

CONCURRENT ORAL PRESENTATIONS: SESSION 1

High Pressure Air: A Solution in Preventing Grain Entrapments

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Tuesday, June 18 9:00 a.m. Galleria I

Purpose:

Grain entrapment is a serious and potentially fatal agricultural hazard that occurs when a person becomes trapped or buried in grain, typically inside a grain storage bin, silo, or other similar structure. It can happen when individuals enter these storage structures for various reasons (including inspection, maintenance, or attempting to dislodge stuck grain). The individual can quickly become submerged and immobilized in the flowing grain, which can behave like quicksand. Grain entrapment incidents are often life-threatening, and the rescue process is challenging. The safest place to work on grain is outside of the bin. We have proposed that compressed air may be a possible vehicle towards safer grain handling practices. Compressed air is a promising technique to prevent grain entrapment, as it can be used outside the bin reducing the need for agricultural workers to enter the bin.

Methods:

Ten columns were setup with rotting grain and placed over the summer in five grain bins. Columns were allowed to go out of condition and form hard structures. During fall, review of the grain shows that they formed 4 foot self-supporting columns. In-bin Auger was removed from flighting and a 10' pipe attached to an air compressor was used to break up the columns. Three nozzles were tested and evaluated in their effectiveness in breaking up the columns. Spore and dust concentrations were also measured in this experiment.

Results:

Overall, high pressure air was successful in fully clearing out 5 out of the 9 columns. They partially cleared another 3 columns as well. A simple pipe was found to be the most effective nozzle in breaking up grain clumps. Dust concentrations were 10 times higher than OSHA limits, however, dust concentrations quickly reached acceptable levels. Spore concentrations were measured in the millions and are a potential hazard in using compressed air.

CONCURRENT ORAL PRESENTATIONS: SESSION 1

Investigating the Relationship Between Respirator Types and Their Impact on Behavioral and Physiological Responses While Performing Simulated Grain Handling Activities

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Tuesday, June 18 9:20 a.m. Galleria I

Purpose:

The study was undertaken to investigate the relationships between different types of respirators and physiological/behavioral responses during simulated grain handling activities. The researchers sought to address a gap in knowledge around identifying comfortable and effective respirators to improve safety for grain workers who face hazardous dust and heat stress. The main objectives were to: Compare four different respirator types (N95, half-mask, full-face, and PAPRs) plus a control condition during simulated grain handling tasks in terms of their effects on heart rate, core temperature, comfort ratings, and perception of heat stress. Test the hypothesis that PAPRs would provide the highest comfort levels compared to other respirator types. Identify comfortable and effective respirators to recommend for improving safety among grain workers exposed to hazardous dust and heat stress.

Methods:

Ten participants (5M,5F, 18-50yrs) will be recruited. Medical evaluations and fit testing will determine safe respirator sizing. In a 90°F, 60% humidity enclosure, participants will wear N95, half-mask, and full-face respirators in randomized orders and complete 10-minute simulated grain handling tasks. Heart rate monitors and core body temperature sensors will continuously collect physiological data. Surveys will assess subjective fatigue and comfort. Safety measures will include stopping criteria if body temperature exceeds 100.4°F, heart rate surpasses 90% max, or participants wish to stop. The use of balanced experimental designs will control potential carryover and order effects. Randomizing and counterbalancing conditions will reduce systematic biases. Recorded data and surveys will allow examination of impacts on comfort measures, behavioural, and physiological responses.

Results:

Analysis of variance (ANOVA) will examine differences in comfort levels across respirator types using physiological measures. The null hypothesis will be that no significant differences will exist between respirators. The alternative hypothesis will be that PAPRs will provide superior comfort compared to other respirators, as indicated by lower core temperature and heart rate. If the ANOVA finds enough evidence to reject the null and support the alternative hypothesis, it would suggest PAPRs offer greater comfort during simulated grain handling activities based on the physiological data that will be collected. This could have implications for recommending optimal respiratory protection to reduce heat stress and ensure comfort for grain workers.

The research would be concluded by May 2024, hence there will be sufficient results to back up the hypothesis.

CONCURRENT ORAL PRESENTATIONS: SESSION 1

Factors Influencing Worker Safety in Grain Handling: Perspectives from Stakeholders

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Tuesday, June 18

9:40 a.m.

Galleria I

Purpose:

Out-of-condition grain has been identified as a primary causal factor in grain entrapments and engulfments. The quality of grain also has implications for grain dust explosions. Limited research has examined exactly which elements of grain condition influence worker safety in grain handling. This research project aimed to establish an advisory panel of experts to examine and provide input on how elements of grain condition relate to worker safety risks in grain handling. The diverse perspectives of the expert panel will be used to develop inputs for future modeling and statistical analysis.

Methods:

A purposeful sampling technique was used to obtain a sample of grain handling and storage experts to function in an advisory role for the project. The final sample contained six industry representatives, five academic professionals, and two insurance/regulatory professionals. A grounded theory approach was used to develop semi-structured interview questions that aimed to explain and provide more detail on elements of grain condition that could lead to an entrapment, engulfment, or grain dust explosion. Data were analyzed using NVivo version 14.

Results:

Four themes were identified as part of the research. These included: challenges to worker safety in the grain handling industry, areas where improved communication is needed, grain quality indicators that may play a role in safety incidents, and available mitigation strategies. Participants confirmed the concept of out-of-condition grain as a primary causal influence to worker safety in grain handling. Specifically, high moisture grain, low moisture grain, and toxin or mold presence were quality traits discussed by the panel.

CONCURRENT ORAL PRESENTATIONS: SESSION 1

Agricultural Harvest Machinery Injuries in the Upper Midwest: A Retrospective Analysis of Trauma Admissions 2010-2021

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Tuesday, June 18

9:00 a.m.

Parlor BC

Purpose:

Agriculture ranks among the most hazardous industries worldwide, and high rates of occupational fatalities, injuries, and illnesses are observed in many studies. Few studies have investigated mechanism of injury, injury characteristics and outcomes of agricultural injuries (AI) among farmers in the upper Midwest, including North Dakota and South Dakota, states with high rates of AI. The purpose of the study was to characterize the incidence, injury characteristics, and outcomes of patients who presented to four trauma centers in the upper Midwest with agricultural related harvest-machine injuries (HMI). We described the nature of these injuries by severity, body region, type, patient characteristics, and clinical outcomes. Our findings represent the total number of HMI throughout our ten-year dataset, not just during the autumn season.

Methods:

We performed a retrospective review of four Sanford Health trauma registries in North Dakota, South Dakota and Minnesota for HMI occurring between January 2010 and December 2021. Sanford Health is an integrated health system operating in the upper Midwest, serving the rural states of ND, SD, MN, and parts of NE and IA.

HMI were identified through ICD-9 & 10 codes and analysis of injury descriptions entered into a free text field unique to the registries. Injury severity was evaluated using Injury Severity Score (ISS) and Abbreviated Injury Scale (AIS). AIS was also used to identify the injured organ(s). Mechanism of injury (MOI) were categorized using the Canadian Agricultural Safety Association (CASA) farm-related injury categories. Descriptive information obtained for each injury included: age and sex of the patient, mechanism of injury, body region of injury, and machine involved.

Results:

A total of 141 injuries were identified, including three deaths. The most common equipment involved with injuries were augers (40%), grain bins (33%) and combines (23%). HMI were common among farmers aged 25-44 (35%) and 55-64 years (28%). Two injuries were among pediatric patients, incidents which occurred from an auger and a combine. Farmers 55+ had the most critical injuries (n=5), but the highest mean ISS was observed in the 13 and under age group. Most injuries occurred in Autumn (n=69), of which 39% were grain bin injuries and 29% were combine injuries. Head injuries were most common in grain bin (n=8) and combine (n=3), and upper extremities were the most commonly injured body region with 51 injuries. Falls occurred most commonly in grain bins (n=38) and from combines (n=20), whereas entanglement injuries were most common in augers (n=40).

Reliability Assessment of a Test Bank of Tractor and Machinery Safety Questions

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Tuesday, June 18

9:20 a.m.

Parlor BC

Purpose:

The U.S. Department of Labor (DOL) supports tractor and machinery safety (TMS) certification for 14-and-15-year-olds taught by 4-H and state agricultural educators. To earn certification youth must earn a 70% passing score on a written knowledge test and a practical tractor driving test. Currently, there is no national standardized written test available to administer to students; the instructors create a test that is representative of the program they offer. The purpose of a national exam would allow uniformity in questions offered to youth nationwide, as well as assist teachers with a pre-designed test. Such test could also be available online. The research goal to establish reliability, ensures a high-quality exam.

Methods:

The TMS test bank of knowledge questions were developed by a panel of subject matter experts establishing content validity. Secondary school educators were recruited from national public domain listserves who acted as facilitators in their agricultural classrooms to assess exam quality/reliability. After TMS classroom instruction, students completed a WebXam of 70 4-option multiple-choice questions. The reliability evaluation was completed using item-analysis. A digital badge via Badgr was awarded to those students who achieved a 70% accuracy.

Results:

The study was initiated during COVID and remains launched to achieve the needed sample size for adequate power. Data from two samples had a 94% and 83% student assent. Digital badges were awarded to 45% of test takers. Preliminary results (n=41) showed the reliability was excellent (Cronbach's $\alpha = .93$). The average score was 43.22 (SD= 13.14), or 61.7% (SD= 18.8%). The TMS reliability evaluation will be completed by May.

Occupational Chainsaw Injuries in the Agriculture, Forestry, and Landscaping Sectors: 2018 through 2022

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Tuesday, June 18

9:40 a.m.

Parlor BC

Purpose:

Chainsaws are a key piece of equipment used in tree felling and trimming work related to forestry and farming. Working with a chainsaw can be hazardous if they are not used correctly without proper training and operation. NEISS data suggest that more than 25,000 people are treated annually in US ERs for non-occupational chainsaw injuries. However, little surveillance is available to help understand the extent to which chainsaws are involved in severe injuries and fatalities suffered by professional tree cutters and farm workers. Data on occupational severe injuries and fatalities can guide research efforts and policy-makers as they strive to reduce hazards from chainsaw operation. Our objectives were to quantify and describe severe occupational injuries and fatalities incurred by professionals working in landscaping, forestry and farming activities while using a chainsaw.

Methods:

This was a cross-sectional study using OSHA occupational data plus the National Electronic Injury Surveillance System (NEISS) data for non-occupational patients treated from January 1, 2018, to December 31, 2022. For the years 2018-2022 we queried all cases in the OSHA/IMIS database for both nonfatal and fatal incidents in all NAICS industry codes. Specific industries of interest include Agriculture, Forestry and Fishing (AGFF) (11), Construction (23) and Landscaping Services (56). National estimates were created using weights provided by the NEISS. The NEISS collects emergency department data from approximately 100 hospitals selected as a probability sample of all 5,000+ U.S. hospitals with EDs. In addition to patient demographics, incident date, diagnosis, injury location, and patient disposition, the NEISS contains a brief narrative describing incident scenarios.

Results:

From 2018 to 2022, an estimated 127,944 people were treated in an emergency department for nonoccupational chainsaw-related injuries; this suggests an average of 25,589 injuries per year. During the same period there were 114 non-fatal and 59 fatal occupational injuries due to contact with chainsaws. This does not include injuries incurred during tree cutting activities when the victim was injured by a different source (e.g., a falling tree). Landscapers suffered 39% of all non-fatal injuries and 58% of all fatal injuries. By contrast, the AGFF sector incurred 23 total incidents; the fatalities in AGFF represented 24% of all fatal occupational injuries from chainsaws.

CONCURRENT ORAL PRESENTATIONS: SESSION 2
A Comparative Analysis of Agricultural All-Terrain Vehicles' Static Stability under Different Loading Conditions

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Tuesday, June 18 10:00 a.m. Galleria II

Purpose:

Rollover incidents involving All-Terrain Vehicles (ATV) are prevalent causes of injuries and fatalities within the agricultural sector. In rural settings, fatalities resulting from rollovers are frequently reported. The static stability of an ATV, an important determinant of rollover propensity, is characterized by its lateral and longitudinal stability angles – the angles at which the vehicle is on the verge of tipping over. Although the effect of adding different types of loads, such as liquid and solid, to the vehicle is known, there are no studies on testing the effect of carrying different types of loads on agricultural ATV static stability. This study aimed to quantify the effect of different types of loads (solid and liquid) on the static stability of two different models of ATVs.

Methods:

Static stability tests are being conducted by using a tilt table to measure the lateral and longitudinal stability angles of ATVs, based on the ANSI/ROHVA 1-2016 standard. For this research, we selected two distinct ATV models. The selection of these models was based on their distinct physical attributes, such as weight, wheelbase, front/rear track width, and center of gravity position. Both solid and liquid payloads are tested on the ATVs' carrying racks, in which only the vehicle's maximum carrying capacity recommended by the manufacturer was accounted for those tests. To account for the most unstable condition, liquid loads consist of rectangular sprayer tanks close to half-volume capacity. To determine the potential impact of load type (liquid and solid) on stability angles, we will perform an analysis of variance (ANOVA) followed by a multiple-range Tukey test.

Results:

The study will provide a comprehensive understanding of the impact of different load types (liquid and solid) on stability angles. Through statistical analysis, we will quantify the effect of the type of load in both lateral and longitudinal stability angles. As a result, we will provide detailed recommendations about safe practices for ATV loading.

CONCURRENT ORAL PRESENTATIONS: SESSION 2
Agricultural Machine-Related Injuries in Pakistan – Survey-based Study Among Surgeons from Nov 2022 – April 2023

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Tuesday, June 18 10:20 a.m. Galleria II

Purpose:

As one of the most perilous industries, agriculture presents both fatal and non-fatal risks to farmers and farm workers. Pakistan, a notable Asian nation, heavily depends on agriculture, which constitutes 23% of its GDP and employs 37.4% of the workforce. The objective of this research is to investigate agricultural machine-related injuries in Pakistan during the period of 2022-2023. Specifically, the study aims to identify the key sources of injuries, assess their severity, analyze the demographics of affected individuals, and determine regional patterns of such injuries.

Methods:

The study conducted a survey from November 2022 to April 2023, involving 55 respondents primarily from the provinces of Sindh and Punjab in Pakistan. The survey collected data on agricultural machine-related injuries, focusing on the types of machinery involved, the severity of injuries, and the demographic characteristics of the injured individuals.

Results:

The results highlight key sources of injuries, such as the fodder cutter, thresher, tractor, and other hand tools. Hyderabad emerges as a significant hotspot, contributing to 32.74% of all injuries across cities. Regarding the severity and demographics of injuries, 38.26% of cases involve amputation, with a higher incidence rate among males (76.52%) and individuals aged 15-34 years (65.06%).

CONCURRENT ORAL PRESENTATIONS: SESSION 2
Perspectives of the DOL Tractor and Machinery Safety Certification by Instructors and State Administrators

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Tuesday, June 18 10:40 a.m. Galleria II

Purpose:

The U.S. Department of Labor (DOL) supports tractor and machinery safety certification for 14-and-15-year-olds taught by 4-H and state agricultural educators. To earn certification youth must earn a passing score on a written knowledge test and a practical tractor driving test.

The specific aim of the study was to understand the current state and need for tractor and machinery safety (TMS) programs with a national needs assessment of stakeholder groups to determine preferences and gaps in current programming, including professional development needs of instructors.

Methods:

A 7-item Qualtrics surveys was distributed to all 50 State 4-H Program Leaders and all 50 State Department of Education (D of Ed) Agricultural Education administrators asking status of TMS certification. The target audience was identified from public domain listserves.

A Qualtrics pilot study was conducted with secondary-school agricultural educators to obtain their perspectives on available TMS resources and professional needs. A convenience sample of 98 agricultural teachers and extension faculty from five states were invited through teacher preparation programs and university contact directors.

Results:

Data collection is ongoing and will be completed by conference time. To date, 58% 4-H and 42% state administrators responded. Both groups reported TMS annual enrollment numbers for their state, with student participants ranging from 0 – >900. State Education administrators were more pessimistic that the TMS training could be self-study compared to 4-H leaders (52% vs. 27.6%).

A pilot survey was distributed to TMS educators. Preliminary (n=38) results showed 6 taught TMS, and 5 taught a safety course but did not issue a DOL certification. Available instructional resources were NSTMOP curriculum (n=3), dealer publications, 4-H curriculum (n=1), Ag Safety 4 U (n=2), farm safety days (n=1), and state/locally developed materials (n=1). Teachers shared their opinions that there were sufficient resource materials available to teach the course, but lack of students who were interested in TMS.

CONCURRENT ORAL PRESENTATIONS: SESSION 2
Meeting Educator Needs: Incorporating AYWG into Curriculum of Wisconsin Agricultural Educators

Peltier, Swenson

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Tuesday, June 18 11:00 a.m. Galleria II

Purpose:

Every day, 33 children are injured, and three children die as a result of agricultural-related incidents in the U.S. In response to this crisis, the Agricultural Youth Work Guidelines were developed, a set of 48 guidelines developed to be used by farm parents and youth supervisors to assign tasks to youth that match their physical and developmental capabilities. Educators are tasked with role modeling and guiding health and safety for youth. To help improve the reach of the guidelines while improving youth ag health and safety, this project aims to transform the Agricultural Youth Work Guidelines into a curriculum that agricultural educators will be able to easily incorporate into their already existing instruction.

Methods:

A multi-method needs assessment of Wisconsin Agricultural Educators was conducted to assess needs and recommendations for the development of agricultural health and safety curriculum. Seven focus groups were conducted with 13 Wisconsin 4-H and FFA educators to gauge feedback that helped inform the development and distribution of a survey which includes: topics taught, resources needed, motivators and barriers experienced, and feedback on the Agricultural Youth Work Guidelines. Survey recruitment is now completed, and data analysis is underway.

Results:

A total of 130 surveys were completed by 4-H and FFA educators. Preliminary results show 32.6% educators report always teaching the prevention of common agricultural injuries, 58.7% report always teaching use of PPE, and 25.5% report always teaching responding to emergencies. The most common topics educators reported definitely needing was: working with animals (42.5%), zoonosis (41.9%), chemical safety (41%), fishing safety (40%), food safety (40%), and tractor safety (40%). 32.8% of respondents indicated it is extremely or very important to have resources in different languages for teaching.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

A Framework in Establishing Partnerships with Tribal Agricultural Stakeholders

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Tuesday, June 18

11:20 a.m.

Galleria II

Purpose:

This project aims to address the existing gaps in research and partnership with Tribal Nations, specifically within agriculture. Historically, research methodologies have contributed to the erosion of trust among Tribal Nations due to exploitative practices. Despite the significant involvement of many Tribal Nations in agriculture, including farming and ranching, there is a scarcity of health and safety resources. Further, the availability of culturally relevant approaches to these needs are severely lacking. This project recognizes these challenges of limited partnerships and identifying specific needs of these underserved communities. The overarching goal of this Tribal outreach project is to navigate these complexities through an informed process that promotes trust, collaboration, and meaningful partnerships.

Methods:

Our framework evolved from a literature review of ethics, partnerships, and research within Tribal communities. We identified Fisher and Ball's (2003) Tribal Participatory Research model, prioritizing Tribal sovereignty and context. While this model primarily served research ends, we adapted it to a four-stage recursive framework for non-research institutions. Prioritizing contextualization, the stages include Tribal oversight, community liaisons, community-driven prioritization, and framing needs and solutions. Implementation involved identifying relationships, gaining Tribal Council approval for oversight, and engaging in meetings with Tribal agricultural stakeholders. Currently at the second stage, these interactions mark the initial phase of relationship-building we aim to nurture through the progression of this project.

Results:

As an ongoing project, it centers on Tribes within Colorado and intertribal organizations. The evolving outcomes include a growing network of agricultural stakeholders within Tribal territories and extension agents closely connected to these communities. Additionally, we have begun early communications with community leaders involved in training programs focused on cultural harvesting practices of bison. As this project advances, our commitment to building trust will remain a priority. In the next step, community liaisons will be identified to help conceptualize any needs within these communities. This collaborative process aims to pinpoint areas where our health and safety resources can be effectively employed to address the needs within Tribal agriculture.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Lung-Delivered IL-10 Therapy Beneficially Impacts Agriculture-Derived Organic Dust Exposure-Induced Lung Inflammation

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Tuesday, June 18

10:00 a.m.

Galleria III

Purpose:

With ~18% of central United States farmers having respiratory diseases, there exists an urgent need to understand disease mechanisms and identify therapies. Even an acute, high-dose exposure to farm-related organic dusts can have lasting effects. Therapeutic options capable of resolving inflammatory lung disease associated with agricultural exposures are lacking. Given interleukin (IL)-10 therapy has shown therapeutic benefit in endotoxin-induced lung inflammation, this study seeks to define the therapeutic potential of lung-delivered recombinant IL-10 therapy in an animal model of organic dust exposure. Following this presentation, participants will be able to describe the beneficial impact of lung-delivered IL-10 on dampening inflammation and hastening recovery following an acute, high-dose agriculture-related organic dust exposure.

Methods:

C57BL/6J mice were intratracheally instilled with swine confinement organic dust extract (ODE) concentrations (12.5%, 25%, 50%) with IL-10 (1 µg) treatment or PBS vehicle administered 3 times: 5-hours post-exposure, then daily for two days. Bronchoalveolar lavage fluid and lungs were collected at the experimental endpoint. Lung cytokine levels of TNF-α, IL-6, IL-10, and CXCL1/2 were quantitated by ELISA. Lung cell infiltrates and monocyte/macrophage immunophenotype characteristics, including phagocytic ability and reactive oxygen species (ROS), were investigated by flow cytometry. Statistical differences were determined with Student's t-test and ANOVA.

Results:

IL-10 treatment reduced 25% ODE-induced weight loss by 66% and 46% at day 1 and day 2 post-exposure, respectively. IL-10 treatment reduced 25% and 50% ODE-induced lung TNF-α (76%, 83% reduction respectively), IL-6 (60% reduction post-50% ODE), CXCL1 (51%, 60%), and CXCL2 (51%, 54%). IL-10 treatment also reduced 25% and 50% ODE-mediated lung neutrophil (49%, 70%) and transitional lung CD11c^{int}CD11b⁺ monocyte-derived macrophage (49%, 70%) recruitment. ODE exposure modulated several cell surface markers with IL-10 therapy downregulating markers associated with antigen presentation (i.e., MHC Class II, CD80, CD86) and skewing transitional CD11c^{int}CD11b⁺ monocyte-macrophages towards an anti-inflammatory phenotype (increased CD206, decreased Ly6C). IL-10 therapy did not affect ODE-enhanced phagocytic ability nor ROS production. ODE-induced lung pathology was reduced with IL-10 therapy.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Behaviors and Practices Involving Agricultural Chemicals of Young Farmers and Ranchers

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Tuesday, June 18 10:20 a.m. Galleria III

Purpose:

It is common practice for farmers to use agricultural chemicals, such as pesticides, to aid in their everyday occupational activities and increase crop yields and quality. While they can be useful, there are also worries about their risks to the environment and human health. There are strong regulations in place to reduce these risks, but there are still concerns with both long-term and short-term occupational exposures to these chemicals. There have been associations made between the exposure to pesticides and declines in mental health of applicators. Due to that, it is important for applicators to follow regulations and safety practices while using chemicals. This project is to analyze the practices of young adult farmers and ranchers while working with agricultural pesticides and the relationship with their mental health to guide future intervention strategies.

Methods:

Young adult agricultural workers enrolled in agricultural science courses across four post-secondary institutions in Iowa were invited to participate in an online survey. Participants reported their frequency of safety behaviors and practices around pesticides (1=never to 5=always). Young agricultural workers also responded to questions about social influences (peers, parents, and supervisors), global risk taking, and risk-taking orientation at work, and stress. Data was analyzed using SPSS. Means and frequencies were used to describe the population demographics and frequency of pesticide-related behaviors.

Results:

There was an even split between those who handled or applied chemicals or pesticides with 113 responses (46.5%) versus those who did not with 117 responses (48.1%). The most common practice or safety check was washing hands after working with pesticides (86.6%) and storing chemicals in their original package (84.8%). The least common practice was locking up chemicals or pesticides after use (32.1%). The emotional health of those who used chemicals was reported higher than those who did not with 96.3% versus 84.9%. The level of stress over the previous 12 months was even between the two groups. Individuals who used or handled agricultural chemicals also reported more injuries in their lifetimes versus those who did not with 35.5% versus 24.1%, respectively.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Development of Novel Compact Wind Tunnel for Testing Efficacy of Insecticide Formulated Products in Mosquitoes

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Tuesday, June 18 10:40 a.m. Galleria III

Purpose:

Ultra-low volume (ULV) space sprays aerosolize insecticide formulated products (FP) to contact flying mosquitoes, while barrier sprays expose mosquitoes to FP residue on vegetation and other surfaces. Centers for Disease Control and Prevention bottle bioassays used to assess insecticide resistance are based on residual active ingredient (AI) exposure and do not directly relate to FP efficacy.

Methods:

The current pilot study developed a novel compact wind tunnel for mosquito exposure to FP. Caged *Aedes albopictus* and *Culex pipiens/quinqüefasciatus* were exposed to undiluted Biomist®3 + 15 FP (permethrin AI) or air (control) within the wind tunnel, transferred to new cages, and held in a 28°C incubator. Separate mosquitoes were exposed to residual permethrin AI (8 µg/mL) in bottle bioassays. Mortality was monitored 15, 30, 60, and 120 min post-exposure.

Results:

Chi square tests ($P < 0.05$) showed significantly higher mortality in *Aedes* compared to *Culex* populations for most time points in both bioassay and wind tunnel exposure groups. As expected, mosquitoes exposed to Biomist®3 + 15 showed higher mortality rates than bottle bioassay exposure to permethrin. Two *Culex* colonies resistant to permethrin in bottle bioassays were susceptible to Biomist®3 + 15 in the wind tunnel.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Efforts to Establish Efficiency in the SFS Application Through Self-Directed Learning and Performance-Based Assessment

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Tuesday, June 18

11:00 a.m.

Galleria III

Purpose:

This study is part of the Safe Farm Steward (SFS) Project, which aims to bring awareness to and increase the current practice of farm safety across nine states in the Southeast U.S. Due to the high rate of farm equipment incidents annually, it is evident that increased safety awareness and practice is a current need for farm operations and employees across the United States. In this study, we evaluate the effectiveness of a three-day instructional training, created using principles of Self-Directed Learning Theory, to develop post-secondary faculty and extension agents' ability to accurately complete and prepare students to complete the SFS Application performance-based assessment (PBA). We will determine how well the training methods prepared participants to complete the SFS application PBA by determining the accuracy and agreement of their scores compared to the expected score.

Methods:

The SFS application is used to determine if farms maintain the safety features of their equipment and facilities based on visual observations by assigning each implement construct with a safety level of Good, Fair, or Replace. Upon training and practice with filling out the application, participants then had to individually complete an application at a farm for 10 implements that served as the PBA to determine how effective the training was. An Expected Core Evaluation Score (ECES) was determined by three farm implement experts, who assisted in facilitating the training, to compare participants' scores to. Percent agreement scores between the ECES and participant scores were then calculated for each construct and implement and for the overall farm score. Scholars determine that a score of 75% to 90% is considered an acceptable level of agreement (Hartmann, 1977; Stemler, 2004).

Results:

For the 10 selected farm implements in the PBA, six of the percent agreement scores were in the range of 75%-90%, while the other four were below 75%. The percent agreement of the constructs that fell below 75% on two or more implements were tires, hydraulic lines, lights/flashers, and Slow Moving Vehicle signs. For the overall PBA farm score, the percent agreement was at 77%. Overall, the percent agreement scores were moderate in acceptability, however, revealed gaps in where we can improve our training in preparing participants to fill out the SFS application and teach others to do the same.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Exploring the Factors Affecting Timely Swine Euthanasia: A Phenomenological Investigation Among Hispanic Caretakers in Iowa

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Tuesday, June 18

11:20 a.m.

Galleria III

Purpose:

This study aims to understand swine caretakers' perceptions, attitudes, and knowledge of euthanasia. Three specific objectives for this research were considered:

1. To understand the effects of euthanizing on Spanish-speaking swine caretakers.
2. To explore how caretakers' experiences affect performing euthanasia decision-making.
3. To understand how caretakers could feel more prepared to perform euthanasia.

Methods:

This study utilized a phenomenological case study approach. It focused on Hispanic caretakers in Iowa, exploring their perceptions of pig euthanasia through a social constructivist lens. The study employed purposive sampling, with the following criteria for the participant's selection: engagement with euthanasia, self-identification as Hispanic, and proficiency in discussing euthanasia-related challenges and opportunities. In total, 86 pig caretakers from 11 farms participated. Data were collected through semi-structured interviews in focus groups, researcher memos, and unobtrusive data. The following topics were covered: euthanasia knowledge, burnout, stress, satisfaction, and transgressions. Data triangulation involved matching interviews and memoing data with document analysis. Data analysis utilized open coding, pattern coding, and thematic grouping.

Results:

For objective one, the data revealed the themes of stress and burnout drivers. Stress drivers included the importance of swift euthanasia, the emotional toll from the inability to save pigs, and stress from productivity demands. Burnout drivers encompassed personnel shortages, increased workload, and inadequate facilities. Objective two revealed themes: "Euthanasia becomes easier with practice," emphasizing experience's role, "Knowledge and Education" on education and veterinary background, and "Cultural Background" on cultural influences. Objective three included themes: "Safety Concerns," addressing precautions; "Confidence," stressing trust in training; "Managing Emotions," acknowledging emotional complexities; and "Therapy," covering the need for emotional support. The study offers insights for enhancing pig caretakers' well-being and euthanasia practices.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Identifying Motivators and Barriers for Use of Voluntary Safety Guidelines - Behaviors and Mentality of Adults and Youth Related to Work Tasks for Youth

Peltier, Saucedo, Salzwedel, Swenson

National Children's Center for Rural and Agricultural Health and Safety

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Tuesday, June 18

10:00 a.m.

Parlor BC

Purpose:

Since 2009, more youth have died working in agriculture than in all other industries combined. It is well known that a prominent risk factor to these injuries and fatalities is youth performing agricultural tasks that do not match their developmental capabilities. In response to this crisis, the Agricultural Youth Work guidelines were developed, a set of 48 guidelines to be used by farm parents and youth agricultural supervisors to assess a youth's capabilities when assigning tasks on the farm. This study was conducted in an effort to better understand current motivators and barriers for use amongst farm parents and youth agricultural supervisors, aiming to improve dissemination and expand adoption of the Agricultural Youth Work Guidelines.

Methods:

Thirty-nine organizations who conduct outreach to agricultural communities were interviewed. Interviews were recorded and transcribed verbatim. A four-person project team conducted initial, axial, and thematic coding, using constant-comparative technique to refine and development themes. This presentation focuses on adult and youth behaviors and mindset related to work tasks for youth identified by the interviewed organizations.

Results:

Respondents discussed adult influence in several ways. These categories included: (1) in how they assigned tasks (based on interests, age, need, the adult's previous experiences, youth's previous experiences, and the abilities of the youth), (2) who within the youth's environment was making decisions regarding what tasks youth complete (e.g., mother, father, supervisor), (3) adult's mindset of child exceptionalism ("Oh, my kid is above average, they're way better than other 7-year old's. And they're really strong and tough, they'll be able to do it no problem." And then, maybe looking at what some of those requirements for the tasks a little more closely might make them stop and think about it. "You know, maybe they're not ready for this yet."), and (4) compliance with safety information or lack thereof (e.g., modeling safe behaviors like equipment checks). The influence of youth in safety was also mentioned by respondents, but with less frequency than adults. Categorizes pertaining to youth influence included: (1) social media influence ("I think social media also influences on how youth express themselves about things."), (2) peer pressure ("I've got a kid in a rural community, who grew up there and never worked on a farm but he – that's all he wants to do because he's gone to school with all these kids, and cowboys."), (3) external pressure ("The children that I'm talking about, those that are working to help families make ends meet. It's out of necessity that's driving them and there's opportunity for them to be able to sort of exploit that lack of oversight, to help their family to be able to put food on the table"), and (4) mentality (e.g., risk taking and impulsiveness).

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Fishermen Led Injury Prevention Program (FLIPP): An Approach for Commercial Fishing Safety Research in the Pacific Northwest

Kincl, Vaughan, Kim, Milkovich, Kasner

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laurel.kincl@oregonstate.edu

Tuesday, June 18

10:20 a.m.

Parlor BC

Purpose:

Commercial fishing is a dangerous occupation. This presentation will share how a research project first funded in 2014 to characterize injury patterns in the Pacific Northwest Dungeness crab fleet has evolved into the Fishermen Led Injury Prevention Program or FLIPP. Informed by fishermen, several commercial fishing safety and health projects have been completed or are ongoing with continued funding and engagement of fishermen. The objectives of this talk are to describe (1) the community engaged research approach with commercial fishermen and coastal communities, (2) an overview of multiple projects undertaken to promote and evaluate injury prevention strategies in commercial fishing, and (3) the approach (implementation and evaluation) in the current effort in the FLIPP for Lifejackets program.

Methods:

FLIPP selected community researchers (CRs) to join our project based on their knowledge and connection to the fishing industry. Fishermen shared insights on injuries and safety in focus groups, helping us create a survey. CRs surveyed fishermen along the West Coast just before the 2015-16 crab season. CRs then engaged fishermen in safety conversations with the results. Resource development and research/training projects followed this initial effort. For example, we conducted ergonomic evaluations of harvesting tasks that have been disseminated. The current project has collected fishermen's views related to use of lifejackets and their stage of behavior change related to lifejacket use. We are currently adapting an evidence-based intervention to build a region-specific program and plan to implement and evaluate the program and compare our adapted strategies.

Results:

Focus group results revealed a concern for safety, but reluctance for anything that would create additional safety regulations. We successfully surveyed 436 fishermen. The majority of limiting injuries (88%) occur with deckhands. The most common are sprains and strains (36%) and most are associated with handling, hauling, and setting gear (72%). Engagement with fishermen with the survey results provided an opportunity to develop targeted solutions. One solution studied is a "banger bar" to assist with emptying the crab pot. This ergonomic solution significantly reduced shoulder and back biomechanical stresses. Surveying fishermen and stakeholders about lifejackets for fishermen has informed a trial of lifejackets and planning of a social marketing intervention.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Project Mantengo, Part of AgSafe's Mental Wellness for Agriculture Initiative

Whalley, Mariscal

AgSafe BC

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Tuesday, June 18

10:40 a.m.

Parlor BC

Purpose:

Mantengo is part of AgSafe's Mental Wellness for Agriculture initiative.

Mantengo aims to educate, inform, and provide informational material for employees and employers in British Columbia about the challenges faced by guest workers and how those challenges affect overall mental wellness.

Mantengo is a series of inter-related videos and resources designed as a wellness package to support mental wellness and help improve the overall mental well-being of agricultural workers who have traveled from outside of Canada and are working in various agricultural sectors in B.C.

Methods:

A wellness / welcome package was provided to over 2000 Spanish speaking temporary foreign workers coming to British Columbia. Each kit consisted of a tote bag containing eight posters, earplugs, sleep / eye mask and links to a video library of resources to support total worker health. Topics of the videos and posters include nutrition, mental health / wellness, hydration, connections, sleep, and peer stories & testimonials. In addition, a song, and poem were written by AgSafe BC Consultant Rita Carrington.

These materials were provided free of charge to workers and farms by AgSafe BC.

All materials were produced in Spanish and English.

Results:

A survey was conducted with over 150 Spanish speaking, migrant workers from Mexico, Guatemala, Honduras, and El Salvador. Participating workers were in Canada working within the 'Temporary Foreign Workers Program'. This was to determine the efficacy of the materials in supporting total worker health. Pre and post surveys were conducted with the same group of workers to assess different aspects of mental wellness, healthy habits, exercise, nutrition and connections. The survey was conducted in Spanish.

The overall results showed that the Mantengo resources had a positive impact on the workers who were given the chance to review part, or all of the resources. In addition, the workers with the lowest scored responses in the first survey, showed the greatest improvement in all areas in the second survey.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

North Central Farm and Ranch Stress Assistance Center: Three Years of Partnerships, Impacts, and Reach

Rudolphi, Cuthbertson, Mott, Keller

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Tuesday, June 18

11:00 a.m.

Parlor BC

Purpose:

The 12-state north central region (NCR) includes some of the most agriculturally productive states in the U.S., with almost 40% of all US agricultural producers and over 300,000 farmworkers. Despite agricultural productivity, agricultural producers and workers in the NCR experience a myriad of occupational stressors associated with adverse mental health conditions. In acknowledgement of the unique stressors and mental health experience of agricultural producers, USDA funded four regional Farm and Ranch Stress Assistance Networks. The goal of the North Central Farm and Ranch Stress Assistance Center (NCFRSAC) program is to develop regional networks that connect agricultural community members with stress assistance programs. NCFRSAC has achieved success in offering mental health literacy programs in NCR agricultural communities.

Methods:

The NCFRSAC partnered with Cooperative Extension Services in all of the 12 region states as well as National AgrAbility Program, Progressive Agriculture Foundation, and the Central States Center for Agricultural Safety and Health to meet the mental health and stress management needs of the agricultural populations in the region. The NCFRSAC focused on delivering resources and services through the following: a) clearinghouse website, b) telephone helplines/hotlines, c) trainings programs for individuals engaged in agriculture and agricultural-related occupations, d) support groups, and e) professional services.

Results:

Between 2020 and 2023, the 15-partner NCFRSAC trained over 17,000 farmers in educational programming about stress and mental health and over 11,000 agricultural community members in evidence-based mental health trainings such as Mental Health First Aid, Youth Mental Health First Aid, and Q.P.R. The Iowa Concern Hotline at Iowa State University responded to over 14,000 calls from nine states in the NCR. NCFRSAC supported over 1,300 hours of professional behavioral health services via counseling and teletherapies and engaged almost 600 individuals in support groups.

CONCURRENT ORAL PRESENTATIONS: SESSION 2

Breaking Down Barriers: Providing Professional Behavioral Support to Farmers in Illinois

Hulshof, Cuthbertson, Rudolphi

University of Illinois Extension, University of Illinois Urbana-Champaign

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Tuesday, June 18

11:20 a.m.

Parlor BC

Purpose:

Illinois farmers experience barriers to mental health care. For many farmers, behavioral health services are not covered by their insurance plans and/or they are not interested in covering costs out-of-pocket. Farmers in rural areas often do not know where to go to find behavioral health professionals and often encounter long wait periods. Finally, farmers are skeptical of seeking care due to stigma or distrust in providers. In response, the University of Illinois Extension in partnership with the Illinois Department of Agriculture established a mental health voucher program that allows farmers and their families to seek help from a certified mental health professional at no cost.

Methods:

Illinois Extension contacted Illinois-based mental health professional organizations to recruit mental health providers. Interested providers completed a brief in-take form with basic information and services offered. All providers were required to be licensed in Illinois and carry insurance. In addition, all providers were encouraged to complete a 4-hour asynchronous course to increase their agricultural literacy ahead of providing services to farmers and farm families. While working with university resources, we also developed a website where agriculture producers could request a voucher and certified professionals could sign up as providers. To help the program launch smoothly, we created a press release kit. The kit had marketing materials, press releases, and basic information with media information.

Results:

Currently, there are 74 participating providers. Providers include social workers (MSW), licensed professional counselors (LPCs), and licensed clinical professional counselors (LPCPs). The 74 providers cover 32 counties in Illinois, however, most providers offer tele-services across the state. Since the voucher program launched in June 2023, over 50 individuals have requested vouchers. To date, 74 vouchers have been redeemed with partnering providers.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Applying Machine Learning to Predicting Injuries in Female Operators Based on Work, Exposures, and Health Variables

Beseler, Rautiainen

University of Nebraska Medical Center

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Tuesday, June 18

2:00 p.m.

Galleria 1

Purpose:

In 2022, the Bureau of Labor Statistics published a fatality rate of 18.6 deaths per 100,000 workers, making agriculture one of the most hazardous industries. Nonfatal injuries continue to be underreported due to small family farms not being included in farm census data. Although there have been numerous studies on causes of agricultural injuries, few studies have specifically examined agricultural injuries in female agricultural operators. In recent years, the number of female operators has been growing. Previous studies have found that males experience more injuries than females due to the division of labor and time spent doing farm work. In this study, we investigated whether a neural network could predict the characteristics of female operators who experienced a farmwork-related injury compared to those who did not report an injury.

Methods:

Data came from the Central States Center for Agricultural Safety and Health surveillance system. The neural network was trained using the 2018 data to predict injury and validated with the 2020 data. The neural network algorithm creates a linear combination of the feature matrix containing 15 farm and ranch characteristics including musculoskeletal discomfort, diagnosed respiratory disorder, diagnosed skin disorder, being on a farm or ranch, gross farm income, exposure to musculoskeletal strain, exposure to noise, percent time spent working on the operation, whether farming/ranching was the primary occupation, reported respiratory exposures, reported skin exposures, age, techniques to prevent musculoskeletal disorders, and work strain (any reported exhaustion, sleep deprivation, work stress). The error rate was computed, and variable importance was calculated using the Olden method.

Results:

In 2018, 53 of 598 women reported an injury (8.86%) and in 2020, 41 of 544 women reported an injury (7.54%). The neural network was able to correctly classify those who did or did not have an injury with 89.8% accuracy. The two principal factors in the classification of injury were having musculoskeletal discomfort and work strain. Previous work in these samples found that musculoskeletal discomfort was associated with work strain. The neural network showed that both strain and musculoskeletal discomfort were associated with a 2,000-fold increase in injury over all other farm characteristics. Despite the injury rate of less than 10% and sample sizes that were moderately small for machine learning methods, the model was stable across many replications and a range of different starting values. With new surveillance collected in 2023, the model can be further validated with a new sample of female operators.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Using Technology and Qualitative Tools for Transdisciplinary Research for Farmer Equity and Well-Being

Cook Marshall, Richardson

North Carolina A&T

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Tuesday, June 18

2:20 p.m.

Galleria I

Purpose:

Providing farmers with resilient technical, personal, and leadership practices to mitigate extreme weather can potentially reduce farmer anxiety and stress. The Multidisciplinary Extreme Weather Toolkit for Small-scale and BIPOC Farmers Research Team at NC A&T includes faculty in computer engineering, agricultural safety and health, leadership, counseling, regenerative soil science, and includes working with qualitative data as well as big data like that from NOA. This research aims to provide insight into the communication and interpersonal variables affecting farmer resilience and to pilot live trainings, and, machine learning mobile applications with natural language responsiveness to assist farmers with decisions affecting their farm practices, communities, and personal lives.

Methods:

The project uses three sample cohorts of farmers:

Cohort A: Live linear discipline cohort

Cohort B: Multidisciplinary cohort

Cohort C: Random sample mobile cohort

Cohort A and Cohort B will continue to be tracked to note mobile app engagement specific to their cohorts. Data from all three Cohorts will be analyzed for qualitative responses and insight. We will be sharing how the SAS Viya platform is assisting us with achieving and implementing robust transdisciplinary analysis, including interfacing with big public data as well as hyper-localized farm and farmer specific qualitative input, and, how our research model demonstrates a means forward for transdisciplinary teams across disparate disciplines.

Results:

TBD- our research is in process and we will have some preliminary qualitative results to share by summer 2024, and, demonstrate how we are interfacing these qualitative results with big public data to chart a course of machine learning/mobile application and live trainings.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Modeling the Role of Weather Patterns and Grain Quality on Rates the Number of Engulfments and Entrapments

Mosher, Derry, Beseler, Pizzaro

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Medical Center, Missouri State Southern University

gamosher@iastate.edu

Tuesday, June 18

2:40 p.m.

Galleria I

Purpose:

Purpose and objectives of presentation: Despite the clear hazard of out-of-condition grain, limited research has explored the role of specific indicators of grain condition and their impact on the rate of grain entrapments and engulfments. The primary aim of the project was to identify significant factors associated with the moisture of harvested corn and to analyze the relationship between these factors and the occurrence of engulfment and entrapments. Corn was the focus of the project because it has been the primary crop involved in document grain entrapments and engulfments. The secondary aim was to measure the relationship between selected weather factors and the moisture of commodity corn with on-farm and commercial entrapment and engulfment incidents in the U.S.

Methods:

Data sets including variables that have been documented to influence the quality of corn were drawn from public sources. These data from corn were examined across 14 states in the U.S. corn belt over five years. Using elastic net regression with a Poisson log link function and analysis of variance, along with a pairwise comparison using Tukey's method, significant predictive variables were identified and the mean number of events were predicted. All data analysis was completed with R version 4.2.2 using the GLM-net package.

Results:

Corn moisture was positively associated with year and state. The maximum high temperature and the relative humidity were also found to predict corn moisture. Significant predictors for the occurrence of engulfments and entrapments included year, state, and maximum relative humidity. Although the moisture of corn did not significantly predict grain engulfments and entrapments, the findings suggest that differences in the weather from state to state and year to year do impact the number of grain safety incidents.

Using Large Language Models to Automate Agricultural Injury Surveillance

Muller, Petti, Li, Gorucu, Pilz, Weichelt

University of Florida, National Children's Center for Rural and Agricultural Health and Safety

jacobmuller@ufl.edu

Tuesday, June 18 3:00 p.m. Galleria I

Purpose:

The purpose of the project was to explore the potential of integrating Large Language Models (LLMs) into the existing framework of AgInjuryNews (AIN), a platform dedicated to curating information about agricultural injuries from news articles and investigation reports. Traditionally, review for data curation is a manual and labor-intensive process that involves complex and repetitive workloads. The project aimed to address this by leveraging LLMs to automate analysis and report generation, measuring the accuracy, safety, and cost-effectiveness of various language models.

Methods:

The methods employed in this project involved the integration and testing of various Large Language Models (LLMs) to automate the tasks performed by human reviewers in AgInjuryNews (AIN). Multiple language models were assessed, including OpenAI's ChatGPT-3 and ChatGPT-4, the open-source Llama2, and a custom model fine-tuned for this experiment. To evaluate accuracy, each LLM was provided with prompts to extract relevant incident data from a set of randomly selected online news articles that were already cataloged by AIN reviewers. The prompts included criteria such as information about the use of drugs or alcohol, time of day, and details about the victim(s). This sample selection allowed for a comparison of accuracy between the LLM-generated results and manually processed data.

Results:

Preliminary findings indicate that ChatGPT is the most proficient among the tested Large Language Models (LLMs) for automating tasks within AgInjuryNews (AIN). The average data accuracy for ChatGPT-4 was reported at 90.5%, with certain categories showing accuracy within a 2% margin of error. The study acknowledged the trade-offs associated with different LLMs, noting that local models offered benefits such as greater data security, customization, and no API costs. However, they are limited by the power of user hardware. Despite none of the models achieving perfect accuracy, the methodology and results demonstrated the viability of the process. LLM integration could streamline workflows, reducing the demand of human resources and presenting stakeholders with more cost-effective and expedient information about agricultural injuries.

Data-Driven Modeling of Grain Entrapments for Increasing the Agricultural Safety

Yousefi

University of Illinois Urbana- Champaign

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Tuesday, June 18 3:20 p.m. Galleria I

Purpose:

The project was initiated in response to the alarming stagnation in injury rates within the U.S. agriculture industry, particularly concerning grain entrapment incidents. Despite substantial investments in training, engineering, and regulations, no improvement has been observed since the 1990s. This stands in stark contrast to other industries like transportation, construction, mining, and manufacturing, which have seen a significant average reduction of 50% in injury rates during the same period. The persistent issue of grain entrapment, resulting in at least 20 incidents per year since 2004, prompted the investigation into quantitative approaches to identify variables impacting these injury rates. The goal is to be able to predict human injuries in grain entrapment based on weather condition with the help of machine learning models.

Methods:

The research employed machine learning algorithms utilizing weather, grain production, and grain storage capacity data to predict grain entrapments. In addressing the research objective, three predictive machine learning models—gradient boosting, random forest, and linear regression—were developed. The three models were rigorously developed and evaluated to identify the most effective predictive approach.

Results:

Based on the weather data variables, correlation between weather condition during harvesting months and grain entrapment injuries in the following year was found. Among the models developed, gradient boosting demonstrated superior results on both the training and testing sets, achieving an accuracy of 99% on the training set and 92% on the test set. This suggests its efficacy in predicting the likelihood of grain entrapments.

Preparing the Food System for the Next Big Thing

Gibbins, Elliott, Lincoln

CDC/NIOSH

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Tuesday, June 18

3:40 p.m.

Galleria I

Purpose:

The impact on workers of the Coronavirus Disease 2019 (COVID-19) pandemic has been well documented and demonstrated the interdependence of all aspects of the food supply chain. Surging inflation and worldwide supply chain shortages have further stressed our food supply system. Conflict has also impacted the global food supply and the cost of shipping, fuel, and fertilizer. Future potential events, such as the introduction of a transboundary animal disease or act of agroterrorism require ongoing planning and preparation.

These events have highlighted the interconnectedness of the food supply system and vertical integration, especially in poultry and swine production. Current and future events have the potential to disrupt our economy and food supply and negatively impact the economic and mental health of workers in occupations involved in the food production system.

Methods:

We reviewed the scientific literature, state and federal agency websites, trade association materials, and publications from the agricultural and food processing industries. Our target audience is safety and health professionals who do research, outreach, and education for workers throughout the food supply system, from farm to fork and beyond.

This presentation will highlight recent initiatives within the Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH) to address safety and health in this critical worker population.

Results:

We found that the following events pose threats to the food system:

1. Disease outbreaks, both zoonotic and non-zoonotic.
2. Cyberattacks, both computer systems and emerging technology in precision agriculture.
3. Terrorism, to include agroterrorism and ecoterrorism.
4. Weather extremes and natural disasters.
5. Global conflict with economic sanctions and shipping disruptions.
6. Labor disruptions.
7. Food and water insecurity.

Recognizing and preparing for these threats is the responsibility of everyone involved in the production and distribution of food and livestock. This presentation will provide examples of current initiatives to address these concerns.

Working to address the many threats to the global food system as outlined here in a comprehensive One Health approach is critical to the economic, physical, and mental well-being for producers and workers.

A Review of the Principles of Culturally Responsive Evaluation and Recommendations for its Application to the Evaluation Work of the NIOSH Agricultural Centers

Joshi, Galindo, Lamino

University of Florida, Southern Coastal Center for Agricultural Health and Safety

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Tuesday, June 18

2:00 p.m.

Galleria II

Purpose:

The agricultural centers funded by the National Institute for Occupational Safety and Health (NIOSH) engage in research, surveillance, and outreach of multidisciplinary issues relating to workplace safety for agricultural workers, fishers, and foresters. The socio-demographic characteristics of the beneficiaries of NIOSH Ag Centers are broad including youth, women, pregnant women, elderly, disabled, non-English speaking immigrant population, rural residents, and others. Evaluating the effectiveness of programs targeting such diverse and vulnerable populations requires the use of sensitive lenses to account for the subjective cultural factors that might affect the implementation of project activities and its outcomes. This desk research reviews the principles of culturally responsive evaluation (CRE) and provides practical recommendations for applying CRE in NIOSH Ag Centers' evaluations.

Methods:

Data for this study were collected through the review of journal articles, reports, and white papers found through Google and Google Scholar. The keywords used for the search were 'culturally responsive evaluation', and 'culturally responsive evaluation in NIOSH'. The relevant literature found in search engines using these keywords were gleaned and descriptive coding was done in NVivo to identify principles of culturally responsive evaluation. Recommendations for application are grounded on the identified principles and informed by the experience of the authors evaluating a NIOSH Ag Center.

Results:

No evaluation is culture-free; the biases of program evaluators seep into the evaluation design and methodological processes, causing them to overlook cultural factors affecting program implementation and outcomes. Following CRE principles help to reduce such biases. Developing cultural competence through self-reflection, increasing cultural awareness, spending time with the target community; avoiding ethnocentrism; forming diverse evaluation teams with individuals having similar shared lived experiences as stakeholders; following participatory approaches to include both internal and external stakeholders throughout the evaluation process; adapting evaluation methodologies according to the cultural context; employing strength perspectives; and striving for social justice are some of the key principles of CRE.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Digital Dissemination of Tools to Manage Heat Illness Risk in Agricultural Workers

Pennington, Porter, Valdiviezo-Perez

Colorado State University

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Tuesday, June 18

2:20 p.m.

Galleria II

Purpose:

In 2022, the state of Colorado enacted rules that require agricultural businesses to implement heat illness prevention programs and training for their employees. University-based and Extension professionals from Colorado State University adapted existing training scripts and visual aids, from California in both English and Spanish, to be compliant with the Colorado rules. In spring 2023, a digital campaign was developed to disseminate these training materials to agricultural employers in Colorado and the surrounding region. The campaign goals were to drive visitors to the campaign website (leads), generate user downloads of heat illness training materials (conversions), and target those leads and conversions (users) from a six-state region of the United States: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming.

Methods:

In April 2023, a conversation was held with key stakeholders to solicit input on the initial campaign strategy. Following this discussion, the key audience was defined as farm owners, managers, and crew leaders, which included both English and Spanish speakers. In early May, a campaign landing page was developed to showcase the heat illness prevention training materials and corresponding advertising images were created. Paid social media ads were placed on Facebook and LinkedIn in late May and early June. Additional organic (non-paid) campaign efforts included organic social media posts, distribution via electronic newsletter, and in-person outreach at farmworker town hall events. All activities drove traffic to the campaign website, in English or Spanish. Urchin Tracking Module (UTM) codes were used to match website visits with campaign source.

Results:

The small investment (<\$250) in paid advertising resulted in 17,000 ad impressions and 201 website visits, but only one user downloaded any resources. Moreover, only 21% of users were located within the target region. By contrast, the non-paid campaign efforts resulted in 76 website visits with 7 users downloading resources. The paid campaign did generate leads, but it did not result in conversions, and users' location was not consistent with paid geographic targeting. Potential contributors to limited conversion include poor website design, users' unfamiliarity with the information source, inappropriate timing, or lack of capacity to effectively use the materials.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Cultivating Connections: A Blueprint for Hosting State of the Science Meetings in Your Region

McLeod-Morin, Irani, Telg, Lindsey, Lundy

University of Florida, Southern Coastal Center for Agricultural Health and Safety

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Tuesday, June 18

2:40 p.m.

Galleria II

Purpose:

The Southeastern Coastal Center for Agricultural Health and Safety began hosting State of the Science meetings in 2018 and soon became a hallmark event leading the center's mission of research to practice. State of the Science meetings brings together interdisciplinary scientists to explore questions and innovations related to agricultural health and safety topics. After hosting six SOS meetings that garnered nearly 800 attendees, our Center wants to share our formula and how these events can support collaborations in your region.

Methods:

SCCAHS State of the Science meetings bring together scientists from multiple disciplines with high-level community and commodity stakeholders as attendees to hear from speakers representing science, policy, and Extension. Each meeting focuses on a specific agricultural health and safety topic, with past examples including heat stress, mental health, and zoonotic diseases. The focus area is determined by public opinion research results from stakeholders and input from the center's Community Stakeholder Advisory Board. Evaluation data is collected from event attendees and results are applied during future events to ensure the meeting addresses the needs of attendees.

Results:

Attendees have reported high satisfaction in State of the Science content and speakers. Attendees also reported reasons for attending the event, which primarily included interest in the topic and desire to build collaborations. Attendees have reported developing collaborations as a result of their attendance that has led to collaborative publications and grant submissions. The State of the Science meetings have also resulted in award-winning media content including white papers, webinars, and infographics.

Mobile Plan Safety: A Systems Exploration to Reduce Fatalities and Serious Injuries Associated with Agricultural Mobile Plant

Franklin, Mason, Casey

James Cook University, Australia, WorkScience

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Tuesday, June 18

2:00 p.m.

Galleria III

Purpose:

Agriculture is one of the most dangerous industries in which to work in Australia, accounting for a disproportionately high number of fatalities and serious injuries every year. Mobile plant, and especially tractors, are responsible for a significant (and often the highest) proportion of these incidents, particularly deaths. There is a need to know more about how and why mobile plant incidents occur. Mobile plant is defined as any plant that is provided with some form of self-propulsion that is ordinarily under the direct control of an operator and typically not used on a public road. The aims of the project were:

1. Understand how to foster improved safety behaviour around mobile plant on farms.
2. Identify changes in attitudes, behaviours, practices, and systems to enhance safety.
3. Identify options for engaging farmers that could be used by associations and other organisations.

Methods:

This program of research, involved a scoping review; interviews, and a CATI survey of farmers. The scoping review used 6 databases: Scopus, CINAHL, Medline, Emtree, PsychInfo, and Web of Science. Literature published in the English language from 2000-2020 was included. Reviews, unpublished literature, and letters to the editor were excluded. Key search terms included “agriculture”, “farm”, “safety”, “risk”, “death”, “injury”, and “mobile plant machinery”, and were slightly modified to suit each database. Interviews with 54 key stakeholder across a range of industries were recruited and thematically analysed. An initial batch of 185 survey responses was obtained. An additional 45 cotton commodity group respondents were obtained in a follow-up data collection process. Both samples were collected using computer-assisted telephone interviewing (CATI) methodology. These were analysed in SPSS.

Results:

From the scoping review of 36 papers: tractors were the most common type of mobile plant/machinery investigated (27, 75.0%), followed by augers (5, 13.9%). Cross-sectional quantitative research (including analysis of archival survey and incident data) was the most common study type (24, 58.4%), followed by qualitative descriptive studies that involved interviews and/or focus groups (10, 24.4%). Considerable gaps in knowledge regarding the risks exist.

From the interviews of 54 stakeholders and the 185 survey responses: The synthesis of findings are encompassed by 3 themes: Individual factors that drive behaviour are complex and should be considered together rather than in isolation; The importance of a systematic and lifecycle approach to mobile plant safety management; and Mobile plant operating behaviours are shaped by individual, organisational, and societal factors – a systems view.

Safety Culture of Utah Livestock Producers

Pate, Lawver, Rood, Salter, Decker, Clawson, Taylor, Longmore

Utah State University

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Tuesday, June 18

2:20 p.m.

Galleria III

Purpose:

Livestock handling injuries represent a significant injury burden in agriculture to farmers and their families. This burden has been magnified among Utah livestock producers with recent wildfire events as ranchers quickly respond to re-locate their livestock during an emergency. This ongoing project sought to identify Utah Farmers and Ranchers' safety culture related to livestock handling.

Methods:

The project intervention utilized partnerships with key influential community organizations to promote a socio-ecological perspective for adopting safety interventions among Utah Livestock producers. This producers who produced beef, sheep, and dairy. This integration of safety training occurred at various community programming and contextualized safety in the form of emergency preparedness. Participants were surveyed after the interventions to identify perceived safety culture. Additional questions were used to collect safety knowledge and practices in order to assess programming impact.

Results:

Participants' average age was range was 29 (SD = 9.6). Most individuals (57%) agreed that people in charge of their work group were committed to improving safety. Only one participant indicated they disagreed that safety issues were openly discussed between people in charge and those they worked with. After the intervention session, 80% of the participants correctly identified two general safety rules when working with livestock.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Influences on Livestock Safety Behaviors Among Young Agricultural Workers

Barnett, Rudolphi

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Tuesday, June 18

2:40 p.m.

Galleria III

Purpose:

Young adult agricultural workers in livestock management face unique challenges, balancing productivity, personal safety, and animal welfare. There's a notable gap in understanding the factors influencing their safety behaviors. This project explores how these workers engage with animals, focusing on safety and best practices. It examines the impact of supervision, peer influence, and family guidance, considering age and gender. This research is key for improving worker and animal welfare, and farm productivity. The objectives are to characterize livestock handling practices and understand the factors affecting young workers' safety behaviors.

Methods:

Young adult agricultural workers from four Iowa post-secondary institutions, enrolled in agricultural science courses, were recruited for an online survey. They rated their safety practices in livestock operations on a five-point Likert scale, from 'never' to 'always', across seven items. The survey also included questions on social influences (peers, parents, supervisors), global risk-taking, and work-related risk orientation. Data analysis was conducted using Stata, focusing on population demographics through means and frequencies. A livestock safety score, ranging from 1 to 5, was derived by averaging responses to the seven handling items for each participant. A multiple regression analysis explored the relationship between livestock safety practices and social influences, adjusting for gender and age differences.

Results:

Most participants identified as male (71.7%), white (99.5%), and aged 18-19 (36.2%). 95.19% of participants stated that they were full-time students and 71.1% reported having lived and worked on a family farm up until the age of 18. 177 of the students reported working with livestock. When asked about their animal handling practices, 55.1% of young adult agricultural workers reported rarely avoiding making loud noises or using machinery around animals and 47.5% reported rarely using PPE. The mean livestock safety score among participants was 3.78. The average livestock safety score was higher among women (4.02) compared to men (3.67). Regression analysis identified gender and supervisor influence as significant predictors of livestock safety scores. Female gender was associated with higher safety scores ($\beta = 0.2895$, $p = 0.028$), as was higher supervisor influence ($\beta = 0.1998$, $p = 0.037$).

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Mitigating Tick-Borne Disease Risk in Agricultural Workers in Southern Vermont

Roome, Zenir, Sheehan-Yassin, Gertz, Sorenson

Northeast Center for Occupational Health and Safety
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Tuesday, June 18

3:00 p.m.

Galleria III

Purpose:

Vermont has the highest incidence rate of both Lyme and anaplasmosis in the United States, both of which can cause severe illness in humans. Farmers and farmworkers are at an increased risk of exposure to ticks and tick-borne diseases due to the nature of their work. Little research has been done with farmers and farmworkers on ticks and tick-borne diseases in the Northeastern United States in recent years. Effective prevention methods that are utilized by farmers need to be identified to mitigate their risk of exposure.

Methods:

A two-year randomized control trial is being conducted to test the effectiveness of TheraCell Tick Control Tubes on dairy and livestock farms in Southern Vermont on both tick density, and reported tick encounters with humans. Tick Control Tubes were developed for residential properties, and have been shown to be very effective in decreasing tick populations. The tubes are filled with permethrin-treated cotton (an acaricide which kills ticks). Mice (the primary reservoir for Lyme and anaplasmosis) will take the cotton for nesting material, thereby killing ticks that may be on them. This study is focused on key areas in agricultural properties where rodent activity is expected, such as barns and farm houses, and areas where farmers and workers spend much of their time.

Results:

The first year of the study has been completed, and the second year will begin in April of 2024. Forty-six farms have enrolled in the study in Rutland, Bennington, Orange, Windsor and Windham Counties. Over 800 tick tubes have been placed at the enrolled farms. Farmer follow ups (every two weeks) to report tick encounters have had over a 90% response rate. Most tick encounters were reported during fence repair in the spring, and somewhat lower in the summer.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Elucidating the Relationship Between Years of Experience, Skill Level, and Safety for Livestock Workers

Woiwode

*University of Nebraska
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Tuesday, June 18

3:20 p.m.

Galleria III

Purpose:

A small percentage of the US workforce is employed in agriculture, and jobs including livestock handling represent a subset of this population, for which limited resources are available. Working with livestock is a high-risk occupation and injuries sustained from accidents involving livestock can be significant and even result in loss of life. Efforts to reduce injury have included safety training and increased use of personal protective equipment. Currently, livestock workers self-report years of experience as a proxy for skill level. The factors that contribute to skill level are complex and not well quantified, and years of experience provides limited insight into risk level for livestock work-related injuries. The objective of this pilot was to develop a tool to assess livestock worker skill level, and to compare self-reported years of experience with an expert-scored assessment.

Methods:

In consultation with a panel of experts, ten tasks were identified which were determined to be representative of a core skill set used by livestock workers across sectors of the cattle industry. The skill assessment tool (SAT) was used to evaluate participants of various experiential backgrounds and self-reported experience levels. A standard pattern including markers associated with tasks was set.

Participants were randomly assigned to groups of three cattle, and were evaluated on animal safety, handler safety, accuracy, affect, effect, use of time, space, and equipment, energy expenditure, and the amount of assistance required or used to accomplish ten tasks on a standard pattern. An assessment was conducted as a pre-assessment, followed by a classroom-based training intervention, and a final post-assessment to determine if changes could be measured due to training intervention.

Results:

In preliminary tests, the tool was sensitive enough to detect differences in skill level between participants. Differences were observed in walking speed, use of voice or noise, and arm movement by participants. Response times varied between participants, with some anticipating cattle movement and others reacting. Initial pre-and-post assessment comparisons showed small differences, and a complete analysis is in process.

Experienced participants reported receiving benefit from the classroom style training, indicating that they were reminded of important principles of cattle behavior and handling principles that they had forgotten. Other feedback included a recognition of how important understanding the limitations of cattle vision was to handler and animal safety and effectively working with cattle.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Simulated Farm Emergency Response Program: Decreasing Cattle-Related Trauma Among Farm Families

Allen, Compton, Button, Penney

*Saint Anthony College of Nursing
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Tuesday, June 18

3:40 p.m.

Galleria III

Purpose:

Cattle-related injuries are often under reported, which delays treatment. Obstacles to preventing farm injuries are not prioritizing safety, limited information about cattle-related injuries and effective injury prevention programs.

The aim of this pilot study is to determine the feasibility of developing a hands-on, simulated curriculum that increases farm family's ability to provide first aid as well as change behaviors and beliefs when handling/caring for cattle.

The objectives of the project were:

- Identify an effective education resource with a culturally sensitive message to influence safety knowledge, attitudes, and behavior practices when handling livestock.
- Increase farm family's ability to respond to a severe musculoskeletal injury requiring medical intervention.
- Determine current cattle management practices.
- Discover barriers to cattle handling practices

Methods:

A convenience sample of farm families in rural Ogle County, Northern Illinois who have a child 12-17 years of age enrolled in 4-H beef cattle project were recruited. The simulation experience was conducted on the family farm. In the pre-survey, participants self-reported their history of cattle-related injuries and barriers to safe practices. During the simulation, while providing first aid, family teams were evaluated on five categories: general safety, assessment, management/intervention, problem identification, and calling 911. The post-survey assessed potential for behavior change, engagement in safety practices, and changes needed to current safety practices. Qualitative data was collected by three questions during the simulation debriefing to measure each participant's belief/attitude toward overall response toward delivering care to the injured.

Results:

Most participants (76%) had at least three injuries caused by direct (58%) or indirect (42%) trauma. Most (82%) participants think safety practices are easy to adopt, however, (23%) are not engaged in safety practices. After the simulation, participants identified the need for first aid supplies (100%), importance of remaining calm and communicate (93%), and were confident with performing first aid (86%). However, barriers to engagement in safety practices did not align with beliefs about safe practice.

Most reported injuries (42%) occurred when using gates/doors and (16%) performing medical tasks. Injuries reported related to 4-H project occurred when (26%) training show cattle and (16%) grooming show cattle. Children ages 12-18 (42%) reported injuries related to grooming and/or training their 4-H project and 16% of those injuries required first aid.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

Development of an Intergroup Dialogue Curriculum for Faith Leaders and Behavioral Health Providers to Improve Agricultural Mental Health Systems

Keeney, Valley

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Tuesday, June 18

2:00 p.m.

Parlor BC

Purpose:

Collaborations between faith leaders and behavioral health providers could expand rural behavioral health care systems. Unfortunately, these groups may be reluctant to collaborate, and there is little guidance on effectively bringing groups together with common goals but holding conflicting or counterproductive beliefs about each other's roles in addressing rural mental health. Intergroup dialogue is an evidence-based technique to increase communication processes and bridge differences. Therefore, we developed an intergroup dialogue curriculum for use in rural communities to improve and increase collaboration among trusted faith leaders, behavioral health providers, and extension agents to expand behavioral health services.

Methods:

Using the National Institute for Mental Health (NIMH) levels of intervention as articulated in the Clergy Outreach and Professional Engagement (COPE) model, we developed an intergroup dialogue curriculum by interviewing content experts representing faith leaders, behavioral health providers, extension agents, COPE framework, and intergroup dialogue facilitator perspectives.

Results:

A four-session, 8-hour intergroup dialogue curriculum was developed to create new levels of understanding, relating, and action between faith leaders and behavioral health providers. The curriculum's modules focus on:

1. Cultivating trust and sharing experiences.
2. Honoring differences and finding common ground.
3. Building bridges and fostering connections.
4. Mapping resources and taking action together.

We will discuss the facilitators and barriers to piloting the curriculum in rural counties in Colorado, Wyoming, and Nebraska.

CONCURRENT ORAL PRESENTATIONS: SESSION 3

A Community-Engaged Approach to Prevent Sexual Harassment in Agriculture

Drury, Early, Torres, Reyez-Páz, Breckwich Vásquez

*Pacific Northwest Agricultural Safety and Health Center
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Tuesday, June 18

2:20 p.m.

Parlor BC

Purpose:

Sexual harassment is a workplace hazard that threatens the health, safety and livelihood of agricultural workers and their communities. This presentation will discuss the academic-community collaboration to understand the needs and develop the ¡Basta! Prevent Sexual Harassment in Agriculture toolkit. During the presentation, participants will learn about the work conducted over the course of a decade to understand the issue, raise awareness, and develop and evaluate training tools using a community-engaged approach with Latino agricultural workers and agricultural stakeholders in Washington and Oregon. This session will also provide an overview on how the ¡Basta! toolkit and resources can be used for training in agricultural workplaces in different communities.

Methods:

This effort began by conducting focus groups with Spanish-speaking farmworkers and supervisors to hear their experiences and understand nature of the problem. An awareness campaign was developed to bring awareness to the issue and invite stakeholders to come together in preventing sexual harassment in agriculture. The BASTA Coalition was launched to bring together researchers, farmworkers, growers, and advocates together to develop training tailored to the needs of the agricultural industry, and culturally-relevant for Spanish-speaking agricultural workers. The training draws from the stories and experiences of workers and includes guidance from growers and advocates championing sexual harassment prevention. A formative evaluation of the training program with 129 workers, supervisors, and growers.

Results:

The evaluation used a cross-sectional pre-post test design to test the effectiveness of the training. Overall, the ¡Basta! training was effective at improving agricultural workers' sexual harassment knowledge, attitudes, and self-efficacy to report, and bystander intervention. Linear regression was performed to determine which participant characteristics were most closely associated with improvements in test scores, adjusting for variables such as job, gender, and language. Knowledge test scores for all participants significantly improved between pre and post-tests (p -value < 0.05 | 95% CI: -6.95, -2.64). Speaking-Spanish was the variable most closely associated with improvements in test scores. No significant differences in gender or job were observed. After the training, 14% more participants reported self-efficacy to intervene if they observed harassment.

CONCURRENT ORAL PRESENTATIONS: SESSION 3
“The source of all my joy and all my stress”: Uncovering Underappreciated Sources of Stress that Affect Farm Women

Budge, Becot, Inwood

The Ohio State University, Pennsylvania State University
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Tuesday, June 18 2:40 p.m. Parlor BC

Purpose:

The mental health and wellbeing of farmers is known to be poor, partly due to volatile economic markets and unpredictable weather conditions. Historically, research regarding mental health challenges has focused on male farmers, with less attention on farm women’s mental wellbeing. However, recent findings from large-scale surveys in multiple countries indicate that farm women report higher levels of stress and anxiety than farm men. These findings have triggered calls to understand the unique sources of stress that farm women might be facing. In this presentation, we will focus on the emotional consequences stemming from the expectations of juggling childcare responsibilities, farm work and managing the household whilst keeping children safe. We also seek to understand how these emotional consequences change as children age.

Methods:

The data were collected via focus groups and photovoice activity with respectively 67 and 33 farm women from Ohio, Wisconsin and Vermont. We used an iterative approach to coding which included both a deductive and inductive approach. We analyzed the data using content thematic analysis.

Results:

There were several key findings which stemmed from our analysis. Even if we did not ask directly about mental health challenges, the words ‘depression’, ‘post-partum depression’, ‘anxiety’ and ‘stress’ were mentioned in all of the focus groups. The triple burden associated with women’s responsibility to child, home, farm, and off-farm work was a major source of stress and participants pointed to lack of help as heightening their challenges. Existing literature tends to depict farmers as needing to be educated so that they become aware of dangers to the children, however respondents in our study were well aware of the dangers. The constant fear that the children could get hurt created a constant worry, yet they often felt that they had no choice but to bring the children to the worksite due to lack of childcare support.

CONCURRENT ORAL PRESENTATIONS: SESSION 4
Primer on Safety and Health in Forestry: US and Oregon

Garland

*Safety Pacific Northwest Agricultural Safety and Health Center,
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Wednesday, June 19 10:00 a.m. Galleria I

Purpose:

Furthermore, there are distinct regional differences in forestry across the US with differing historical, cultural, and demographic trajectories. The various players in forestry’s safety and health arenas of regulations, education, workforce, and research communities are likewise regionally distinct. Selected statistics are reviewed and compared. Brief comments on international forestry safety and health connections are provided.

Methods:

Fundamental Knowledge of Forestry Sector Useful for Safety and Health Researchers Statistics from National, International and Oregon Statistics.

Results:

Oregon’s unique forestry situation is compared to the US overall and some regions for safety and health structures and institutions. Some Oregon “Firsts” include: First Forest Practices Act in 1973; First ranked Forestry College; First to include forestry services safety regulations; and Nations top producer of softwood lumber.

Assessment of Timber Faller Working Conditions in Mixed Hand and Tethered-Machine Cut Harvest Units on Steep Slopes- A Case Study in Western Oregon

Belart, Pokharel, Chung, Morrisette

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Wednesday, June 19 10:20 a.m. Galleria I

Purpose:

Adoption of tethered-assist harvester technology on steep terrain by the forest industry has decreased workplace accidents. However, there are portions of harvest units that remain inaccessible to mechanized falling, therefore requiring manual falling as well. We hypothesized that in contrast to the traditional manual falling only operations on steep slopes, the use of mechanized harvesting on steep slopes in combination with manual falling would result in manual fallers having to work in more difficult and challenging terrain for more of their work hours. The rationale for this study is based on the concerns voiced by loggers and industry professionals reported in Naillon (2017), where the author documented interviews of timber falling company owners and reported their perspectives on the safety aspects of tether-assist mechanized operations.

Methods:

We collected field data including ground and forest characteristics (ie. slope, tree size, hazard trees) in three unharvested (named "new") forest units and six harvested (named "previous") forest units that were harvested or were going to be harvested with mixed mechanized-hand felling methods, and then tested for differences between the two methods. In addition, we collected surveys and an interview to determine whether our field findings were similar to the workers/manager perspective.

Results:

In both new and previous harvest units, slope was the only significant predictor of the falling methods.

-Our results show that the average slope of the hand felled areas in the new harvest units was 46% (25°), which is a 14% (8°) greater than the average slope of the machine-felled areas. If the unit had been felled only by hand, the average slope for hand falling would have been only 39% (21°).

-Similarly, the data from the previous harvest units show that hand fallers worked in areas that are 30% (17°) steeper on average than the machine-felled areas. Timber fallers had to spend 63% of their work hours on slopes greater than 50%, compared to only 40% of their time if the units were hand felled only.

-Our findings from the field data are generally confirmed by the hand faller survey results.

Listening to the Forestry and Timber Harvesting Workforce

Haskins, Stoltzfus

AgriSafe

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Wednesday, June 19 10:40 a.m. Galleria I

Purpose:

It is common knowledge that the workforce that manages and harvests timber faces significant safety and health hazards. The forestry and timber harvesting workers are subject to regulatory training and educational content targeting safety. Expectations and requirements of safety trainings can vary by work role, state, region, or liability requirements. Looking at the occupational safety and health concerns through the eyes of workers can aid public health professionals in identifying what causes workers concern and worry. While mental health awareness in agriculture has become more common, engaging timber and forestry organizations these conversations and activities remain challenging. The project objective was to interview workers in the forestry and logging workforce to gain an understanding of the perceived threats to health and safety.

Methods:

The project team developed ten interview questions. An additional review of the questions was provided by a key forestry health and safety partner. The project lead consulted with NORA council members to identify helpful partnerships and effective interview strategies for this workforce. After obtaining IRB approval, the project lead reached out to partners in the Southern, Northeast, and Northwest regions of the US. Subject recruitment occurred through a combination of a large logging event, direct communication through trusted partners, personal contacts, and snowballing. Twenty-eight subjects were recruited. Interviews were completed over the course of eight months. Twenty-one interviews were in-person and seven were by phone. Demographics and question responses were reviewed independently followed by a team discussion for consensus on topic frequencies and themes.

Results:

Subjects were recruited from three United States regions. Of the twenty-eight subjects, most were in a supervisory or owner role. Question analysis revealed subjects answered questions from both their perceptions of the impact on workers they supervise and themselves personally. Answers reflected regional commonalities and differences regarding safety and health work risks. Personal issues of subjects mostly revolved around themes of financial stress, liability risks, and work/life balance. Supervisors linked the challenges they faced in maintaining a skilled workforce to the lifestyle choices of crew members. Subjects identified types of training and education needed for this workforce were in general health, personal well being/mental health with less emphasis on safety topics.

CONCURRENT ORAL PRESENTATIONS: SESSION 4

Hidden Hands: Safety and Health of Latino Immigrant Forestry Services Workers in the Pacific Northwest

Harrington, deCastro, Wilmsen

PNASH Center, University of Washington, Northwest Forest

Worker Center

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Wednesday, June 19

11:00 a.m.

Galleria I

Purpose:

The forest service workforce in the Pacific Northwest is largely immigrant, low-literate, and Spanish-speaking with unique vulnerabilities due to a lack of skills and safety training, occupational immobility, remote work locations, and small contractor employment. These workers, distinct from the logging workforce, do the remote reforestation, rehabilitation and forest thinning/cutting, and all the other tasks necessary intending America's forests. Job-related injury and illness rates among these workers are two to three times the rates of the average US worker, and fatality rates are nine times as high.

Methods:

Using a participatory model and mixed-methods study design, this project characterized working conditions, injury and illness experiences, safety mitigation efforts, employer retaliation, medical treatment, and recovery/return-to-work among this workforce. Data collection involved worksite observations, employer and worker surveys, and in-depth case study interviews.

Results:

This study provides a detailed assessment of the job tasks and working conditions experienced by forestry services workers. Workers reported broken bones, chainsaw lacerations, back pain, heat and pesticide illnesses, and other occupational injuries. One-third of the cases fell into a Systems Functional category in which they reported their injuries to their supervisors and received medical treatment and workers' compensation benefits. The remaining two-thirds experienced System Failures with difficulties in receiving medical treatment and/or workers' compensation benefits, employer direction to not report, being fired, or seeking alternative home remedies.

Our research also identified two major injury prevention and injury recovery themes: 1) a need to address pervasive reports by workers of supervisory attitudes and abusive behaviors detrimental to workplace safety, and 2) that production pressures are a primary contributor to non-compliance with safety protocols.

CONCURRENT ORAL PRESENTATIONS: SESSION 4

Interim Results of a Co-Designed Gamified Farm Injury Prevention Online Educational Resource for Adolescents

Peden, Franklin

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Wednesday, June 19

11:20 a.m.

Galleria I

Purpose:

Globally, agriculture is one of the most dangerous industries; likely to be exacerbated with climate change and evolving farming practices. Adolescents are a neglected group in farm injury prevention, facing injury risk from both recreational and work-related activities. Additionally, in Australia, one-third of all injury incidents involve visitors to the farm. Thus, a systems approach in which education is provided to the broader population at-risk is required, such as educational efforts linked to the school system. This presentation will describe the method and lessons learned in a co-design process undertaken with rural dwelling adolescents at agricultural high schools to develop a freely available online gamified farm injury prevention education resource that educates players on hazards and risks, risk mitigation and injury outcomes across vehicles, workshop, paddock and water.

Methods:

A literature review and curriculum mapping exercise informed semi-structured focus group discussions with students (~12-14 years of age) and one-on-one interviews with teachers from 3 agricultural high schools across regional locations in two Australian states. Student discussions focused on experiences of farm injury to self and broader community, farm injury risk factors, current education, and preference for future education on this topic. Teacher interviews focused on feasibility and acceptability of the resource in-classroom. Game design gives students instant feedback as they delve into farm safety scenarios, cultivating active learning while retaining autonomy. Pre and post surveys with the same students assessed acceptability of the game's courses on vehicle, workshop, paddock and water safety, as well as self-reported knowledge change.

Results:

Calm Your Farm is freely available online at www.calmfarm.education. Focus groups indicated a sense of inevitability around farm injury. Students indicated some farm safety education was provided but the content, and in particular the mode of delivery (reading with multiple choice quiz questions) was not engaging; with a preference for learning via interactive game play. Teachers highlighted the need for supportive lessons plans which clearly linked to curriculum. Significant ($p < 0.05$) improvements in self-reported knowledge post play were seen among boys for the water safety course (63% said knowledge improved) and among 13-year-olds for vehicles (35%) and workshop safety (50%). Sixty-one percent of respondents ($n=40$) agreed that 'Calm Your Farm' taught them more about farm safety and was more fun than other farm safety education previously received.

CONCURRENT ORAL PRESENTATIONS: SESSION 4
Safety Zone: Introducing a New Delivery Mode Aimed at Providing Youth Farm Safety and Health Education to Rural Communities Throughout North America

Davidson, Kuhl

Progressive Agriculture Foundation

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Wednesday, June 19 11:00 a.m. Galleria II

Purpose:

According to data from the National Children's Center for Rural and Agricultural Health and Safety (NCCRAHS), statistics reveal about every 3 days a child dies due to an agriculture-related incident, while every day around 33 children are injured in these incidents. From animals and ATV/UTVs to tractors and machinery, many incidents could have been prevented with safe practices in place. Safety is often an unaddressed concern in rural communities with safety education resources are not widely available to rural America. Community leaders lack the time and often the expertise to create safety training programs; however, statistics point to a need for intervention at an early age. PAF Safety Day's new Safety Zone delivery mode goes where the intended audience will already be and take place in conjunction with another community event (i.e., Fairs, Farm Shows, Ag Awareness events, etc.).

Methods:

For three decades, the Progressive Agriculture Foundation (PAF) has been perfecting its formula for delivering high quality programming aimed at keeping the safety and health of rural children at the forefront. The Progressive Agriculture Safety Day (PAF Safety Day) program provides customizable, age-appropriate, and hands-on experiences for children ages 4 to 13. PAF Safety Day's new Safety Zone delivery mode will provide vital touchpoints through shorter, condensed safety stations. Key volunteers will receive customized, on-line, self-paced training to become a PAF Safety Day Coordinator and receiving mentoring on gather local community support and planning their program. A minimum of four, 3–5-minute interactive safety or health stations should be offered at a Safety Zone with each child receiving a take-home with additional resources at the conclusion of their participation.

Results:

Community safety and health champions often have the best intentions of providing hands-on, educational programming to youth locally; however, potential barriers can exist with the adoption of a standalone PAF Safety Day. Scheduling a date and identify a location can often be the biggest challenge for community leaders. Therefore, PAF Safety Day's new Safety Zone delivery mode can easily be incorporated into another successful community event and provides a youth safety and health component that may be currently missing or lacking. While a Safety Zone will still have a youth-focus, parents and adults attending with children will also be introduced to potentially life-saving messages whether on the farm or ranch, at home, or throughout the local community. In 2023, the Safety Zone format was piloted at a farm show and county fair, which led to thousands of impressions and direct contacts.

CONCURRENT ORAL PRESENTATIONS: SESSION 4
Students' Opinions Toward Safety

Summerfield, Jepsen, Specht, Lawson, Filson

The Ohio State University

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Wednesday, June 19 11:20 a.m. Galleria II

Purpose:

The purpose of this study is to explore high school students' opinions towards safety. The objective for this study was to: Explore high school students' opinions towards practicing safe behaviors.

Methods:

A convenience sample of participants aged 14-17, who engaged with the OSU Ag Safety and Health exhibit at a large outdoor agricultural trade show in September 2023, was used for this study. Participants were asked to provide anonymous responses to one open-ended question informing the question: *Why do you practice safe behaviors in your everyday life?*

Responses were imported into DeDoose, an online qualitative analysis software and analyzed for themes. Inductive coding (Charmaz, 2006) found emergent themes from the data. Line-by-line coding (Charmaz & Thornburg, 2021) was also utilized for detailed participant responses. Established themes were used to help inform the research objective.

Results:

A total of 219 responses were collected with 196 deemed usable based on study criteria. Three major themes emerged through analysis of participant responses – ability to protect others, fear of death, and worry of potential injury. Sub-themes were present throughout analysis exploring further the specific issues involving participants' opinions toward safe behaviors. Results from this study were used in a secondary study determining the implications of advertising on students' intentions to engage in safety education programs.

CONCURRENT ORAL PRESENTATIONS: SESSION 4
Updating Economic Benefit and Cost Valuations for Occupational Injury and Fatality Prevention in Agriculture

Pena

Colorado State University and HICAHS
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Wednesday, June 19 11:00 a.m. Galleria III

Purpose:

A recently circulating draft of the FY 2025 Fact Sheet of the Agricultural Safety and Health Centers states “The Association of University Programs in Occupational Health and Safety (AUPOHS) respectfully requests \$375.3 million for the National Institute for Occupational Safety and Health (NIOSH), including no less than \$30 million for the Agriculture, Forestry and Fishing (AgFF) Program, in the Fiscal Year 2025 Labor, Health and Human Services Appropriations bill.” The sheet goes on to present the tag line “Saving Lives, Saving Money.” Calls for big money investments to address disproportionate injury, morbidity, and mortality in agriculture are not rare. Cost-benefit analysis (CBA) is a toolkit based in applied economic analysis that is designed to provide net impact values in dollar terms for far-reaching direct and indirect benefits minus costs associated with a policy or intervention. CBA can include valuations of lives saved and of lives preserved via fatality and injury prevention. The application of CBA to agricultural health and safety to date, however, is limited.

Methods:

In this research, I will review how economic “shadow price” values can be used to estimate value of a statistical life, value of a life-year, and injury costs adjusted for use with farmwork populations. Goals include providing background information on tangible valuation methodologies to the agricultural health community that could contribute to impact analyses and future funding requests that highlight the importance of health and safety in the farm workforce. Secondly, I aim to update previous work in economic costs in agricultural health and safety. Economic cost measures move beyond direct financial outlays such as medical expenditures in traditional accounting frameworks to also include indirect costs associated with lost or reduced opportunities (e.g., foregone earnings and other returns to economic activity).

Results:

Leigh et al. (2001) is an early example that extrapolates from data on farm injuries from the Bureau of Labor Statistics to impute real economic costs after adjusting for reported injury undercounts and other aspects of uncertainty. That work estimated \$1.66 billion for direct and \$2.93 billion for indirect in 1992 dollars. If parameters had remained constant over time, an implication is that this value would be approximately \$9.92 billion in 2023 dollars (<https://www.minneapolisfed.org/about-us/monetary-policy/inflation-calculator>). Changes in the prevalence and severities of injuries, in technologies, and in labor policies, among other factors, suggest scope for significant differences in the calculation’s parameters over time. Furthermore, new and novel data collections in surveillance can further inform economic valuation efforts (e.g., as summarized in Rautiainen, 2021).

CONCURRENT ORAL PRESENTATIONS: SESSION 4
Farmworker Housing and Health

Forst, Martin

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Wednesday, June 19 11:20 a.m. Galleria III

Purpose:

The manual labor of farmworkers is critical to the sustainability of US agriculture systems and the food supply. Seasonal farm work is low-paying and hazardous, and the limited supply of workers draws, largely, immigrant populations from Mexico and Central America. While ~80% of workers live in the U.S. year round, the remote locations of crop work require temporary, local housing options proximate to worksites. For the 20% who migrate from other states or across the border (e.g., H2A workers), local housing is essential.

There is a clear connection between housing and health. Chemical contamination, substandard conditions, extremes in temperature, and crowding have been shown to cause adverse health effects.

The purpose of this study was to examine the current state of research on the housing for hired migrant and seasonal farmworkers in the U.S.

Methods:

We conducted a systematic literature review on farmworker housing in the U.S. using the PRISMA recommended protocol, and querying variations on housing and farm, farmworker, agriculture, and health. 1179 studies were screened and 78 studies included in the review.

Results:

Major study types included:

1. measurement of toxicants, esp pesticides
2. compliance with regulatory issues
3. inclusion of occupants in public health efforts (FEMA preparedness, COVID-19 interventions)
4. relationship between housing and health effects
5. housing framed as a social determinant.

Housing was largely found to be substandard and non-compliant with regulatory requirements and hidden from view; pesticide contaminated; associated with other adverse social effects like non-proximity to services and isolation; contributory to adverse health effects related to sleep, mental health, and heat; requiring of special public health interventions. FW housing is a place to access this population for PH interventions, but continues to be hazardous, neglected, and poorly regulated. It is time to conceive new strategies to protect these essential workers and US agriculture.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Farm Progress Show Attendees' Use of ATVs and UTVs On Public Roadways and Their Knowledge and Attitudes Regarding These Vehicles on Roads

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Wednesday, June 19 2:00 p.m. Galleria I

Purpose:

All-terrain vehicles (ATVs) and side-by-sides, often called utility task vehicles (UTVs) have become very popular for both recreation and work purposes in rural areas, especially on farms and ranches. Most deaths for both ATVs and UTVs occur on public roads, and manufacturer's state that their vehicles are not designed for public roads and warn of the dangers of using them on public roads. Despite this, an increasing number of municipalities, counties and states across the U.S. are legally opening up their roads to these off-road vehicles. Our objective was to determine the present use of ATVs and UTVs on public roads in rural areas, and the attitudes and knowledge rural adults have regarding the use of these vehicles on public roads including their safety, design, and the manufacturer's recommendations.

Methods:

A convenience sampling of attendees of the 2022 Farm Progress Show, the largest outdoor farm show in the U.S., were anonymously surveyed at the University of Iowa Stead Family Children's Hospital Off-Road Vehicle Safety Task Force booth. 361 participants that were ≥16 years old completed the survey. Data were compiled, and descriptive and comparative analyses were performed.

Results:

Over 90% of riders had ridden ATVs and UTVs on unpaved public roads with 39% and 55% reporting at least weekly riding. Over 75% of riders had ridden ATVs and UTVs on paved roads with 25% and 36% reporting at least weekly riding. Those from farms had higher proportions riding ATVs/UTVs frequently on roads. Majorities felt it was safe to drive on both unpaved and paved roads with ATVs/UTVs. Over 3/5ths agreed that ATVs (62%) and UTVs (64%) were designed for unpaved public roads, only 13% and 9% disagreed, respectively. Over two-fifths agreed that ATVs (42%) and UTVs (46%) were designed for paved public roads, only 37% and 22% disagreed, respectively. Only 26% and 31% agreed that most ATV and UTV deaths occurred on public roads, respectively. Regarding assertions that manufacturers state ATVs/UTVs are safe to ride on unpaved and paved public roads, only 8-29% disagreed to these falsehoods.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Agricultural All-Terrain Vehicle Safety Test Station
Khorsandi, dos Santos, Hong, Parvin, Farhadi, Abla, Wong
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Wednesday, June 19 2:20 p.m. Galleria I

Purpose:

All-terrain vehicle (ATV) incidents are among the leading causes of fatalities and injuries in agriculture among all age groups. Rollover accidents constitute 85% of ATV incidents on farms. The main goal of this project is to prevent and protect operators in ATV rollover incidents. This presentation focuses on the application of engineering control methods to prevent and protect operators in agricultural ATV incidents across all ages for both male and female ATV riders.

Methods:

This study focuses on the methods to improve the stability of ATV (static and dynamic) and operator protection devices. A crush prediction, detection, and notification device was also developed to accelerate the rescue operation by emergency responders in ATV rollover incidents. The study also discusses the application of engineering methods in evaluating the physical capabilities and limitations of youth and female operators of utility ATVs on farms.

Results:

The results of this comprehensive study include practical recommendations for prevention and methods for protecting operators in ATV incidents.

CONCURRENT ORAL PRESENTATIONS: SESSION 5

Contributing Factors for Bystander Lawn Mower-Related Injuries: A Qualitative Study

Jennissen, Gibson, Drewry, Bibbs, Krupp, Vakkalanka, Hoogerwerf

*University of Iowa Carver College of Medicine, University of Iowa
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Wednesday, June 19 2:40 p.m. Galleria I

Purpose:

Riding lawnmowers are the most frequent cause of major limb amputation in young U.S. children, and in the majority of these events the child is a bystander. Our study objective was to investigate the circumstances of these injuries and to identify behaviors leading to these events and contributing risk factors.

Methods:

Followers/members of both a public and a private lawn mower injury support and prevention Facebook page who had or were aware of children who had suffered a lawn mower-related injury were invited to complete an electronic survey on Qualtrics which included open-ended questions regarding supervision and circumstances of the event. Injuries involving push mowers and duplicate cases were removed. Qualitative analysis of responses was independently performed by three research team members, and differences in coding were resolved through an iterative process. Descriptive analyses of responses were performed.

Results:

Of 140 injured children, 97 (69%) were bystanders. Major themes identified that contributed to the injury event included: Supervision Issues (40%), Child Not Perceiving Danger (40%), Child Allowed to be in Vicinity of Mower (23%), Mowing in Reverse (51%), and Other Mower-Related Issues (15%). Sub-themes included, but was not limited to, distracted supervisor, child not supervised, child approached mower for a ride or given a ride just prior, and child allowed to play near mower or doing other activities near mower. Distracted supervisor was sub-categorized into attending other children, doing another task, visiting/talking with other adults, and supervisor was the mower operator. Mower-Related Issues included the sub-themes: Issues with the Ability to Mow in Reverse (7%), Mower Guard/Chute Issue (4%) and Blind Spots (4%).

CONCURRENT ORAL PRESENTATIONS: SESSION 5

Evaluation of Alternative Compact Bed Plasticulture for Fresh Market Vegetables

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Wednesday, June 19 3:00 p.m. Galleria I

Purpose:

Florida' fresh produce industry is encountering difficulty remaining profitable in the face of ever-tightening economic constraints and environmental regulations. The raised bed plasticulture (RBP) system is used to produce the majority of fresh market vegetables. One promising production system redesign is to use compact beds. Compact bed plasticulture was introduced to Florida vegetable growers and evaluated on commercial farms. Preliminary evaluations for tomato and eggplant showed the reduction of inputs and costs with sustained or enhanced yields. The objective of this study was to evaluate the advantages of the compact bed geometry that have not yet been quantified. This paper focuses on the ergonomic evaluation of the alternative compact bed geometry.

Methods:

The biomechanical modeling approach used in the project relied on the University of Michigan's Three-Dimensional Static Prediction Program (3DSSPP). This approach has been widely used in various tasks to predict spinal compressive forces and other joint forces. After preliminary observations and evaluation of the tasks involved in the maintenance of various crops, it was determined that the priority tasks to consider from a low back disorder prevention standpoint are the harvesting and staking tasks. The objectives for this modeling approach are: (1) to determine if the reduction in spinal compression occurs under compact bed geometries when performing simulated harvesting and staking tasks, and (2) which of the four bed geometries would be most optimal to achieve that goal.

Results:

Biomechanical simulations show that for all main tasks considered, namely harvesting, hand staking, and staking with a "post-driver," spinal compressive forces were reduced for all the compact bed geometries. Reductions in spinal forces ranged from 2% to 8% for the simulated harvesting tasks, 5% to 29% for hand staking, and 2% to 43% for staking with a post-driver (lifting and pushing). Overall, the highest reductions occurred in the 41×30 compact bed geometry (3%-43%), followed by the 46×30 (3%-39%), and the 61×30 (2%-35%) compact geometries.

CONCURRENT ORAL PRESENTATIONS: SESSION 5

Meeting the Safety Needs of the Children and the Farm: What Kinds of Solutions do Farm Parents Want?

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Wednesday, June 19

2:00 p.m.

Galleria II

Purpose:

The dominant narrative in agriculture is that farmers can successfully balance their farm business alongside their family and childcare care responsibilities. However, increasing research has demonstrated that farm parents struggle with accessing childcare impacts children safety and farm enterprise development.

Methods:

We synthesize national qualitative and quantitative data to identify and understand the solutions that would make it easier for farm parents to balance keeping the children safe while getting the work done on the farm. We conduct an exploratory factor analysis along with bivariate and multivariate analysis on quantitative data (860 farm household surveys) and a thematic analysis on qualitative data (focus groups and photovoice activity with respectively 68 and 33 farm women).

Results:

Solutions to support the health and economic well-being of the household were most favored (94% of respondents) followed by safety solutions to bring children to the farm worksite (89%) and solutions to support access to childcare (79%). Farm women participating the qualitative phase valued raising their children on the farm, but they would still like support so that their household and farm business can be financially viable. Farm women also indicated that support to acquire safety supplies would enable them to safely include the children into their day-to-day work, and that they would like to participate in networks of rural and farm mothers to share safety tips and reduce the sense of isolation.

CONCURRENT ORAL PRESENTATIONS: SESSION 5

A School-Based Virtual Hearing Conservation Intervention for Teen Farmers in Rural Texas

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Sam Houston State University

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Wednesday, June 19

2:20 p.m.

Galleria II

Purpose:

The epidemiological (quantitative) study will test the hypothesis that the use hearing conservation mobile applications in a hearing conservation educational program for rural adolescent farmers improve hearing conservation knowledge and behavior more effectively than the use of printed educational materials. The study will collect data from the adolescent farmers who are also participants of the FFA chapters in rural Texas before and after a four-month long hearing conservation education program.

RQ 1: Is a mobile-app based hearing conservation educational intervention more effective than the traditional hearing conservation education offered via printed educational materials in improving hearing conservation knowledge?

RQ2: What are the perceived usefulness, perceived ease of use, and perceived barriers for using mobile applications in a hearing conservation program?

Methods:

The initial contact was made through the school's ag teacher, looking at FFA members as potential participants. A printed invitation letter and consent forms were given to students. Each group (experimental and control) was made up of 50 individuals from 5 FFA chapters, with 100 participants and 10 FFA chapters total. Those in the experimental group received a 15-minute video demonstration on the Sound Level Meter (SLM), which is a noise measuring app delivered via phone and NIOSH, as well as a self-driven hearing acuity screening app known as HearScreen USA. They also received two printed leaflets on NIHL prevention published by NIOSH. Those in the control group did not receive any smartphone education, instead of receiving the two NIOSH leaflets in order to obtain basic hearing conservation. Data was collected over a 4 month period from each group. A follow up survey was collected too.

Results:

The average age of the participants was 17 years. Most of the participants were White (57%) followed by Hispanic (15%). About 40% of the participants reported frequently working on a farm. Data analysis concerning noise exposure identified numerous outdoor/rural agriculture activities that participants were engaged in. Furthermore, the use of hearing protection was low prior to the study. Respondents indicated that using the app was easy to use during noisy work (82.1%), measurement of noise was easy with the app (82.1%), the app use improved their decision making for hearing protection use (53.8%), and the instructions for the app are easy and understandable (53.8%). Overall, the perceived usefulness of the app were positive as noted by participants but in-person, classroom training was preferred.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Student Motivation to Engage in Agricultural Safety Education
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Wednesday, June 19 2:40 p.m. Galleria II

Purpose:

The purpose of this study is to examine Ohio high school students' intentions to engage in agricultural safety education programs. Objectives for this study were to:

- Describe participants' attitudes, norms, perceived control, and intent to engage in an agricultural safety education course.
- Describe participants' attitudes, norms, perceived control, and intent to engage in an agricultural safety education course by treatment group (framed advertisement).
- Determine differences in behavioral intent of Ohio high school students to participate in an agricultural safety education course by treatment group.
- Determine how attitudes, norms, and perceived control influence intent to participate in an agricultural safety education course by treatment group.

Methods:

The population was Ohio high school students enrolled in an agricultural education (AgEd) course. Recruitment materials were presented to AgEd student teachers during their monthly professional development seminar and made available online through OSU's learning management system. Study materials consisted of a video summary of the research, recruitment post cards, and the link to a Qualtrics questionnaire. The instrument was created based on previous studies (Ajzen, 1991; Ajzen, 2006, Ajzen et al., 2019) to measure attitudes, norms, perceived control and intentions. Semantic differentials were used to measure attitudes and perceived control, while Likert scales were used to measure norms and intent. Participants were shown one of four safety-framed advertisements, developed through a previous study, before completing the questionnaire.

Results:

Results will report participants' attitudes, norms, perceived control and intentions to engage in an agricultural safety education programs. Results will also be categorized by advertisement treatment groups for further analysis. Questionnaire results from 20 Ohio high schools will be completed by April 2024. Discussion will follow on the influence of advertisement framing on students' intentions to engage in agricultural safety education.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Farmer Based Community Health Project
Jones, Malin, Bryant, Collins
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susan.jones@wku.edu

Wednesday, June 19 3:00 p.m. Galleria II

Purpose:

Understanding the unique physical and mental health needs of farmers from their perspective is crucial for health professionals that work with this population. The goals of this project were to gain insight into the health care needs and desires of farmers and provide mental and physical health services, screenings, and education for farmers and their family members in a 10-county area in southcentral Kentucky. The project was one component of a statewide initiative in Kentucky titled, Raising Hope. The presentation will share the development, implementation, and evaluation of this farmer-based community project.

Methods:

A Raising Hope health care team at a regional university in southcentral Kentucky spearheaded this project. The project was approved by the university's IRB before the screenings and data collection began. Extension agents in each of the ten counties and statewide commodity leaders assisted in identifying agricultural events where farmers routinely gather. Physical health screenings (blood pressure, n=178; lipids, n=130; glucose, n=132; hearing, n=24), mental health screening (anxiety and depression, n= 38), and health services/education (immunizations, n= 83 and prevention of skin cancer, n= 190) were provided at 8 of the 10 events where farmers gathered. A demographic survey and a health needs assessment were designed and administered to the farmers at the completion of each screening/educational event to capture the future health needs/desires of the farmers.

Results:

Of 178 blood pressure screenings, 121 were abnormal (> than 120/80), of 132 glucose screenings, 61 were abnormal (> than 100), of 129 total cholesterol screenings, 11 were abnormal (> than 200), of 120 triglycerides screenings, 56 were abnormal (> 150), and of 38 depression/anxiety screenings, 2 were abnormal (3 or > PHQ-2). Eighty-three immunizations were administered at five events including nine influenza immunizations and seventy-four tetanus (Tdaps). At the request of the farmers, educational material and 190 canisters of Coppertone sunscreen Spray Sport SPF 70 were distributed at the events. During the last month of the project, we addressed the top request of the farmers offering CPR training at nine locations. Seventy-nine farmers and farm community members received their American Heart Association Heart Saver CPR certification.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Workplace Psychosocial Hazards and Mental Health of Latino Farmworkers

Hammer, Robles-Saenz, Brockwood
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Wednesday, June 19 2:00 p.m. Galleria III

Purpose:

The National Agricultural Workers Survey (Gold et al., 2022) estimates there are 2.4 million farmworkers in the United States, 70% of whom are immigrants working on average 46 hours per week, with much higher hours during peak season. Farmworkers' average family income in 2019-2020 was in the range of \$25,000 to \$29,999 with 20% of farmworkers' family incomes falling below the poverty level. For those with families of 6 or more members, 44% lived below the poverty line. This research addresses the NIOSH NORA for Agriculture, Forestry, and Fishing by focusing on understanding the relationship between psychosocial hazards of agricultural work and mental health of Latino farmworkers.

Methods:

We are currently collecting quantitative survey data for this pilot study funded by the Pacific Northwest Agriculture Safety and Health (PNASH) center from approximately 100 farmworkers using phone and in person surveys. We are using a Community Based Participatory Research (CBPR) approach, and are currently collecting data in collaboration with three Community Based Organizations with whom we have been working for several years already (i.e., Pineros Y Campesinos Unidos del Noroeste/PCUN; Centro Cultural; NOWIA Unete, Center for Farm Worker Advocacy). The survey instrument, which has already been developed, tested, and refined during our pilot phase, consists of established measures assessing physical and mental health, economic stressors including job insecurity and wage theft. Findings will be reported on the relationship between psychosocial hazards and mental health outcomes.

Results:

Our preliminary quantitative results based on 32 respondents suggest that nearly half the participants reported pain, only 62.5% accessed healthcare, 30% reported job insecurity, and 13% reported wage theft. Social support was related to more positive health outcomes, but wage theft was particularly strongly related to negative health outcomes; of those who reported wage theft, all met the threshold for potential clinical depression.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Epidemiologic Data of Health Limitations and Disabilities Among Farmers and Their Families

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Wednesday, June 19 2:20 p.m. Galleria III

Purpose:

The intricate landscape of health limitations and disabilities among the diverse range of individuals engaged in agriculture, including farmers, farmworkers and farm family members across the United States will be explored. The prevalence, nature and implications of health-related challenges within this population will be addressed. This study employed a comprehensive research framework to gather both quantitative and qualitative data.

Methods:

The methodology included relevant literature review, BLS datasets, USDA AgrAbility program datasets and health assessments conducted across various agricultural settings that are designed to capture a holistic view of the health profiles within the farming community by examining the intersections of health, disability, and agriculture. The common health limitations, the impact on daily activities and the subsequent socio-economic ramifications for individuals and their families will be identified.

Results:

The findings reveal a spectrum of health challenges and morbidities that affect farmers and their families. These challenges range from chronic conditions, occupational injuries to permanent disabilities. The study also unveiled disparities in access to healthcare services and resources, emphasizing the need for targeted interventions to address the unique health requirements of those involved in agriculture operations. Furthermore, findings included identification of coping mechanisms employed by individuals facing health limitations in agricultural settings and a better understanding of the role of support networks and national and community resources. The insights garnered from this study contribute to a more nuanced understanding of the complex interplay between health, disability and agricultural livelihoods.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Agricultural Injury Surveillance at State-Level or Region-Level: A Systematic Literature Review

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Wednesday, June 19 2:40 p.m. Galleria III

Purpose:

This review paper will summarize the agricultural injury data and trends in the states and regions. More findings of this systematic review will be shared at the conference, including how regional and state-level surveillance systems data.

Methods:

This review applied the Preferred Reporting Item for Systematic Reviews and Meta-Analysis (PRISMA) technique. The PRISMA conduct permits the accountability and repeatability of a literature review. The current research followed all the PRISMA identification, screening, and inclusion processes. Keywords like "farm-related injuries", "agricultural injuries", and "injury surveillance" were used. Each paper title has been analyzed and selected if it included outcomes from surveillance or survey processes relating to agricultural injuries and fatalities. This review contains data analysis from approximately 90 articles.

Results:

This review provides a systematic assessment of agricultural injuries integrating state- or region-level data through farm surveillance data.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Celebrating Women in Agriculture: Wellness, Safety and Leadership: Expanding Opportunities for Canadian Agriculture by Understanding the Experience of Farm Women

Anderson, Watson, Allin, Wilber, Lear

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Wednesday, June 19 3:00 p.m. Galleria III

Purpose:

There is no question that women are indispensable to the strength and success of farms across the country and the entire agricultural industry. According to the Canadian Census of Agriculture, about one-third of farms have women as primary decision-makers, be it as sole proprietors or in a partnership.

Yet, despite women being vital to the success of family farms, their roles are often undervalued and unacknowledged, with limited initiatives undertaken to measure and provide a quantifiable assessment of the experiences of farm women, including safety and health.

Objectives:

To improve the understanding of the roles and experiences of farm women.

1. By developing a data set in order to replace stereotypes with evidence of the activities undertaken by farm women.
2. By gaining an understanding of the experiences of farm women.

Methods:

Research Methods:

1. Created a project Steering Committee of farm women representing agricultural women's groups from across Canada
2. Undertook an environmental scan of existing literature and data
3. Conducted one-on-one interviews with farm women
4. Conducted a nationwide survey with farm women
5. Summarized the survey findings
6. Performed further analysis and interpretation of the results

Results:

Key Findings - Farm Safety and Health:

1. Women are pivotal to safety plans on the farm. 46% of farm women report they are responsible for creating and implementing a safety plan on their farm.
2. Findings highlight challenges farm women face regarding farm safety, including safety apparel, and machinery design.
3. Stress regarding safety is common among farm women and stress is related to the farm negatively impacts their health.
4. Safety of children, daycare needs & health hazards related to child-bearing were reported.
5. A significant portion of respondents say that others on the farm do not respect their opinion regarding farm safety.
6. When asked about what is most representative of their definition of personal success, 27% of farm women cited health and safety. understanding of the complex interplay between health, disability and agricultural livelihoods.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Farm Adolescent Stress, Risk-Taking, and Mental Health
Anderson, Watson, Allin, Wilber, Lear

Rudolphi, Berg

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Wednesday, June 19 2:00 p.m. Parlor BC

Purpose:

Agricultural producers experience worse mental health than the general population. However, the research and resources have largely focused on adult agricultural producers and workers. Farm adolescents may represent a unique population with respect to their risk of poor mental health. Stressful experiences, including economic adversity may have negative impacts on youth mental health. Adolescents' health and well-being is further threatened by their inclination to engage in risky behaviors, such as substance use. The objectives of this analysis are to describe stress, mental health, and risk-taking behaviors among farm youth.

Methods:

Farm families were recruited to participate in online surveys via mail, email, and social media. One adolescent and at least one adult from each family were required to participate for a response to be valid. All respondents were sent an electronic gift card. Where available, validated instruments were used to collect information about adolescent mental health, stress, and risk-taking behaviors. Extensive data validation was required to identify and exclude bot-generated responses from analysis. Descriptive statistics were used to describe sample demographics and prevalence of symptoms of depression and anxiety. Pearson correlations or Kruskal-Wallis tests were used to examine associations between stress, mental health, and risk-taking behaviors.

Results:

Of the 298 respondents, two thirds were boys, and the mean age of the sample was 15.5 years old. Just over 70% of the farm adolescent sample met the criteria for at least mild symptoms of depression. And 62.8% of the farm adolescent sample met the criteria for panic disorder and 70.5% met the criteria for separation anxiety disorder. There were no significant differences among mental health conditions by gender. School performance and future uncertainty caused the most stress among adolescents. Adolescents with more stress were more likely to experience symptoms of depression. Almost a quarter (22.5%) of agricultural youth reported having tried cigarette smoking and about a quarter of agricultural youth reported alcohol use. There was no significant difference between reported cigarette or alcohol use between boys and girls.

CONCURRENT ORAL PRESENTATIONS: SESSION 5
Supporting Rural Student Resilience Through a Mental Health and Wellbeing Curriculum in Agriculture Education Classrooms

MacDonald, Norrod, Ickes

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Wednesday, June 19 2:20 p.m. Parlor BC

Purpose:

Building Bridges to Farmer Mental Health is an innovative project which focuses on developing agricultural community capacity to recognize and address mental health issues. In order to support this goal, Agriculture Education student teachers were trained on DBT in Schools: Skills Training for Emotional Problem Solving for Adolescents (DBT STEPS-A). This curriculum, which will be implemented by the student teacher, focuses on building rural student resilience through the cultivation of mindfulness, distress tolerance, emotional regulation, and interpersonal effectiveness skills in agriculture classrooms. The purpose of this study is to assess the feasibility of an adapted implementation training for ag-ed students and to determine student confidence in implementing the DBT STEPS-A curriculum within middle and high school agriculture classrooms.

Methods:

Student teachers in Kentucky and Georgia participated in an abridged version of the standard three-day implementation training. This version included pre-work before the trainings, one eight-hour training session, and one three-hour training session. In these trainings, participants were given time to practice teaching the curriculum with their peers and professors. After training, the student teachers received an online retrospective pre-post survey about their confidence in implementing curriculum elements and their overall knowledge of key concepts of DBT STEPS-A. Intervention appropriateness, acceptability and feasibility outcomes were assessed post-training.

Results:

A total of 46 participants completed the training in January 2024. Results are forthcoming.

CONCURRENT ORAL PRESENTATIONS: SESSION 5

Mental Health Among Swedish Farmers – A Strategy for Improved Health and Wellbeing

Lundqvist

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Wednesday, June 19

2:40 p.m.

Parlor BC

Purpose:

The Swedish Government has commissioned the Swedish Board of Agriculture to develop a new strategy for improving the health and safety in agriculture, with an implementation during a 5-year period 2024 – 2028. The initiative was undertaken due to previous reports regarding the high level of work related injuries as well as mental health problems among Swedish farmers. The whole initiative was going to be funded by EU-resources for competence development.

Methods:

A report describing the new strategy was finalized early 2023. It was also concluded that further knowledge was needed regarding mental health among farmers. The Swedish University of Agricultural Sciences (SLU) was asked to start with an international review of studies regarding farmers and their psychosocial working conditions and mental health, which was finalized during 2023 and also presented in Brussels at the European Parliament during a seminar regarding farmers and mental health. The review concluded that there is a lot of international research but a lack of Swedish studies. SLU was then asked to perform a national Swedish study, using a digital survey as well as focus group interviews in different parts of the country, which will be finalized during 2024.

Results:

The national strategy started up in early 2024 and involve all major stakeholders, such as farming organizations, authorities and others, but most of all farmers themselves. The program will deal with injury prevention, health issues and a lot of focus on prevent and deal with mental health issues among farmers. The results from both the international review and the Swedish study regarding mental health will be phased in and used within the strategy program.

CONCURRENT ORAL PRESENTATIONS: SESSION 5

Two Lenses: A View of Mental Health First Aid in North Carolina’s Agricultural Community

Denning, Robinette

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Wednesday, June 19

3:00 p.m.

Parlor BC

Purpose:

The agricultural sector is more at risk for suicide than any other occupation (Peterson et al., 2020). Compounding stressors, stigmas surrounding mental health, and a lack of mental health providers all contribute to farmers not seeking support to manage their stressors. The North Carolina Agromedicine Institute’s (the Institute) Farm and Ranch Stress Assistance Network of North Carolina (FRSAN-NC) aims to provide agriculturally relevant services and resources related to farm stress and suicide prevention. Institute staff serve as Mental Health First Aid instructors to reduce stigmas and equip the agricultural community with the knowledge and tools needed to address mental wellness.

Methods:

The Institute has two staff members certified to provide Youth Mental Health First Aid and Mental Health First Aid instruction. When preparing for a mental health first aid program, the instructors used their individual lived experiences to best reach the audience. Instructor A was raised on a century farm and knew from a young age that they wanted to pursue a career serving the agricultural community. Instructor B entered the industry in college after growing up in an urban community.

Results:

To date, 61 people have been certified as mental health first aiders, including farmers, veterans, community leaders, 4-H agents, and extension agents. Instructors A and B have different paradigms influencing their perceptions of the instructional certification experience and pedagogy. By having both experiences in the instructional team, they are best suited to meet the needs of a wider audience than a homogenous team would.

CONCURRENT ORAL PRESENTATIONS: SESSION 6
A Comparison of Audiogram Tests for Future Farm Safety Analysis

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Wednesday, June 19 3:20 p.m. Galleria I

Purpose:

The purpose of this exploratory study is to compare the effectiveness and accuracy of different hearing tests in diagnosing hearing loss. The hypothesis of this study is that there is no difference between the GSI AMTAS™ test, Mimi Hearing Test, or the Hearing Test & Ear Age Test.

Objectives:

1. Describe the average results for each frequency between each test.
2. Describe the time required to test a patient's hearing by instrument.
3. Define the difference between each instrument by cost.

Methods:

To conduct this study three different audiogram tests were used to compare results. All three tests used are audiogram tone threshold tests. The first test is the GSI AMTAS™ that was downloaded onto a tablet that uses its own set of headphones, and was the most expensive. The other two tests were free mobile applications, the Mimi Hearing Test, and the Hearing & Ear Age Test. There are multiple tone threshold tests available to download onto smartphones, the top two rated free tests were selected for this study. There were a total of 14 participants who completed all three audiograms. All tests were administered in a quiet environment to ensure the accuracy of the test. The researcher's measures of central tendencies as well as an univariate ANOVA to derive results.

Results:

After uploading the data the preliminary results reveal a non-significant difference in low frequency ranges. At 250 Hz $P=.807$. The significance level in the right ear at 500 Hz shows a non-significance level of $P=.115$. These preliminary findings suggest that there is no difference between these different audiogram tests. Results were found in the acceptance of the null hypothesis.

CONCURRENT ORAL PRESENTATIONS: SESSION 6
Assessing Ergonomic Benefits of Enhanced Scoop Shovels and Pitchforks on Women Farmers' Physiological Responses

Oguche, Zhou, Funkenbusch, Shannon
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Wednesday, June 19 3:40 p.m. Galleria I

Purpose:

In agricultural practices, where manual labor is prevalent, this study underscores the critical importance of ergonomic tool design, scoop shovels, and pitchforks equipped with D and T grip handles and auxiliary grips, to reduce physical strain and enhance work efficiency among women farmers. Focusing on the physiological impacts of using traditional versus ergonomically enhanced tools across a diverse array of fourteen shovel and thirteen pitchfork variants, the research aimed to quantify the ergonomic benefits through a comprehensive investigation into the physiological differences these tools induce, including assessments of heart rate variability, energy expenditure, total cardiac, and physiological costs of work, the Rapid Upper Limb Assessment (RULA), Rapid Entire Body Assessment (REBA), and Lifting Index (LI).

Methods:

Using a cross-sectional design, 10 women participants were tasked with using traditional and enhanced scoop shovels and pitchforks to move hay over two 15-minute intervals, with a 5-minute rest between each interval. Measurements taken included heart rate, blood pressure, body temperature, and other physical characteristics before and after the task. employing advanced engineering instruments, and force analysis to analyze the potential of ergonomic enhancements to reduce musculoskeletal stress. Videos capturing tasks from multiple angles were uploaded for analysis to an ergonomic assessment software, which utilized RULA and REBA methodologies to assess the risks associated with posture and motion, particularly focusing on movements like bending and lifting.

Results:

Preliminary findings revealed there might be significant physiological benefits of using ergonomically enhanced tools, demonstrating a marked reduction in energy expenditure, heart rate variability, total cardiac, physiological cost of work, improved ergonomic assessment scores (RULA, REBA, LI), indicating a decrease in ergonomic risk, alongside a moderate variance in trunk angles during lifting with an average of 65 degrees. This indicates a broad applicability of ergonomic enhancements in reducing physical strain and enhancing work efficiency, advocating for a shift towards adopting these innovations in agricultural practices. The study not only highlights the importance of ergonomic tool design for improving health outcomes, reducing the risk of musculoskeletal disorders, and increasing productivity among women farmers but also sets a foundation for future research.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Evaluation of the First-of-Its-Kind Spanish Private Pesticide Applicator Training Program in Oregon: An Interagency, Interstate Collaborative Project

Balbi, Schaedel, Servin, Omelas, Borges, Rodriguez, Uribe, Bond, Zimmerman, House, Zaragoza, Thompson, Giordono, Buhl
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Wednesday, June 19 4:00 p.m. Galleria I

Purpose:

The purpose of this project is to address barriers for Spanish speakers seeking pesticide applicator licensing, including a lack of resources, insufficient access, and other barriers to success. This project was initiated by the Hood River Soil & Water Conservation District (HRSWCD) and OSU Extension, involving the Washington State Department of Agriculture (WSDA), and the local orchard community. It grew into an interagency, bi-state collaboration including the Oregon Department of Agriculture (ODA), OSU Pesticide Safety and Education Program, industry personnel, bilingual educators, and technical support. The main educational outcomes of this program are to 1) improve access to professional advancement for Spanish-speaking agricultural workers, and 2) improve the dismal passing rate in the state-required exam (in Spanish) to become licensed private pesticide applicators.

Methods:

HRSWCD has a well-established relationship with fruit growers in the area, which proved instrumental in reaching out to the target audience: Spanish-speaking agricultural workers seeking a license as pesticide applicators. Also, they have a history of working with WSDA to deliver their renowned bilingual training program in the tree fruit industry. WSDA delivered the training, and OSU Pesticide Safety Education Program (PSEP) taught the OR-specific information. ODA and many community-based organizations also played integral roles. Training materials, registration, and state forms were translated, updated, and collaboratively improved with the audience in mind. Surveys and interviews were used to evaluate the first-of-its-kind training event, delivered in February 2024. Participants took licensing exams for Oregon and Washington.

Results:

Collaborators planned for months to execute this training event in Spanish for the first time in Oregon. Identified gaps in service/access included: a) no mechanism for participants to register for the pesticide exam in Spanish, b) insufficient local capacity for proctored testing in Spanish, c) outdated training materials, and d) disparity between Oregon and Washington in terms of 1) regulations and 2) the accessibility/success rate of exam attempts. Participant slots (40) filled quickly for the multi-day course, and prospective students expressed more advanced training needs, as well. Results from the post-training questionnaire and interviews will be presented. Data collection will continue after the abstract submission deadline.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Enhancing Agricultural Safety Training Through Portable Virtual Reality (VR) Simulations

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Wednesday, June 19 4:20 p.m. Galleria I

Purpose:

This research aims to modernize the Advanced Applicator Technician (AAT) associate in applied science degree curriculum by introducing adaptive virtual reality (VR) simulations that will have the potential impact of enhancing entry-level skillset of those entering the agricultural sector. The primary focus of the project is the development and integration of portable (VR) headsets into the semi-tractor trailer safety training component of the AAT curricula to provide a more “real—world,” immersive learning experience. Once implemented, these adaptive simulations should provide students and custom applicators with higher confidence and improved abilities to acquire a Commercial Driver License. A virtual reality simulation of a pre-trip inspection of the engine block was developed and evaluated in this project.

Methods:

The virtual reality simulation was demonstrated and evaluated on college students and AAT in the field. Several evaluation methods were conducted including the generalized self-efficacy scale, user engagement scale, training experience, and knowledge test (pre and post). Data was analyzed using Microsoft Excel and qualitative insights from open-ended questions regarding the simulation's quality were documented.

Results:

For college students, the results indicated improvement in pre- and post-test assessments. Moreover, participants rated the (VR) training experience as highly favorable, with responses indicating ease of use (4.50), complexity (1.50), enjoyment (4.25), satisfaction (4.25), and an overall positive learning experience (4.25). The AAT professionals demonstrated increased general self-efficacy scores (41.6/50) and knowledge improvement from 81% to 84% in pre-test and post-test evaluation.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

We're on This Road Together: Building a Toolkit for Enhancing Rural Road Safety Around Farm Vehicles

Noray, Rockwell, Reese, Peek-Asa, Rudolphi, Hamann

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Wednesday, June 19

4:40 p.m.

Galleria I

Purpose:

Rural crashes claim lives at twice the rate of urban crashes, making them a particularly deadly concern for communities across the country. Crashes between farm vehicles and passenger cars are among the most severe of all rural crashes. To address this critical issue, we developed an implementation toolkit for community educators based on the evidence informed "We're on This Road Together" campaign. Our toolkit aims to equip educators with the resources, skills, and strategies to engage their communities in improving road safety with a focus on farm vehicle interactions. The toolkit fills the resource gap for educators by including an easy-to-follow step-by-step implementation guide and customizable outreach materials that can be tailored to local communities. This presentation outlines the process of engaging educators in developing the toolkit.

Methods:

To ensure our toolkit resonated with both educators and their communities, we employed a two-pronged research approach. First, we convened focus groups with extension educators in Iowa and Illinois to gain insights into educator experiences with other campaign implementation, challenges faced during implementation, and desired resources for campaign implementation. We coded and analyzed the focus group transcripts to identify common themes. We then further engaged community educators through a conjoint analysis survey, a marketing approach that identifies how people value different options. We focused on various campaign elements such as toolkit's content, format, and delivery. We used the results to identify the most impactful combination of campaign elements for the toolkit. This approach ensured the toolkit is not only comprehensive and well-informed, but also relevant and acceptable.

Results:

We focused on three broad categories: toolkit contents, training preferences, and recruitment/appeal. Within toolkit contents, educators preferred practical outreach materials like social media templates and relevant road safety swag items like car air fresheners. In terms of training preferences, educators expressed preference for virtual meetings and workshops due to ease of attendance. One of the top topics for professional development was how to tailor messages to diverse audiences. Lastly, the top reasons for participation in the campaign were a stipend and topic relevance to job duties or interests. These findings helped us better understand the needs and desires of community educators so that our toolkit can support educators' work and facilitate implementation.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Enhancing Agricultural Safety Communication & Leveraging Resources: A Storytelling Approach

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Wednesday, June 19

3:20 p.m.

Galleria II

Purpose:

Through the ages, storytelling has been used to engage audiences, educate, and help people understand and interpret their environment. From this knowledge, The Telling the Story Project (TTSP) was conceived with the aims of (1) providing a space for those directly or indirectly involved in an agricultural incident to share their story and unique perspectives on how others can avoid similar incidents and (2) delivering the storyteller's written and video narrative and providing educational resources to those who visit the website with the ultimate goal of reducing agricultural injuries and fatalities. The personal narratives serve as powerful testimonials. Tailored resources include training materials, videos, and classroom curriculum. This presentation will discuss how the narratives and resources can be leveraged to create engaging outreach and training.

Methods:

Beyond the storyteller's narratives, the TTSP website provides safety professionals, educators and the public educational materials and resources related to each story, thereby identifying best work safety practices. Resources include:

- Discussion guides - support educators and safety professionals during classroom discussions and training. These guides are designed to allow students to think critically.
- Vignettes - short accounts of agricultural incidents accompanied by prevention messages and resources.
- Story Frames - capture safety and health messages in cartoon format, providing another avenue for communicating safety.
- Word Clouds - show commonly used words and phrases within the stories allowing readers to click on a topic and to be taken directly to other related stories.
- Media releases that can be used to widely disseminate safety messages in the press.

Results:

The Telling the Story Project website has been visited over 35,000 times since 2016. Groups including agricultural educators, safety trainers, outreach professionals, and the press have used the stories and resources located on the website to convey safety messages across the U.S. Examples of how the narratives, videos, classroom curriculum, training materials and other resources have been used will be shared by the presenters.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Participatory Rural Appraisal: Implementation of Farmer-to-Farmer Program on Ecuadorian Agricultural Associations

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Wednesday, June 19

3:40 p.m.

Galleria II

Purpose:

This research articulates the rationale behind the Farmer-to-Farmer program conducted in Ecuador from 2018 to 2023. The initiation of training sessions within farmers' or Host Organizations (HO) arises from a meticulous problem assessment, where the field coordinator and county director identify issues and propose specific training topics through a Scope of Work document. Subsequent approval from headquarters prompts the selection of a US Volunteer to travel and provide training to the HO.

Three specific objectives shaped the study: (1) Understand how agricultural leaders perceive the implementation process of the Farmer-to-Farmer program in their organizations, (2) Describe how the Farmer-to-Farmer program has benefited agricultural organizations, and (3) Examine improvement opportunities for future Farmer-to-Farmer interventions.

Methods:

This study utilized a Participatory Research Framework rooted in the Participatory Rural Appraisal (PRA) approach, engaging rural community members as interviewees (Vaughn & Jacquez, 2020). The research treated agricultural organization leaders as integral parts of rural communities, uniquely assessing Farmer-to-Farmer implementation from beneficiaries' perspectives. Data collection involved individual interviews with agricultural organization representatives, focusing on goals, activities, membership, participation decisions, expectations, training experiences, challenges, and areas for improvement within Ecuador's host organizations. Multiple data sources like researcher memos, field notes, and photos. All interviews were audio-recorded, transcribed, and coded by hand using open, axial, and selective coding for comprehensive data analysis (Creswell & Creswell, 2018).

Results:

The Farmer-to-Farmer (F2F) study elucidates crucial findings involving 15 out of 19 representatives of agricultural organizations. The first objective, gauging leaders' perceptions, revealed motivations like collective growth aspirations and new knowledge acquisition, translating into vital benefits such as enhanced skills and improved livelihoods. The second objective demonstrated the program's positive impact, inducing shifts in farmers' attitudes and successful implementation of recommendations when assigned responsible individuals. Improvement opportunities identified for future interventions emphasized effective communication through calls, WhatsApp, and emails, with a proposed WhatsApp group for leaders. Financial support challenges were acknowledged, and program assistance was for securing funding.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Surveillance of Injuries in Farmworkers

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Wednesday, June 19

3:20 p.m.

Galleria III

Purpose:

The Great Lakes Center for Farmworker Health and Wellbeing was formed in 2022 as part of the NIOSH-funded Centers for Agricultural Safety and Health and has a unique focus on improving the health and safety of hired migrant and seasonal farmworkers, a critical sector of the agriculture workforce. The Agricultural Safety & Health Surveillance Program within GLCFHW aims to (1) develop a comprehensive and integrated state-based occupational health surveillance system for identifying and characterizing work-related illnesses and injuries (WRIs) among hired farmworkers, utilizing existing data systems that principally capture acute, moderate to severe illnesses and injuries and (2) integrate outpatient health data from clinics serving FW communities into our surveillance data repository, which capture minor and chronic injuries and health conditions.

Methods:

We are building a "system of systems approach" to more effectively use surveillance data to identify and mitigate WRIs among agriculture workers in Illinois. We have completed the preliminary analysis of agriculture-related illnesses and injuries in the following state-based data systems: police crash reports, workers' compensation first reports of injury, hospital Compdata, and Poison Center call data. We have also leveraged publicly available government data and have established partnerships with two clinic systems that serve migrant and seasonal farmworkers. We will summarize the information we have identified on farmworker injury and illness surveillance sources and welcome discussion to build consensus and develop protocols for reporting injuries and illnesses in hired farmworkers.

Results:

While these data sources provide valuable information related to agricultural injuries and illnesses, it remains challenging to identify farmworkers, particularly seasonal and migrant workers. Substantial gaps for determining injuries and illnesses in this population and general counts to better characterize this segment of the workforce remain. These gaps are due to various root causes, including policies that exempt the reporting of injuries and illnesses, challenges related to the transitory nature of this workforce, and others. Additionally, the different hiring programs and mechanisms, for example, between settled and H2A visa workers, also result in variations in workplace conditions and interactions with the existing surveillance systems and contact with partner services.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Agricultural Workplace Fatalities in the State of Oregon. Contributions of the Oregon Fatality Assessment and Control Evaluation (OR-FACE) Program

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Wednesday, June 19 3:40 p.m. Galleria III

Purpose:

Agricultural workers face significant fatal risks from heavy machinery accidents, chemical exposures, extreme weather, and physical demands. Despite safety improvements, hazards like dangerous wildlife encounters and tool injuries persist. Enhanced safety protocols and support are crucial for this vital sector. The Oregon Fatality Assessment and Control Evaluation (OR-FACE) program conducts surveillance of workplace fatalities as well as in-depth investigations of selected cases. We will present a description of fatal occupational cases in agriculture from the last five calendar years that occurred within the state.

Methods:

The Fatality Assessment and Control Evaluation (FACE) program conducts surveillance of workplace fatalities to identify the causes of work-related deaths and develop strategies to prevent them. By investigating specific incidents, FACE aims to offer insights and recommendations for employers, workers, and safety professionals to implement safety measures and training programs designed to reduce the occurrence of fatal accidents in various industries. This program plays a crucial role in enhancing workplace safety and health standards through its detailed analyses and dissemination of findings to prevent future fatalities. The OR-FACE program curates a dataset of workplace fatalities, adding as much information as available regarding the case.

Results:

In the 2018-2023 period, 30 workplace fatalities were recorded in the OR-FACE dataset. The majority of these tragic events involved being crushed or struck by an object. The majority of cases occurred in the Willamette Valley, but other agricultural-rich areas, such as Southern and Eastern Oregon, accounted for various cases. Most cases were concentrated during harvest seasons, especially the summer months.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Developing an AI-Enhanced Data Pipeline for Automated OIICS Code Assignments in Agricultural Injury Surveillance
Li, Schneider, Twidale, Gorucu, Issa

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Wednesday, June 19 4:00 p.m. Galleria III

Purpose:

The primary goal of this research is to develop an efficient data pipeline with AI tools to manage and update agricultural injury data in Illinois Agricultural Safety and Health Injury Database (IASHID), including processing raw data, fine-tuning AI assigner, Occupational Injury and Illness Classification System (OIICS) code assigning. The objectives are to: 1) develop and fine-tune AI assigners using Anthropic Claude 3 model to accurately assign OIICS codes based on given newspaper clipping reports; 2) Evaluate and Optimize the performance of the trained AI agents; and 3) Establish a data pipeline for fatal and non-fatal agricultural injuries based on the IASHID.

Methods:

The research design involves process of preliminary data and manuals, preparation and human assignments for training datasets, AI agent prompt development and fine-tune, performance evaluation, and establishment of the data pipeline.

In the preprocessing raw data section, report sources can be PDF, Excel, or Text formats, and are converted into a standardized format suitable for the AI assigner. The OIICS manual (v2.01) is processed using ChatGPT-4 to deserialized tokens, which are then passed through the Claude 3 AI model to create simplified code trees (the JSON file) for nature, event, source, and body part categories. The fine-tuning of the AI assigner involves developing a task prompt that outlines the coding task and provides the necessary context for the Claude 3 AI model. Once considered as a certified AI assigner, more incident reports can be sent to the AI assigners to have codes assigned. The AI assigner compares the assigned codes to those provided by human reviewers. If the first two digits of the AI-assigned codes match the human-assigned codes, the codes are considered accurate and included in the final dataset for further study and research. If there is a discrepancy, the case is flagged for human review and correction. After fine-tuning the model, another 40 cases will be tested, and the model effectiveness will be documented and reported.

Results:

Certified AI code assigners will be trained and used in IASHID injury data process and update. The certified AI assigner will play three distinct roles with various personalities, ensuring a comprehensive and accurate approach to the coding process. Furthermore, an AI-enhanced data pipeline for IASHID will be developed and implemented. We anticipate a substantial improvement in the efficiency and accuracy of assigning OIICS codes to agricultural injury cases by sending newspaper clipping report pieces to trained AI agents. This innovative AI-driven method will greatly improve the reliability and consistency of code assignments while greatly reducing the time and resources required for manual coding. Moreover, the establishment of a data extraction and processing pipeline specifically designed for newspaper clipping datasets will streamline the integration of new injury cases into the IASHID. This adaptable pipeline will be used in continuous updating and maintenance of the future injury surveillance database.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Living in the Borderland: An Examination of the Work-Family Borderland of Dual Agriculture Teacher Couples in [State]

Spence, Park, Warner, Cope

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Wednesday, June 19

4:20 p.m.

Galleria III

Purpose:

The work-family interface is a complex exchange between domain cultures, creating experiences that range from enrichment to conflict. For some, the work and family domains are combined (e.g., work-linked spouses or family farm operations). Faculty in the University's Department of Agricultural and Human Sciences has identified that 20% of agriculture teachers in [state] are work-linked with their families. However, little research has been conducted to document work-linked families teaching agriculture or to explore their lived experiences with work-family stress (Spence, 2022). The study objectives aim to minimize the gap in our understanding of the work-family interface as it relates to the work-family integration/segmentation continuum and identify or develop strategies that prevent or resolve work-family conflict among work-linked couples in agriculture.

Methods:

As part of a larger mixed-methods study utilizing an explanatory-sequential design (Creswell & Clark, 2017), the qualitative phase answered the research question: "How do dual-agriculture-teacher couples in [state] experience the work-family interface?" The qualitative phase used semi-structured interviews and personal photos to answer this question. Purposive sampling was used to select study participants who are work-linked spouses in a dual-agriculture-teacher couple (Merriam & Tisdell, 2015. p. 96). Interviews were conducted via Zoom. Two separate, one-on-one interviews took place over six months. Between interviews, participants were invited to respond to written prompts by submitting personal photos and captions to describe further their experience as a work-linked couple teaching agriculture.

Results:

The study included nine couples or 18 individual participants, generating a total of 36 one-on-one interviews. Of these couples, six couples were not only agriculture teachers, but spouses involved in family farm operations. The interviews totaled 2033 minutes of data that were transcribed 359,423 total words. In addition to interview participation, six couples were represented in the 44 collected photos. Some results describe the general structure and navigation of dual-agriculture-teacher couples' combined work and family domain which is described as the work-family borderland. The borderland significantly blended participant work-family roles, relationships, and responsibilities. Living in the borderland generates a paradoxical experience for the dual-agriculture teacher couples as they navigate benefits and barriers that stem from their blended work and family domains.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Farm Safety for Rural Families Coping with Dementia

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Wednesday, June 19

3:20 p.m.

Parlor BC

Purpose:

Older agricultural workers experience 46% greater odds of developing dementia relative to sociodemographically similar peers in other occupations. Our preliminary research and analysis of case studies (e.g. NIOSH FACE Reports) suggest increased injury risk among cognitively impaired older agricultural workers. While PLWD rely on family members to protect them from serious harm, farm families report considerable stress initiating discussions or actions that limit older farmers' independence and desire to remain professionally active. In this presentation, we describe the development of a Stage 1 intervention ("Farm Families Coping with Dementia (FFCD))" – to be delivered by Cooperative Extension Specialists (ES) in Iowa and Illinois – that provides structured education to family caregivers of farm workers/residents with suspected or diagnosed dementia.

Methods:

FFCD will be finalized in collaboration with a research-community advisory team. It will comprise of four modules: 1) dementia disease education; 2) dementia progression and farm safety; 3) communicating with dementia patients in agricultural settings; and 4) resources for rural dementia patients and caregivers. Using a staggered approach, FFCD will be delivered virtually by four ES from Iowa State University and University of Illinois to 100 farm families in Iowa (N=50) and Illinois (N=50). We will conduct a two-arm randomized controlled trial (RCT) with an intervention group and a waitlist control group.

Results:

We will assess intervention efficacy (family caregiver's dementia knowledge, burden, and self-efficacy, and PLWD's farm safety risk) and implementation outcomes (feasibility, acceptability, and fidelity). In this presentation, we will describe the development and pilot testing of the FFCD modules.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Cultivating Wellness: The Farm Health Connector Program and Personalized Peer Support in Agricultural Communities

Robinette

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Wednesday, June 19 3:40 p.m. Parlor BC

Purpose:

People in agriculture face severe challenges in managing their physical and mental health. As a result of several compounding factors, farmers have the highest suicide rate of any other occupation (Peterson et al., 2020). While several interventions utilize peer support models to promote the health and safety of farmers, farmworkers, and their families, an identified need exists to evaluate such programs for efficacy (O'Connor et al., 2021). The North Carolina Agromedicine Institute (the Institute), as a part of the Farm and Ranch Stress Assistance Network (FRSAN-NC) efforts, has implemented the Farm Health Connector program to address their local agricultural communities' unique needs.

Methods:

Five North Carolina counties were chosen to pilot the Farm Health Connector program due to their proximity to partner offices and the county's agricultural contributions. Six Farm Health Connectors were selected for this role due to their agricultural backgrounds and social capital.

Results:

While each Connector faced individual challenges, there were similarities in concerns between multiple communities; for example, multiple connectors expressed concerns about how to visit farms and report their efforts. Initial program evaluations have highlighted the importance of personalized support for each Farm Health Connector to optimize their effectiveness in serving the agricultural community.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Characteristics of Suicide Among US Farmers and Ranchers: 2019-2022

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Wednesday, June 19 4:00 p.m. Parlor BC

Purpose:

Suicide is among the top 10 causes of premature death in the United States. As part of any suicide prevention strategy, understanding the risk factors associated with suicide are vitally important. Farmers and ranchers may be at increased risk of suicide when considering demographic, environmental, and occupational circumstances common to population. This analysis provides an update from our previous study that covered the years 2003-2018, which did not contain data from all 50 states.

Methods:

Using more current data from the Centers for Disease Control and Prevention's National Violent Death Reporting System Restricted Access Database from years 2019-2021 and covering all 50 states, we present descriptive statistics and adjusted odds ratios on US farmer and rancher suicide decedents, including demographic information, mental health status, history of suicidal thoughts and attempts, and circumstances associated with death. Data are presented for farm and nonfarm populations in addition to farm populations by age groups and sex.

Results:

Preliminary results indicate that over 40 percent of the farmer suicide decedents were over 65 years old, and 30 percent were between 46-64 years old. Firearms and hanging are the most widely used means of death by suicide among farmers and ranchers. Physical health problems, intimate partner problems, and argument/conflict seem to be the most prevalent precipitants to farmer and rancher suicide. Nearly 30 percent of farmer and rancher suicide decedents had a depressed mood, 28 percent had a known mental health problem, but only 12 percent were receiving mental health treatment at or near the time of death.

CONCURRENT ORAL PRESENTATIONS: SESSION 6

The Landscape of Farmer Mental Health Programs in the US Midwest

Ruszkowski, Becot, Henning-Smith, Bjornestad

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Wednesday, June 19

4:20 p.m.

Parlor BC

Purpose:

The farm income crisis of the late 2010s and the COVID-19 pandemic amplified mental health challenges in agriculture. To address these challenges, a range of mental health programs have been developed. While efforts to curb these mental health challenges are needed, key knowledge gaps remain about the availability and effectiveness of farmer mental health interventions.

Methods:

To understand how farmer mental health programs in three US Midwest states have evolved recently and their focus, we conducted two waves of an environmental scan of resources and interviews with 64 key informants in Minnesota, South Dakota, and Wisconsin. We conduct univariate analysis on the data from the environmental scan and content analysis on the data from the key informant interviews.

Results:

Our findings indicate that between 2019 and 2022, the total number of resources nearly quadrupled. While numbers increased in absolute, the most notable shifts were the sharp increase in the share of offerings from health organizations and a decrease in the share of offerings from agricultural organizations. We also found an associated increase in resources aimed at improving access to care and reducing cost. Informants noted that farmers are more willing to engage with programs and resources to address financial challenges over programs and resources to address mental health challenges. Finally, key informants called for more comprehensive support of the social and economic needs of households (i.e. food assistance, health insurance, childcare).

CONCURRENT ORAL PRESENTATIONS: SESSION 6

Scoping Review of Protective Factors Against Suicide in Agriculture

Franklin, Dawes

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Wednesday, June 19

4:40 p.m.

Parlor BC

Purpose:

The project was initiated due to the pressing unmet mental health needs among Australian farmers, workers, their families, and friends. Suicide is the leading cause of death for Australians aged 15-44, with a rise in suicide rates among younger adults from 2001. Farmers face a disproportionately elevated risk, for example, farmers are up to 94% higher than non-farmers, with an average of one farmer taking their life every ten days. Recognising the scarcity of empirical studies on protective factors for suicide in agricultural communities globally, this project aimed to address this research gap.

The objectives for this project were, to comprehensively review global literature & consolidate knowledge on protective factors against suicide in farmers and, to elucidate the implications of these findings for developing and implementing suicide prevention services.

Methods:

Guided by PRISMA-Sc, a systematic scoping review addressed gaps in the literature on protective factors against suicide in agricultural communities. The identification of relevant peer reviewed studies, and thematic analysis contributed to the knowledge base, to guide future research, practice, and policy in evidence-based mental health services for agricultural suicide prevention. The search strategy targeted key databases (CINAHL, Emtree, Medline, PsychInfo, Scopus, Web of Science), focusing on agricultural roles and specific protective factors. Data extraction involved thorough evaluation and thematic analysis. The Mixed Methods Appraisal Tool ensured critical evaluation, enhancing the reliability and validity of findings.

Results:

Despite a systematic search, only 14 articles, globally, were found, with 71% concentrated in the United States or Australia. Critically, none related to low and middle-income countries, raising concerns amid rising suicide trends and limited prevention strategies in these settings. Notwithstanding the limited geographic scope and varied methodologies used by studies, we found evidence relating to 3 themes relevant to the question: What are the protective factors linked to suicide and suicidality in agricultural settings? These were: i) a link – albeit still poorly defined – between individual coping mechanisms and self-reliance as a protective factor, ii) the impact of perceived levels of social support and sense of belonging on discouraging suicide, and iii) health interventions and frameworks as protective factors against suicide and suicidality in agricultural communities.