. Maria has been a key person involved in PNASH as an MPH and PhD student, as well as a member of our Outreach Core. Maria completed her PhD in the UW School of Environment and Forest Sciences this summer with the project, Re-Storying Food Systems Assessments: A Community-Based Approach to Assess Food System Impacts on Farmworkers. Please see Maria's bio, and this article highlighting her past work in our department and her Bullitt Foundation award.

John Flunker, PhD, Postdoctoral Scholar

Dr. Flunker joins PNASH also under the mentorship of Dr. June Spector. He is a BEBTEH trainee and comes to PNASH from our colleague ag center in Kentucky. In addition to his research with June and her team, he is joining the PNASH Evaluation Program and our Ag Health Indicators project. Please see John's bio to learn more about his work.

Professional Development

UW PNASH Center supports professional development of our faculty, staff and students. We offer training through our UW Professional Development Office, Northwest Occupational Safety and Health Center (ERC), and the professional associations that our personnel participate in (e.g., ISASH, AIHA, ISES). In Year 5, additional support and training was also offered through our UW CareLink, the employee assistance program hosted a webinar series to promote personal wellness and productivity.

Resources

- 2020 Year End Report. Pacific Northwest Agricultural Safety and Health Center
- Evaluation Tool: Harvest Program Monitoring Database, v. 3.0 (available on request)
- Special issue for the Western Ag Conference
  Journal of Agromedicine, Volume 26, Issue 1 (2021)
- Repository for PNW Agricultural Health Indicator Program: Data sources and analysis code

Pilot Project Program and Emerging Issues Fund

PNASH administers an annual Pilot Project Program and Emerging Issues Fund, allowing us to award Northwest investigators small exploratory research and service projects.

Pilot Project Program

NIOSH Year 6 supplement allowed for another round of pilot project funding for 2021-2022 with total fund of $180,000 direct costs. The call for applications was released in Spring 2021. Updates to the program included a focus on funding new research directions, increasing projects scope and award levels, and an option to apply for an outreach supplement to help with research translation and education. Eligibility requirements were also updated to expand the reach of the program and encourage young investigators to apply. See application guidelines on our Pilot Project Program website. Distinguishing criteria are:

- Significance, investigator qualifications, innovation, approach, future funding potential, and overall impact
- Relevance to PNASH Center and NIOSH goals
- Demonstrates collaborative research
- Contains a research-to-practice strategy
- Includes an evaluation component

See final reports for projects funded in Year 4 reported under the section, PNASH Pilot Projects, starting on page 25.

Pilot Projects Awarded for Year 6

Marissa Baker, Assistant Professor, University of Washington
$39,982
Characterizing determinants of stress, fatigue, and injury risk in log truck drivers

Savannah D'Evelyn, Postdoctoral Fellow, University of Washington
$45,800 plus $5,000 Outreach Supplement
Stressors of balancing childcare, work, and concerns about ambient exposures on personal well-being and work presenteeism for farmworker parents during and after the COVID-19 pandemic

Carly Hyland, Postdoctoral Fellow, Boise State University
$39,994 plus $4,984 Outreach Supplement
Pesticide exposures and risk perceptions among male and female Latinx farmers in Idaho

Jennifer Pickett, Research Scientist, Alaska Marine Safety Education Association
$37,732 plus $5,000 Outreach Supplement
Exploring personality and decision making among Alaska Native commercial salmon set netters

Emerging Issues Fund – Year 5

Through PNASH's Emerging Issues Fund we can take rapid action to address an emergent issue or cultivate a developing partnership. The fund allocates up to $50,000 direct costs per year with awards as small as $2,000. Awards are available to active investigators within PNASH's Northwest network.

PNASH's Emerging Issues Fund prioritizes partnership building activities. The fund is used to address issues and priorities raised through project advisory committees, solicitation from Center stakeholder meetings, and input from ad hoc advisors.

Activities should fall outside of the scope of currently funded PNASH work. Distinguishing criteria for this fund are:

- New effort to cultivate a developing partnership
- Address issues and priorities raised by stakeholders
- High impact opportunity in preventing injury and illness
- Immediacy/timeliness of the need
- Not a fit for other funding streams
- Opportunity to extend our research into practice

Current Emerging Issues Projects

Chris Simpson. Cannabis Allergy in Occupationally Exposed Cannabis Workers and Recreational Users. $25,000 direct costs. This small project aimed to develop an appropriate control group of recreational cannabis users and non-users in order to compare the prevalence of cannabis allergy, respiratory symptoms, lung function and airway inflammation with a cohort of occupationally exposed cannabis workers. A cross-sectional study of cannabis users and non-users was designed with participants completing a questionnaire, including cannabis use history and respiratory symptoms. Currently, the recruitment target for the study population has been met with data collection and clinical measures completed on 20 cannabis users and 20 non-users. Data analysis is ongoing with plans to include findings as pilot data in a pending grant proposal on Respiratory Health in the Cannabis Industry.

Viktor Bovbjerg. AgFF Northwest Injury and Illness Surveillance Development. $13,937 OSU total costs, $20,000 UW direct costs. This activity is positioning surveillance as a core Center function, fully integrating surveillance activities with the other PNASH projects. Doing so will enable projects to make rapid use of surveillance information to support their activities for research and stakeholder communication. Major goals are to establish the metrics and regional data sources which are key to projects and stakeholders.

Jennifer Otten. Review of Food Security and Agricultural Total Worker Health. $10,000 direct costs.
This project will assess food security as a component of Total Worker Health for northwest food and agriculture workers.

Elena Austin. Mental Health Stressors Impacting PNW Spanish Speaking Agricultural Workers. $24,908 direct costs. (Continued from Year 4). This one-year project is identifying workplace stressors contributing to mental health burden and develop a common language framework to enhance discussion of mental health particularly between workers and employers. This project will build capacity with support from programs at Washington State University and the Northwest Communities Education Center.

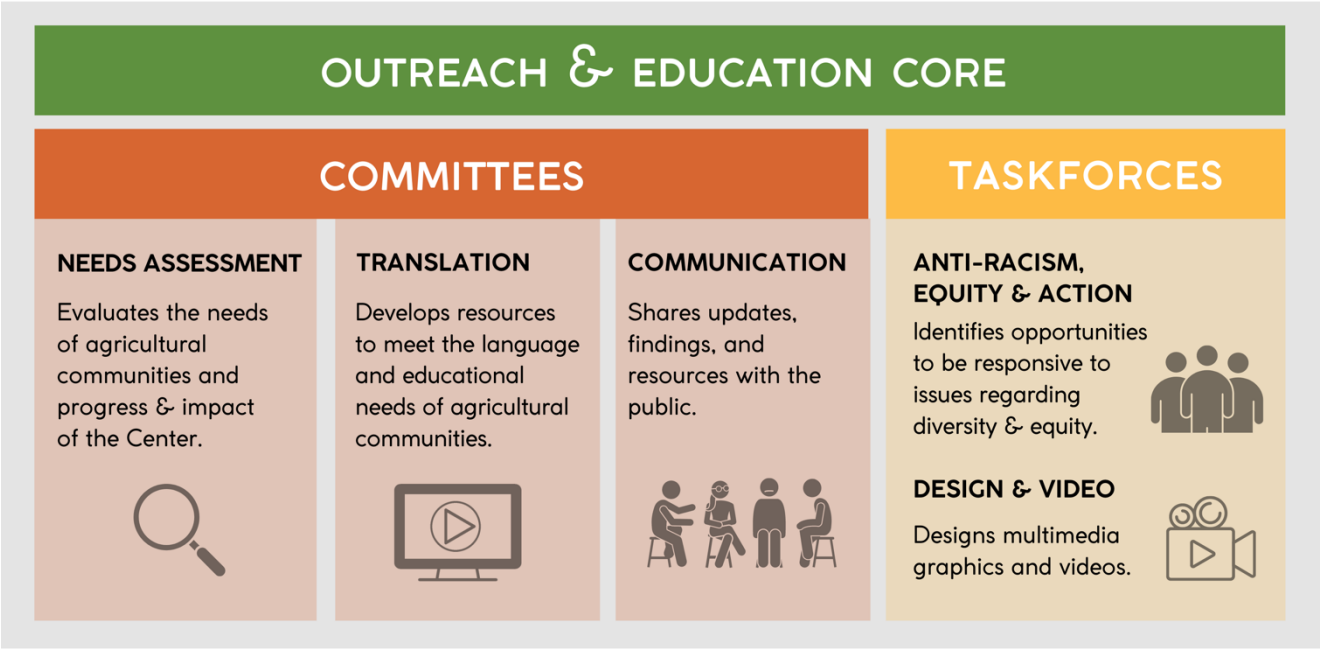
Externally Funded Research Projects

P.I. June Spector. Wildfires and Human Health
Sponsor: Science for Nature & People Partnership 2020-2021
This working group is led by a core team of researchers at the University of Washington and The Nature Conservancy. The purpose of the group is to develop a consensus-driven, evidence-based approach to identify and communicate the human health and health equity implications of wildfires versus ecological restoration-focused forest management, including managed and prescribed burns in the Western U.S. With support from SNAPP, the core team assembled a working group that brings together dozens of diverse perspectives on the issue, including foresters, ecologists, public health researchers and representatives from organizations such as the Tribal Healthy Homes Network, the California Environmental Protection Agency and Department of Forestry and Fire Protection, the Washington State Departments of Ecology, Health,
Labor & Industries, and Natural Resources, Oregon State University, and the US Forest Service, US Geological Survey, and US Environmental Protection Agency. Learn more about this project by reading this article or visiting this webpage.

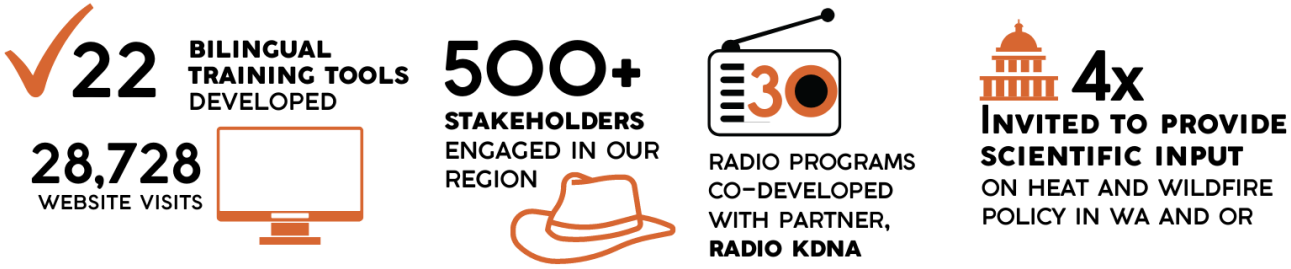
P.I. Kit Galvin. Etiquetas Bilingues de Pesticidas/Bilingual Pesticide Safety App.
Sponsors: WA Department of Labor & Industries, WSDA Crop Block Grant Program, & University of Washington CoMotion
This project is developing mobile device apps with health, safety, and environment information from EPA agricultural pesticide labels in English with contextual Spanish translations. This project addresses the inherent language disparity that can compromise farmworker health and safety and is central to our work developing safety solutions designed for a Spanish-speaking audience. The mobile app contains 40 pesticide information from the label in labels in English and Spanish for products commonly used on these crops. The team is currently working on conducting an evaluation of the app with users to learn about their experiences and to get insight to help improve the app. Learn more about this project through PNASH's Pesticide Safety webpage.

Outreach and Education Core

The Outreach and Education Core builds relationships and shares information with agricultural communities. In Year 5, the Outreach Core: 1) collaborated with individual PNASH projects to promote research findings and resources through coordinated campaigns; 2) developed new resources in response to emerging needs such as wildfire smoke and COVID-19; and 3) established new funding opportunities to foster new partnerships with industry and community partners and expand the reach of PNASH resources in agricultural communities.



Overview of Year 5 Impact



Responding to COVID-19

The PNASH Outreach Core collaborated with state, regional, and national partners to respond to COVID-19 needs. At the national level, we collaborated with NIOSH Ag Centers on a survey to understand the impact of COVID-19 on Extension Professionals and identify opportunities to expand support for agricultural employers. Regionally, we partnered with organizations in Washington and Oregon to support local efforts to understand workforce needs and share educational resources through the COVID-19 Farmworkers Study (COFS) in Washington and Oregon. Alongside several other community-based organizations, El Proyecto Bienestar played a key role in the PNASH Center's participation in the COFS study by recruiting farmworkers to participate in the survey and interviews. In addition, EPB helped develop 12 different resources and disseminated 500 COVID-19 safety resources to promote mask use in the agricultural community. In Washington, we worked in collaboration with the Department of Labor and Industries,

Department of Health, Grower's League, Yakima Health District, El Proyecto Bienestar, Radio KDNA, and community-based organizations from the COFS study to co-develop bilingual resources such as a fotonovela (10,000 print copies), social media campaigns, and 30 one-hour radio programs on COVID-19, heat illness, and wildfire smoke safety.

Partnering with Agricultural Communities

The Outreach Core established a new Mini-Grants Program to expand the reach of PNASH resources among underserved communities. The opportunity was extended to community-based organizations, employers, cooperative extension agents, commodity groups, and health and safety educators. This year, two applicants were funded in the amount of $7,500 each.

Harvust Wildfire Smoke Safety Campaign

Harvust Inc. was funded to develop an outreach campaign to promote the Harvust mobile app and Air Quality Communication tool. This app provides employers and human resources managers with local air quality information and resources (including PNASH Wildfire Smoke Safety materials) to help guide training and decision-making.

Pest Management in Cannabis: A Practical Workshop

The Cannabis Alliance was funded to develop the State of Cannabis Pest Management in Washington for pesticide applicators with safety tips from the PNASH Practical Solutions for Pesticide Safety. The workshop will provide guidance on pesticide mixing and decontamination techniques tailored to the cannabis industry.

Identifying Regional Needs

The Outreach Core conducts needs assessments to evaluate health and safety assets and needs in our region, examine progress of PNASH projects and initiatives, and identify opportunities for collaboration with the ag community.

During Year 5, the Outreach Core established the Translation and Dissemination Committee to promote the adoption of PNASH resources and evaluate how many resources were shared. Two Outreach interns, Monica Bobadilla and Eric Gambino, assisted in our efforts to promote the Heat Toolkit among 32 stakeholder partners to help expand the reach of PNASH resources among agricultural employers, trainers, and workers. As a result of these efforts, the HEAT Toolkit is now hosted on webpages hosted by Migrant Clinician's Network, Harvust, and WA Department of Labor and Industries.

Anti-Racism, Equity, and Action Task Force

In August 2020, the Outreach Core established the AREA Taskforce to identify opportunities to integrate an anti-racism lens into PNASH work. In Year 5, the taskforce expanded the questions used to evaluate new PNASH research projects to encourage researchers to highlight: the racial, economic, and social challenges impacting agricultural worker's health; stakeholder participation in project planning and decision-making; and how resources and tools will be developed to sustain health and safety efforts after the project.

Advisories

Our stakeholder advisories are facilitated through projects and supported centrally through the Outreach Core. In Year 5, we initiated a strategic planning effort in collaboration with project teams to identify opportunities to increase outreach support with stakeholder engagement, communications, and activities across our 6 advisories.

Translation of Research

The Core works in collaboration with research project teams to ensure that the benefits of our research, interventions, and education are put back into the hands of agricultural workers and producers, health and safety professionals, health care providers, public agencies, and academic institutions.

Creative Commons Licensing Guidance for PNASH

The Outreach Core has been working to establish a set of guidelines using Creative Commons licensing for the PNASH Center. We selected the CC-BY-NC-ND 4.0 licensing agreement to encourage wide use and adoption of PNASH products. Please contact pnash@uw.edu for adaptations or commercial use.

New PNASH Products

Visit the PNASH resources page to search our database by topic, industry, or resource type.

5 Education & Training Tools

4 Bilingual Checklists for Wildfire Smoke

6 Media Kits

28 Social Media Card Sets

Communicating with Agricultural Stakeholders

The Core develops media to promote and share the Center's research and resources through our social media, eNews, blog, and website. In Year 5, we focused on enhancing our digital media presence to share research findings, resources, and changes to workplace safety requirements for COVID-19, wildfire smoke, and heat.

During Year 5, we improved our website by making the homepage more visual, updating research project pages and the Pesticides and Health page, and developing the Wildfire Smoke Safety page with regional and national resources. We published 11 blogs and 7 eNews letters on topics including pesticide drift, sexual harassment, COVID-19, wildfire smoke, and pesticide safety.

As a result of the limited in-person activities in response to the COVID-19 pandemic, we continued to prioritize the use of social media as the primary method to communicate and share resources with our stakeholders. We developed social media with limited text, many visuals, and accessible English and Spanish language. Over this past year, activities on social media were organized through campaigns to draw attention to specific health and safety topics and to measure and track stakeholder action and engagement. To date, we have launched three campaigns: Be Heat Smart, Fishing Fridays, and COVID-19. In addition, we have developed media kits for other key health and safety topics including dairy safety and health and pesticide safety. Our goal is to use these resources to launch additional campaigns on these topics in collaboration with industry and community partners.

Be Heat Smart Campaign: July 2021 – September 2021

Launched a social media and radio campaign to promote the HEAT Toolkit with regional and national partners.

Fishing Fridays Campaign: October 2020 – January 2021

Collaborated with the RISC Fishing team to share research findings and build fishing presence on Facebook.

COVID-19 Campaign: July 2020 – January 2021

Partnered with the WA Department of Labor and Industries to develop and share COVID-19 resources on Facebook.

PREVENTION OF OCCUPATIONAL EXPOSURE TO PESTICIDE DRIFT

YEAR 5 of 6 (2016-2022)
PI: Edward Kasner, PhD
Clinical Assistant Professor, University of Washington

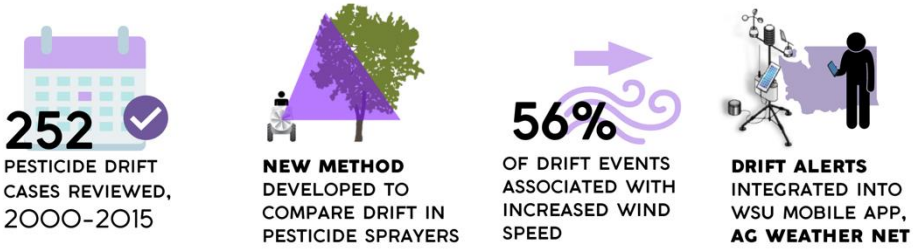
Challenge

Pesticide drift is a long-standing issue in the Pacific Northwest, especially for the tree fruit industry and workforce. Studies have shown that at least 60% of drift events were linked to wind speed or direction changes. Understanding the role winds play in pesticide drift can prevent unintended exposure for workers and nearby community members.

Project Overview

This project aims to understand the causes of pesticide drift exposure occurring among agricultural workers in order to prevent these exposures in the future. To accomplish this, we seek to determine how factors such as wind speed and direction affect the likelihood of drift. Our goal is to develop a statistical model and conduct field studies to validate this model for use in forecasting. This model will assist orchardists in assessing risks for conditions when drift is most likely to occur. Findings from our field studies will be incorporated into farmworker pesticide safety training.

"The tree fruit industry is migrating to low-drift technology. The benefit to growers is better crop protection, less culls, [and]...different regulations that recognize better practices."
- Gwen Hoheisel, WSU Partner
WSU Research & Extension



Findings to Date

- Most pesticide drift events occurred in tree fruit (151/252 = 60%). Wind speed increases and changes were found in 56% (32/57) of drift events with available data (Kasner and others, 2021).
- Drift events primarily occurred during two types of pesticide application: ground spraying (68%) and aerial spraying (23%). The confirmed cases of human illness were 69% workers and 31% bystanders (Kasner and others, 2021).
- When comparing airblast tower sprayers (ATS) and axial fan sprayers (AFA), ATS were found to produce less pesticide drift events and lower pesticide exposures for workers (Kasner and others, Jan 2020).

Accomplishments

- Established a new novel approach to study pesticide drift using epidemiological data on pesticide drift illnesses and historical weather data over multiple years.
- Published 5 peer-reviewed research papers since the study began. Two of these papers were published during the grant year.
- Made recommendations to the WA Department of Health to increase pesticide illness monitoring and share resources in areas where cases are high during March–July.
- Experimental drift alerts have been integrated into a 'smart orchard' on an AgWeatherNet station; wider adoption expected in 2022.
- Developed a new training module and recommendations for Spray Drift Best Management Practices Course led by the WA State Department of Agriculture and Washington State University.

Next Steps

We are producing a video tutorial for WA Dept. of Health to link weather data to pesticide illness data and integrated spatial features from GoogleEarthPro as part of their epidemiological investigations. This will also be made available to other state programs in the SENSOR-Pesticides program. For growers, first, we are finalizing key messages and training resources to integrate research findings into certified state pesticide applicator training. Second, we will demonstrate the utility of on-site meteorological stations for applicators to monitor wind conditions throughout a spray period, instead of using a hand-held anemometer only at the beginning of a spray period, as is currently required. Third, we are coordinating with PNASH's Practical Solutions for Pesticide Safety project to develop infographic communications of our results to be disseminated through the project website and PNASH's pesticide safety partnerships and media outlets.

Resources

Visit the links below to learn more and download our resources.

Pesticides and Health webpage

Peer-reviewed articles

NIOSH Research Rounds article

2 blog posts

The Healthy Dairy Worker Study

YEAR 5 of 6 (2016-2022)
PI: Peter Rabinowitz, MD, MPH
Associate Professor, University of Washington

Challenge

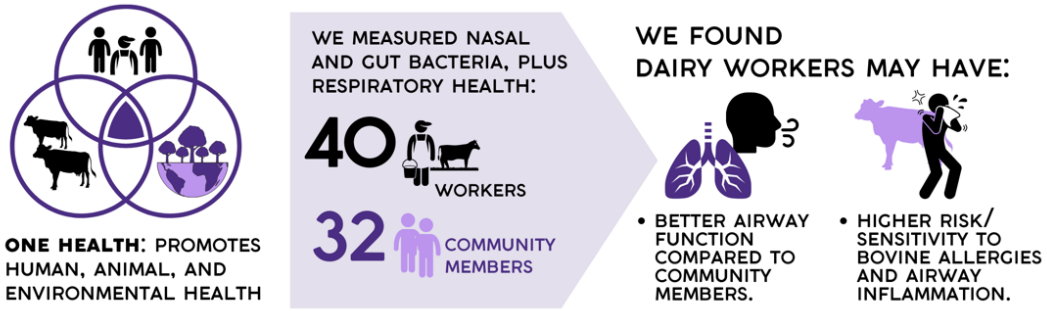
Dairy workers are commonly exposed to microbes and allergens on the job. However, little is known about whether these exposures provide health benefits or contribute to an increased risk of illness. The "hygiene hypothesis," suggests that exposure to microbes on farms may have immune benefits and could be play a role in whether farmworkers remain healthy or develop illnesses.

Project Overview

The study evaluates the impact of these factors on respiratory and gut health by measuring the nasal and gut bacteria present in the body and comparing it to respiratory function of workers. To test this hypothesis, we will observe changes in the microbiome and health status for newly hired dairy workers, existing dairy workers and community members over a two-year period. Our goal is to determine if the quantity and type of bacteria in the microbiome of workers are related to the participant's health or leaving the job.

"Este studio me ha dado la oportunidad de placticar con me hija y esposa sobre como puedo mejorar mi salud cuando trabajo con las vacas."

"This study has given me the opportunity to talk with my daughter and wife about how I can improve my health when I work with cows."
-WA Dairy Worker



Findings to Date

- The study did not find higher levels of asthma or airway inflammation among dairy workers compared to community members who did not work in dairy. However, it did find some evidence that some dairy workers were developing an allergy to cows (Marcken, MPH Thesis, 2020). Marcken, MPH Thesis, 2020
- Dairy workers were found to perform better on breathing tests compared to community members, and the dairy workers who performed the best on the breathing test had greater contact with animals (Carmona, MPH Thesis, 2019).

Accomplishments

- Comparing the gut microbiomes of dairy workers to those of community members, the study has found increased abundance of certain "healthy" bacteria among the dairy workers that may be protective against inflammation.
- Significant microbiome differences have been identified between subjects with and without asthma. Persons with asthma had a higher abundance of certain bacteria associated with inflammation.
- Developed an eLearning Online Course, Infection Prevention & Control on Farms in collaboration with Continuing Education Programs in the UW Department of Environmental and Occupational Health. The course covers common risk factors and transmission modes of zoonotic diseases, offers best practices for prevention of disease threats, and shares resources for infection prevention and control on the farm.

Next Steps

With the additional year of funding, the study has been able to focus on recruiting new-to-dairy workers and follow them as they adjust to the dairy work environment. Through the support of a collaboration with Quest Diagnostics, the study has added COVID-19 testing to the study protocols, shedding light on vaccination and COVID-19 illness rates among the workers and controls. Other planned developments are to finish collecting samples and have the samples sequenced. The study aims to collect 350 more samples by May 2022. A scientific manuscript reporting on the findings about dairy work and respiratory health (based on the work of two OHHAI Master's students and one PhD student supported with OHHAI funds) is almost complete and will be submitted to a peer-review journal by the end of October 2021. We plan to submit a manuscript reporting on microbiome analysis to a peer-reviewed journal by the end of 2021. Additional publications are planned for 2022.

Resources

Visit our webpage to learn more or to download our resources.

Dairy Partnership webpage

Farm Infection Prevention course

"Milk Mondays" social media cards

Dairy Partnership video

A MULTI-LEVEL APPROACH TO HEAT-RELATED ILLNESS PREVENTION FOR AGRICULTURAL WORKERS

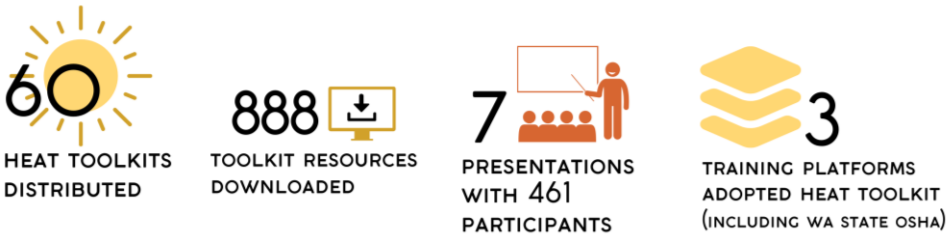
YEAR 5 of 6 (2016-2022)
PI: June Spector, MD, MPH
Associate Professor, University of Washington

Challenge

Heat stress is a preventable cause of injury, illness, and death for outdoor workers. Heat events are projected to become more frequent and occur for longer periods of time, and agricultural communities are looking for practical solutions. Few studies have examined heat prevention solutions that consider individuals, workplaces, and communities all together.

Project Overview

This project is developing and evaluating a multi-level approach to prevent heat illness by providing training tools and resources for employers, supervisors, and workers. The Heat Education & Awareness Tools (HEAT), developed in collaboration with agricultural workers, educators, and other stakeholders features a facilitator's guide, heat awareness mobile application, worksite posters, and interactive educational materials for workers in English and Spanish. The goal is to determine if the HEAT Toolkit is effective at reducing heat illness among agricultural workers. To accomplish this, a 3-month field study was conducted on 4 farms, among a total of 78 workers in 2019. We recorded worker's tasks and signs and symptoms of heat illness and placed monitors to measure heart rate and temperature of surrounding environment. We are determining whether workers who received HEAT Toolkit and education ('intervention group') had less signs and symptoms of heat-illness than those that did not ('usual practice group').



Findings to Date

- Results from the analysis of heat knowledge question responses from 2019 indicate improvement in knowledge scores at the end compared to the beginning of the season in the 'intervention group.'. Scores in the 'intervention group' improved more than scores in the 'usual practice' group from the beginning to the end of the season (Marquez and others, 2021, in review).
- Preliminary results suggest a decrease in physiologic strain in the 'intervention' compared to the 'usual practice' group, particularly for participants who worked with high effort, compared to low/medium-low effort (publication to be submitted soon).
- Algorithms using heat rate and initial body temperature were tested and demonstrate promise for assessing worker heat strain in research settings (Egbert and others, 2021, in review).

Accomplishments

- Published one peer-reviewed article, two are under review, and two are in progress.
- Developed study procedures to assess a multi-level (individual, workplace, and community) heat prevention approach, which we hope will advance the literature by providing insight into assessing the impact of heat stress interventions in the workplace (Krenz and others, 2021).
- Launched the 2021 Be Heat Smart campaign in collaboration with NIOSH Ag Centers and regional partners, including WA State Department of Labor and Industries. The summer-long campaign produced 124 social media posts on Facebook, Instagram and Twitter. Across all platforms, the campaign resulted in 31,118 impressions and 973 engagements.
- Produced 3 radio programs to promote heat and wildfire smoke safety and resources through the Be Heat Smart Campaign in collaboration with Radio KDNA, WA Grower's League, WA Department of Health, and the WA Department of Labor and Industries.
- Integrated the heat awareness mobile application within WSU AgWeatherNet.
- Developed the Prevention of Heat-Related Illness course which is part of the University of Washington Continuing Education Program: Principles for the Practicing Industrial Hygienist Series.

Next Steps

The HEAT team continues to work in collaboration with PNASH's Outreach Core to disseminate information on heat-related illness prevention, results of analyses, and the promotion of the HEAT Toolkit. The team will evaluate the HEAT toolkit and educational materials in the coming year. Finding ways to engage small farms, particularly those owned by Latino farmers, would likely help to disseminate materials and safety messages to workers who might not receive adequate safety training. We are currently working with WSU AgWeatherNet on developing a "How-to" Guide for installing and using theApp that will be shared with current and potential users of the application. The team is also working with WSU's AWN team to optimize the App. Four upcoming publications have been submitted or will be submitted by the end of 2021.

Resources

Visit our webpage to learn more or to download resources in English & Spanish.

Heat Illness webpage

Heat Toolkit

Workplace Posters

Peer-reviewed article

INJURY AND ILLNESS PREVENTION FOR THE PACIFIC NW DAIRY INDUSTRY

YEAR 5 of 6 (2016-2022)
PI: Michael Yost, Ph.D., MPH
Professor, University of Washington

Challenge

Worker's compensation claims data show dairy workers have a higher injury rate than workers in other industries. Industry specific risks include acute injuries from animal assaults, slips and falls on wet surfaces, and chronic injuries from repetitive stress.

Project Overview

We seek to reduce serious dairy worker injuries by tracking injuries, examining high-risk work tasks with farmers and workers, and developing train-the-trainer programs and best practices guide. The Dairy Safety Kit (DSK) was developed based on training needs identified in a survey of PNW dairy producers. Different safety formats and training approaches are being piloted and evaluated to determine which have the greatest impact on dairy employee learning and safety. We also worked to establish a system to track dairy worker injuries. An online interactive dashboard was developed to share data visually with dairy stakeholders and partners. We combine expertise from Washington State University (WSU)'s Department of Animal Sciences, Washington State Department of Labor and Injuries (LNI) Safety and Health Assessment and Research for Prevention (SHARP) Program, Washington State Fatality Assessment (FACE) Program, and the Washington State Dairy Federation.

DAIRY SAFETY KIT

12 SAFETY MODULES

32 WORKSHOP ATTENDEES

12 SPANISH MODUELS

35 INTERACTIVE USERS

Findings to Date

- Over the course of Fall 2020, project materials were converted to the online Dairy Safety Kit (DSK), including the train-the-trainer program, an online toolkit to common dairy safety topics and tasks. Evaluation tools including online questionnaires and discussion boards were implemented.
- Key informant interviews were conducted with four industry representatives to determine the usability, value and improvements required to the toolkit. Their feedback included reducing the text in the modules to help farmers better understand the material and reduce the amount of time spent looking for the correct information. Another farmer mentioned the need for training materials to be in Spanish, since most supervisors and training managers are bilingual. To be responsive to this feedback, one-page summary cards were created, and toolkit content was fully translated to Spanish.

Accomplishments

- The Dairy Safety Kit has been adopted by the Dairy Safety Network and the WA Leaders Enabling Advanced Dairy Safety (LEADS) Train-the-Trainer Program. Participants are manager level and owners of WA state dairies. We currently have 35 enrolled participants representing dairies ranging from one employee to 150 employees and 45 dairy safety leaders have participated in three partner-hosted workshops. Two upcoming trainings are scheduled for Fall 2021.
- Hosted the "Think Safety, It Won't Hurt" interactive virtual workshop in partnership with the Washington State Dairy Federation. Eighteen attendees, including herdsmen, safety managers and owners, joined researchers in identifying solutions and tools to improve safety meetings on dairies, approaches to animal handling training and accident prevention programs. This informed changes to the train-the-trainer materials including additional tips for implementing on-site monthly safety meetings.
- Invited as safety keynote organization to the annual 2021 WSDF meeting.
- Supported an application to develop and implement on-dairy safety training to the Northwest Center for Occupational Safety and Health.

Next Steps

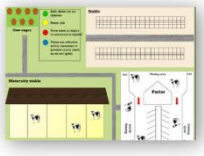
Feedback from participants will be used to improve current offerings and align content with existing training needs. Toolkit promotion, evaluation, and improvements will take place over the final two years of this project. Goals are to strengthen the LEADS training to include Oregon partners through inclusion of Oregon producers in the LEADS program. Additionally, we are working with commercial partners to develop a sustainable regional training solution for dairy workers.

Resources

Visit our webpage to learn more, enroll in the training, or download resources.

Dairy Partnership webpage

Dairy Safety Kit



Dairy Farm Hazard map

Dairy Partnership video

SAFETY SURVEILLANCE FOR PACIFIC NORTHWEST COMMERCIAL FISHING: Risk Information System for Commercial (RISC) Fishing

YEAR 5 of 6 (2016-2022)

PI: Laurel Kincl, PhD, CSP
Associate Professor, Oregon State University

PI: Viktor Bovbjerg, PhD, MPH
Professor, Oregon State University

Challenge

Commercial fishing is vital to Pacific Northwest economies and communities. Compared to other industries, it is one of the most hazardous due to higher rates of serious injuries and deaths. There is a need for increased information and research that identifies the causal factors of these serious and frequent injuries in order to better inform prevention strategies.

Project Overview

"I have served on many advisory boards, and this has been of the better managed boards. Despite the interference of COVID, I can't think of any way to improve the experience outside of everyone getting a vaccine so in-person meetings can resume."
-RISC Fishing TAB member

This project is addressing this information gap by expanding the Commercial Fishing Incident Database (CFID) developed for fatalities to include information on nonfatal incidents and vessel disasters in the Pacific Northwest. The new CFID is now in use by NIOSH and industry partners. RISC Fishing partners with the CDC/NIOSH Commercial Fishing Safety Program and is guided by a Technical Advisory Board composed of stakeholders from commercial fishing safety-related organizations, including the United States Coast Guard, Washington and Oregon fisheries management professionals, the Oregon Health Authority, the National Oceanic and Atmospheric Association, the Alaska Marine Safety Education Association (AMSEA), health and safety professionals, and Sea Grant commercial fishing extension agents.

Findings to Date

- In this year's analysis, we examined 245 nonfatal and 93 fatal incidents from 2000-2018 from OR and WA. Leading were slips, trips, falls, and falls overboard with 44 (18%) nonfatal injuries and 18 (20%) fatalities. These were the result of slips & spills, ladders & stairs, poor housekeeping, and open hatches.
- Seventeen fatalities caused from falls overboard occurred with deckhands (71%) and owner/operators (29%). The two main causes were slips and trips (35%) and knocked by gear or gear entanglements (29%). The Dungeness crab fishery accounted for the most falls overboard (41%). None of the fall-overboard victims were wearing personal flotation devices.

Accomplishments

- New research article. This paper describes the novel approach utilized to link 4 different commercial fishing incident datasets that provided routine, accurate, and automated data linkage (Nahorniak and others, 2021).
- New research article. This paper used publicly available data sources to identify exposures and health outcomes common among fishermen. These include musculoskeletal conditions (33%), severe low-back pain (27%), smoking (45%), and second-hand smoke exposure (25%). 21% reported no health care coverage (Doza and others, 2021).
- Developed 5 RISC Fishing Findings with data summaries and 6 RISC Hazard Sheets with fishermen partners. These were disseminated in 4 Fishermen First Aid and Safety trainings with commercial fishermen (n=36) held in Washington and Oregon from November to March.
- Established "Fishing Fridays" social media campaign that resulted in 16 #FishingFridays posts, 23 shares, 22 new followers, and reached 1,537 people.
- The Commercial Fishing Incident Database (CFID 2.0) continues to be successfully managed by the NIOSH Western States Division. This year, we identified 189 unique diagnostic codes and 44 unique external codes within the data.

Next Steps

In our final year of the project, we will develop new RISC Fishing training and resources using research findings, providing summary analysis and data visualization tools for our stakeholders. Dissemination will take place regionally at dockside exams, commodity meetings, first aid and safety training, social media, and through Sea Grant. After linking more data to CFID, we expect to be able to conduct detailed analyses of the utility and limitations of the data and continue to improve the system and collaborate with our surveillance partners at NIOSH and US Coast Guard.

Resources

Visit our webpage to learn more or download our resources.

RISC Fishing webpage

Created 6 Hazard sheets for injury prevention

Published 2 Peer-reviewed Articles

Developed 16 Social media cards

PRACTICAL SOLUTIONS FOR PESTICIDE SAFETY: Handheld Application Equipment

YEAR 5 of 6 (2016-2022)
PI: Kit Galvin, MS, CIH,
Senior Research Scientist, University of Washington

Challenge

Handheld pesticide application takes place in farming and forestry work, and unintentional exposures can be common. Few evidence-based solutions have been developed to reduce pesticide exposures for handheld application equipment.

Project Overview

This project works with industry partners to discover and share practical pesticide safety measures for handheld application equipment in greenhouses, nurseries, and forest services. The solutions developed will: 1) reduce exposure; 2) are practical, compatible, convenient; and 3) support the requirements and training for state regulations and the revised US EPA Worker Protection Standard. We are engaging with managers and handlers in the identification and evaluation of solutions. Our goal is to publish solutions online and use social media for ongoing discussion.

"The room order protocol makes sense. You don't want to enter a room and accidentally introduce bugs into other rooms. Then you only have to treat one room and end up using less (pesticide) products."
-Research Participant

21 IDENTIFIED SOLUTIONS

4 AGRICULTURAL INDUSTRIES

7 SITE VISITS AND **56** INTERVIEWS

Findings to Date

- 50% interviewees have story of adoption/use in field.
- Reviewers found the online solutions visually appealing and accurate and the curated resources specific to solutions an excellent feature.

Accomplishments

- Conducted 7 site visits and 56 interviews with agricultural workers.
- In Year 5, five new solutions were identified covering topics of worker hygiene, pesticide application efficiency, and reducing pests in the greenhouse rooms.
- Developed a new remote approach to engage partners by providing a custom tablet used to gather pictures and conduct live walk-throughs and interviews.
- Adoption scenarios are in development. For example, a participant adopted the room access protocol solution, motivated by the use of less pesticide products because they would only need to treat one room instead of several rooms.

Next Steps

In our final year, we will publish 15 new solutions to the website in English and Spanish. Our Expert Working Group (EWG) is currently reviewing 9 of our published solutions and will also review our 6 new solutions. We will also be developing Shop Talks, with a focus on solutions that help growers meet the EPA Worker Protection Standard. In Year 6 we will disseminate solutions and evaluating grower interest and use. Our promotion plan includes social media and meetings (remote and in-person). We are partnering with Oregon State University Pesticide Safety Education Program (PSEP) and the national Pesticide Educational Resources Collaborative (PERC).

Resources

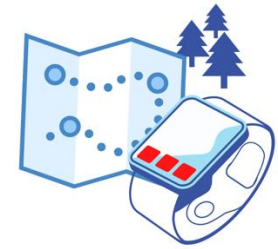
Visit our webpage to learn more and download resources in English and Spanish.

Practical Solutions for Handheld Equipment webpage

Practical Solution: Remote control for hose reels

Pesticide Labels, Now!™ Pesticide Labels Now app!

Practical Solutions for Pesticide Safety webpage



Pilot: WEARABLE ACTIVITY RECOGNITION MODELING FOR LOGGING SAFETY

FINAL REPORT
Year 3 of 3 (2019-2021)
PI: Robert F. Keefe, PhD, MS
Associate Professor and Director,
University of Idaho Experimental Forest

Challenge

Logging consistently has among the highest fatality rates in the US. While increased mechanizatic has improved safety for loggers, ground crews, rigging workers, and hand fallers are still at risk. Emerging technologies that enable real-time positioning, activity recognition, and data sharing in remote areas have the potential to improve safety for loggers, aiding situational awareness and rapid emergency response.

Project Overview

This small project pilots the integration of geospatial technology and activity recognition modeling into a Garmin smartwatch and smartphone application for rigging crew workers in the logging industry. We aim to improve loggers' situational awareness by providing real-time updates of their coworkers' work activity status, location, and smart alerts. Time and motion studies and designed experiments are used to develop and test wearable-based activity recognition models and smart alerts. We then code the resulting models into a smartphone application so that smart alert features can eventually be available to anyone using a Garmin smartwatch.

Findings to Date

- Model testing has demonstrated 80% accuracy in predicting work activity and person-down status.
- Results from the Idaho logger evaluations indicate favorable intent to adopt wearable-based activity recognition systems.

Accomplishments

- Through a presentation to the Council on Forest Engineering and International Symposium on Forest Mechanization (FORMEC), the project team initiated a broader discussion on ethical considerations associated with using wearable data in the workplace in forestry.
- This research presented at FORMEC 2021 was selected by the scientific committee for the 'Best Presentation' award from among 120 talks given globally.
- These results are peer-reviewed and published in PLOS One on May 12, 2021. Associated Random Forest models have been published via University of Idaho Northwest Knowledge Network data repository.

Next Steps

Strategic planning has begun that will merge the pilot project model into a broader project framework to develop enhanced functionality over the next 5 years. This pilot is now expanding to a larger project, which will include the release of an app.

Resources

https://bit.ly/PNASH-Logging-Activity-Recognition

Zimbelman, E. G., & Keefe, R. F. (2021). Development and validation of smartwatch-based activity recognition models for rigging crew workers on cable logging operations. Plos one, 16(5), e0250624.

Pilot: Use of Unexpected Events and Management Requiring Conditions in the Training of Workers

FINAL REPORT
YEAR 2 of 2 (2019-2021)
PI: Kevin Lyons, PhD
Associate Professor, Oregon State University

Challenge

Forestry work takes place in a natural and largely uncontrolled environment. Traditional logging jobs such as choker setting with rigging crews continue to suffer severe injuries and fatalities. In addition, new logging methods such as tethered ground-based systems are bein introduced where there is little practical experience on which to base risk assessment. Developing guidance on Management Requiring Conditions (MRC) and Unexpected Events (UE) combined with severity ratings will provide valuable information for training and supervision of workers performing these high-risk tasks.

Project Overview

This pilot project is developing a novel system, using a simulated environment (John Deere Forest Harvesting Simulators), where workers identify potential safety concerns and assign a severity rating to the safety concerns. This system will uncover factors in risk decision makin for new logging workers, informing future safety training programs.

Findings to Date

- All participants reported they could understand the simulated incident scenarios, and risk assessment role-play.
- All participants successfully were able to identify the seniors' MRC, although the severity assigned varied.
- It was common for lower severity rating for MRCs vs. higher severity rating to the UE. This demonstrates a need to for training in risk assessment.
- Simulated incident scenarios provide an alternative training environment where workers can gain some experience, over a wide range of incidents, in a short time, and safely.

Accomplishments

- Switching to simulated incidents allowed us to present more incident scenarios than would have been possible in the field.
- Six incidents were simulated.

Next Steps

Study results will help shape future Northwest logging training programs using simulated scenarios.

Resources

https://bit.ly/OSU-Mechanized-Logging

Lyons K. *Hazard recognition and risk assessment by cable logging rigging crews (In Review).*

Pilot: Smoke Monitoring for Agricultural Safety and Health (SMASH)

FINAL REPORT
PI: Edward Kasner, PhD
Clinical Assistant Professor
University of Washington

Challenge

The hazard of wildfire smoke exposure continues to increase in the Northwest and presents an important health risk to outdoor workers, including those in agriculture.

Project Overview

Our aim is to develop wildfire decision aid tools for growers, driven by data from a high-density network of low-cost air quality monitoring sensors. During the 2020 wildfire season, new smoke sensors were tested in Washington state to assess needs for worker health, crop protection, and plume tracking. Improving access to more localized air quality information could help agricultural employers protect both worker and crop health as wildfire smoke exposure increases.

Findings to Date

- This pilot study demonstrates proof-of-concept for air quality monitoring based on Washington State University's AgWeatherNet platform. Our results from before and during an intense wildfire smoke episode in 2020 indicated that the Thingy AQ smoke sampling platform provides a strategy to increase access to real-time air quality information in rural areas where monitoring networks are sparse.

Accomplishments

"Does it make sense for an individual grower to own a PM1.0 sensor? Will we be able to correlate those levels to potential smoke exposure risk?" -Grower

- Permanent deployment of Thingy:AQ sensor at Wenatchee regulatory air monitoring site.
- Our project partnership has connected local sensor startup company (Thingy:AQ) with wine and tree fruit industries. As a result, they have become heavily involved in new precision agriculture "smart farm" initiatives, such as innov8.ag and agaid.org.
- The project team has responded to requests for public technical comments in 2021 smoke and heat rulemaking efforts in Washington and Oregon states.
- This project's technology and identified risk factors for agriculture were presented locally and nationally at the 2021 Washington Ag Safety Day, 2021 Washington State Tree Fruit Association Annual Meeting, and in a 2021 AgriSafe webinar.

Next Steps

This project's work will continue with the goal of deploying 30 additional Thingy:AQ sensors on the AgWeatherNet platform. Spinoff proposals have been written for two upcoming grant opportunities to test and develop this system for Washington growers and related proposals have been funded for smoke taint research in local agriculture.

Resources

SMASH website

Austin E., Kasner E., Seto E., Spector J. Combined Burden of Heat and Particulate Matter Air Quality in WA Agriculture. J Agromedicine. 2020 Jul 30;1-10.

Heat, fire, smoke and health in Washington's ag industry. 2020 Sep 3.

Pilot: Systematic Evaluation of Exoskeletons in Reducing Musculoskeletal Disorders in Manual Timber Felling

FINAL REPORT
Year 3 of 3 (2019-2021)
PI: Jay Kim, PhD, MS
Assistant Professor, Oregon State University

Challenge

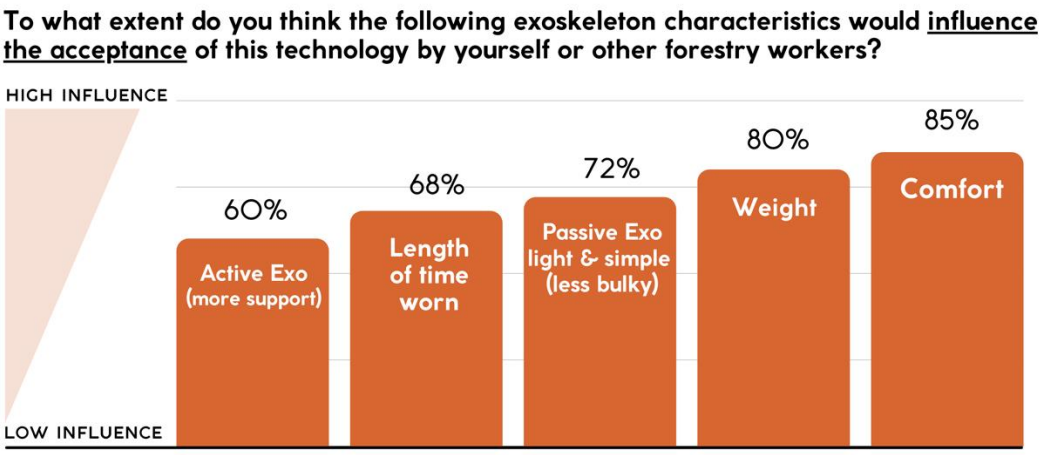
Logging represents one of the most dangerous occupations, with high fatal and non-fatal injuries, particularly with timber falling. The physically demanding nature of the work is challenged by steep ground and adverse weather conditions with unstable footing. This pilot project seeks solutions to reduce physical risk factors and injuries for hand timber fallers by introducing exoskeletons as an ergonomic control.

Project Overview

We surveyed loggers to identify potential barriers and unintended safety hazards associated with exoskeleton use. Due to COVID safety considerations, this survey was conducted online with professional logging workers, including timber fellers, safety managers, logging company owners, forestry educators, and logging workers. Survey results will provide understanding of the feasibility of an exoskeleton intervention in improving hand fallers' health and safety and offer guidance for safe and effective use in forestry settings.

Findings to Date

- Survey results showed that while the forestry workers were not familiar with exoskeletons, they expressed considerable interest and acceptance for their use in the forestry industry.
- The results identified timber falling, cutting/sawing, and mechanic work as potential forestry tasks that may benefit most from exoskeleton use.
- The important factors of the exoskeletons included weight, comfort, and simplicity/portability. When asked about health risks that may be posed by use of exoskeletons, workers expressed concern about getting snagged in brush, reduced mobility causing hazardous situations, loss of feeling from the ground, stab injuries, being trapped, malfunction, and weight stressing on the body.
- Potential barriers to exoskeleton adoption can be grouped into four categories: Financial, productivity, psychosocial, and physical aspects. The most important barrier to respondents was the productivity barrier.



Next Steps

Data from the survey results have been analyzed and will be disseminated through a peer-reviewed journal article. These survey results suggest that given the high prevalence of musculoskeletal pain in the low back and upper extremities, evaluating exoskeleton support of these areas would be a reasonable first step in a future study. Overall, the survey results suggest that passive exoskeletons, which are lighter, simpler in structure, and more portable than active exoskeletons, may be a good candidate for forestry settings and inform a future study, including field-testing with loggers in real forest conditions.

Resources

https://bit.ly/OSU-Logging-Ergonomics

Kim, S., Moore, A., Srinivasan, D., Akanmu, A., Barr, A., Harris-Adamson, C., Nussbaum, M. A. (2019). Potential of exoskeleton technologies to enhance safety, health, and performance in construction: Industry perspectives and future research directions. IISE Transactions on Occupational Ergonomics and Human Factors, 7(3-4), 185-191.

Education Small Grant: Sexual Harassment Prevention in Agriculture: Evaluating a Training Video and Curriculum

YEAR 2 of 2 (2019-2021)
PI: Jody Early, PhD, MS, MCHES
Associate Professor

Challenge

Studies estimate female farmworkers face sexual harassment at a rate of 2-3 times higher than other work sectors. Yet, there are limited training and resources tailored to the needs of agricultural communities.

Project Overview

The ¡Basta! Prevent Sexual Harassment in Agriculture toolkit is a tailored worksite resource developed in collaboration with the agricultural community in a previous PNASH project. The purpose of this project was to evaluate the effectiveness of the ¡Basta! training video and curriculum. A pre/post-questionnaire was developed to assess participant's knowledge, attitudes, and beliefs (in both English and Spanish) before and after a one-hour training session.

Findings to Date

- Participants' knowledge and attitudes scores significantly increased after the training ($P<0.05$). We did not observe any significant differences in scores between supervisors and workers or men and women. However, we did notice a significant difference between English and Spanish speaking workers.
- Only a few participants indicated they did not feel comfortable intervening if they observed sexual harassment or reporting it to their employer (n=6). However, all those that did were Spanish-speaking.
- 94% of the participants who indicated sexual harassment is not common in agriculture were male (50% supervisors and 44% workers).
- 98% of participants indicated they believed sexual harassment training should be required and 100% believed sexual harassment prevention in the workplace was important.

Accomplishments

- 562 agricultural workers, supervisors, and growers have been trained in 13 training sessions and 6 growers in Oregon and Washington invited us to deliver training.
- The questionnaire was administered to 129 stakeholders, 103 Spanish and 26 English speaking workers, supervisors, HR personnel, and others during Ag Safety Days.
- ¡Basta! toolkit was adopted by the WA State Coalition Against Domestic Violence, WA Human Rights Commission, and Harvust Inc.
- Developed the ¡Basta! We Deserve a Workplace without Sexual Harassment comic in collaboration with Latina farmworkers and uses a narrative format based on real stories.
- 2020 Award Winner, APHA Public Health Education & Health Promotion

Next Steps

The findings from this pilot study are being used to develop a longer survey to assess additional factors such as sexual harassment experiences and workplace climate. This winter/spring, the team will be conducting validity and reliability testing for this new instrument. In addition, we will continue to expand the resources for Basta! Toolkit.

Resources

Visit our website to learn more or to download our resources.

https://bit.ly/Basta-Toolkit

¡Basta! Facilitator's Guide

¡Basta! Training Videos

¡Basta! Graphic Novel

¡Basta! Worksite Posters