



Southwest Center
FOR AGRICULTURAL HEALTH, INJURY PREVENTION, AND EDUCATION

ANNUAL REPORT

- 2022 / 2023 -



CENTER SUMMARY

The Southwest Center for Agricultural Health, Injury Prevention, and Education (SW Ag Center) is nestled in the piney woods of East Texas at The University of Texas at Tyler Health Science Center. The SW Ag Center serves Public Health Region 6 which includes Arkansas, Louisiana, New Mexico, Oklahoma, and Texas. The mission of the SW Ag Center is to improve the safety and health of agricultural, forestry, and fishing (AgFF) workers. This is accomplished through research, intervention, and education projects that build and leverage a network of strategic partners who represent the diversity of the workforce and range of agricultural production in the region.

Center Theme: Leveraging strategic partnerships to advance best practices that promote and protect the health and safety of diverse AgFF populations.

The Center is composed of an experienced leadership team, dedicated staff, and regional advisors in an organizational structure that facilitates a cohesive, coordinated, and synergistic operation. Experienced researchers are leading six diverse projects; three of which are continuations of prior research. The Center's impact is magnified by a feasibility studies program and outreach core that augment the funded scope of work and are responsive to emerging issues. The Center's feasibility studies program enhances research projects, supports mentorship relationships between senior and junior researchers, and directs resources to emerging issues within AgFF in the region. Outreach activities include the development of new resources, presentations, structured safety and health communication, cross center collaborations, and capacity building through outreach mini grants. The Center supports an agricultural safety and health intern each summer and graduate students through practicum and capstone projects. Research and outreach are guided and improved by an integrated evaluation program that uses interconnected logic models and contribution analysis to assess goal attainment.

LEADERSHIP

SW Ag Center leaders represent four organizations from three states. These multidisciplinary professionals bring an array of expertise to the Center, including public health, industrial hygiene, engineering, occupational medicine, mental health, epidemiology, ergonomics, organizational leadership, marketing, business management, finance, dairy safety, forestry, logging, and commercial fishing.



Vanessa Casanova, PhD
UT Tyler Health Science Center
Center Director



David Douphrate, PhD
Texas A&M University
Deputy Director



Jeffrey Levin, MD, DrPH
UT Tyler Health Science Center
Senior Advisor



Kevin Moore, PhD
Oklahoma State University
Pilot Studies Program



Eva Shipp, PhD
Texas A&M University
Outreach Core



Sharon Newbill, PhD
Folkstone Anthropology
Center Evaluator



Amanda Wickman, MBA
UT Tyler Health Science Center
Program Director



Shelbie Lambert, MPH
UT Tyler Health Science Center
Content Strategist



Kayla Shelton, MBA
UT Tyler Health Science Center
Program Manager

Contact information listed at the end of this report.



ADVISORS

The SW Ag Center's **Regional Advisory Committee (RAC)** is comprised of eight professionals who represent six states as well as numerous disciplines across agriculture, forestry, logging, and commercial fishing.

- Chair: Tim Struttman, MSPH, Wabee Farm LLC | NC
- Jennifer Conner, DrPH, MPH, MAP, American Heart Association | SW Region
- Knesha Rose Davison, MPH, AgriSafe Network | LA
- Cornelis de Hoop, PhD, Louisiana State University Ag Center-Forest Products Center | LA
- Robert Hagevoort, PhD, New Mexico State University-Dairy | NM
- Matt Nonnenmann, PhD, University of Nebraska Medical Center | NE
- Mark Shirley, MS, Louisiana State University Ag Center- Marine | LA
- Robert Williams, CSP, Noble Research Institute | OK

The Outreach Core established the **Extension Advisory Team (EAT)** to provide feedback on outreach priorities and to assist with regional education and product dissemination. There are currently fifteen members on the EAT who represent cooperative extension offices in all five states in the SW Ag Center's region.

- Jordan Voges | TX
- Janelle Duffey | TX
- Skyler Shively | TX
- Claudann Jones | TX
- Miquela Smith | TX
- Mackenzie Thomas | TX
- Andrew Lewis | TX
- Ron Gill | TX
- Jim Rhodes | OK
- Anna Timmerman LA
- Cathy Agan | LA
- Johnny Gunsaulis | AR
- Rick Wimberly | AR
- Jessica Swapp | NM
- Robert Hagevoort | NM
- Talisha Valdez | NM

RELEVANCE

The SW Ag Center is uniquely positioned to address farming, ranching, commercial fishing, forestry, and logging occupational safety and health. Research projects reach into every state in the region and address diverse regional worker groups. The Center has a record of success working with at risk populations and producing culturally appropriate interventions. Research projects for the 2022-2027 cycle address organic dust in confined animal feeding operations, large herd dairy farms, commercial fishermen, grain handling facilities, loggers, and motor vehicle crash surveillance.

building capacity for research & outreach

Feasibility studies allow the Center to investigate emerging issues or gaps in research while fostering mentoring relationships with scientists new to the field. The studies funded in 2022-2023 (1) assessed a navigator program that would assist producers in accessing recovery resources following a natural disaster and (2) characterized the vulnerability of small farmers to extreme weather events and climate change. The SW Ag Center partners with the Southwest Center for Occupational and Environmental Health to host an annual research symposium for feasibility study PIs.

Outreach consultant, Doug Simmerman, exhibits at the Beef Cattle Short Course.

Outreach activities address a wide range of issues through Monthly Safety Blasts, e-newsletters, social media, presentations, exhibits, trainings, educational materials, internships, practicum experiences, and mini grants. In 2022-2033, the SW Ag Center initiated the roll bar retrofit program in Texas, produced an award-winning video on mental health, attended 17 events, and awarded five outreach mini grants. The Center expanded in-person outreach through a consultant who attended six events and reached 4,550 people across three states (pictured below). New audiences were engaged, including women in ag groups, livestock trade associations, crab fishermen, and universities and colleges who serve diverse student populations.



RESEARCH



The SW Ag Center region includes robust agricultural, forestry and commercial fishing enterprises. Research projects not only reach into each of those work sectors, but also address regional at-risk populations, including Vietnamese fishermen, multi-cultural dairy workers, and aging operators. The SW Ag Center’s research portfolio includes basic science (B), intervention (I), translation (T) and surveillance (S) projects. A project summary is provided below. Dr. Moore’s project starts in year two and Dr. Casanova’s project will take place in years four and five of the cycle.

PROJECT SUMMARY

Project	Principal Investigator	States Covered
Role of Bacterial Extracellular Vesicles from Organic Dust in Lung Inflammation (B)	Vijay Boggaram, PhD, University of Texas at Tyler Health Science Center	Regional
Characterization and Comparison of Worker Health Status on Western US Dairy Farms (B)	David Douphrate, PhD, Texas A&M University School of Public Health	New Mexico, Texas
Addressing Health Disparities among Commercial Fishermen by Implementing a Community-Based Intervention (I)	Shannon Guillot-Wright, PhD, University of Texas Health Science Center at Houston School of Public Health	Louisiana, Texas
Impact of Safety Climate on Respirator Use in Grain Handling Facilities (I)	Kevin Moore, PhD, Oklahoma State University	Oklahoma, Texas
Hearing Conservation for Loggers (T)	Vanessa Casanova, PhD, University of Texas at Tyler Health Science Center	Arkansas
Integrating Motor Vehicle Crash and Injury Data in AgFF Surveillance and Research (S)	Eva Shipp, PhD, Texas A&M University School of Public Health	Regional

Role of Bacterial Extracellular Vesicles from Organic Dust in Lung Inflammation

PI: Vijay Boggaram, PhD

University of Texas at Tyler Health Science Center



Inhalation of aerosolized dust found in concentrated animal feeding operations (CAFOs) is a risk factor for the development of respiratory diseases. The PI previously reported that bacterial extracellular vesicles (EVs) isolated from poultry CAFO dust elicited proinflammatory responses in lung epithelial cells and mouse lungs [Meganathan et al (2020) *Am J Physiol Lung Cell Mol Physiol* 319: L893-L907]. To further understand mechanisms mediating inflammatory responses, the involvement of microbe associated molecular patterns (MAMPs) and lung cell pattern recognition receptors (PRRs) in the induction of proinflammatory mediators by bacterial EVs were investigated in Beas2B airway epithelial cells. It was found that bacterial EVs increased TLR2, TLR3, TLR4, and MyD88 mRNA expression. siRNA knockdown of MyD88 significantly reduced bacterial EVs induction of pro-IL-1b, IL-6 and IL-8 protein levels. TLR2 chemical inhibitor CuCPT22 significantly reduced induction of pro-IL-1b, ICAM-1 and IL-8 protein levels whereas TLR4 chemical inhibitor C34 had no effect.

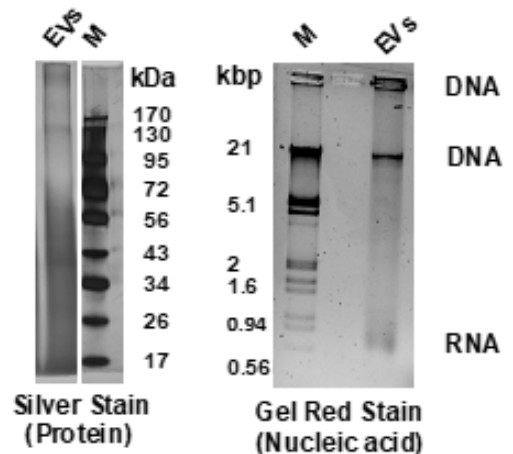


Fig. 1. Bacterial EVs contain proteins, DNA and RNA. Bacterial EVs were analyzed by SDS-PAGE and agarose gel electrophoresis. Proteins and nucleic acids were visualized by silver nitrate and GelRed staining, respectively.

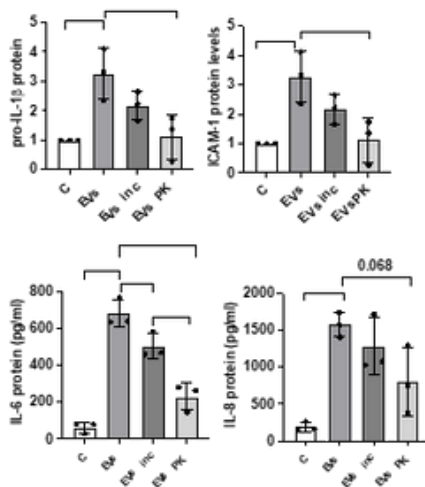


Fig. 2. Proteinase K (PK) digestion decreases inductive effects of bacterial EVs on proinflammatory mediator levels in Beas2B cells. Effects of undigested and PK-digested EVs on inflammatory mediator levels were investigated after treatment for 3 h. ProIL-1 β and ICAM-1 levels were determined by western immunoblotting and normalized to actin levels. IL-6 and IL-8 were determined by ELISA. Data are mean \pm SE (n = 3). *P < 0.05, **P < 0.01, ****P < 0.0001.

Bacterial EVs contained proteins, DNA and RNA (Fig. 1). Bacterial EVs likely also contain lipoteichoic acid (LTA) as Gram-positive bacteria along with Gram-negative bacteria are found in poultry CAFO dust. Degradation of DNA and RNA in bacterial EVs by digestion with DNase I and RNase A had no effect on the induction of inflammatory mediators whereas degradation of proteins by digestion with proteinase K (PK) reduced induction of pro-IL-1b, ICAM-1, IL-6, and IL-8 protein levels (Fig. 2). Treatment of bacterial EVs with hydrogen peroxide (0.1 - 1%), known to inactivate LTA and lipoproteins, reduced induction of IL-6 and IL-8 protein levels in a dose-dependent manner (data not shown). Taken together, our data has indicated that bacterial lipoproteins and LTA acting via TLR2 and MyD88 control induction of proinflammatory mediators by bacterial EVs isolated from poultry CAFO dust.

Characterization & Comparison of Worker Health Status on Western US Large Herd Dairy Farms

PI: David Douphrate, PhD

Texas A&M University



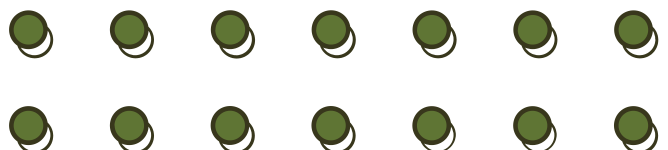
Maintaining a healthy workforce is vital for ensuring large-herd dairy farm sustainability. Immigrant agricultural workers face multiple health challenges due to a myriad of factors. The identification of worker health needs and healthcare delivery mechanisms are paramount. Utilizing a Total Worker Health® approach, the team will characterize the health status of workers on large-herd dairy farms in the western U.S. (Aim 1), which will include: the identification of job factors associated with health status of dairy farm workers; an estimation of COVID-19 prevalence and experiences among dairy farm workers; and a determination of on- and off-farm healthcare service delivery priorities, access barriers, feasibility, and utilization among dairy farm workers. The PI will also estimate prevalence of cardiovascular, renal, and musculoskeletal risk factors among dairy farm workers by utilizing point-of-care biometric testing during on-farm health risk screening events (Aim 2). Project researchers will assess healthcare utilization among participants referred to local health care providers due to identified health risks during on-farm health risk screenings. Lastly, Dr. Douphrate and his team will evaluate on-farm health risk screening satisfaction and benefits among dairy workers (Aim 3).

During the first year of the five-year project, the study team developed all survey materials and research methods. They initiated on-farm recruitment of participants and began survey administration. Preliminary analysis of collected data has begun. They are in process of planning the first on-farm health risk screening data collection events which will take place in the Spring.



Project personnel, Luz Chavez, administering a Dairy TWH survey.

Discussions with dairy owners and managers of the importance of having a healthy workforce and the objectives of the study were very well received. Dairy owners, managers and dairy associations have expressed their support for the project and have welcomed their dairy operations as sites for upcoming on-farm health risk screening events. An additional tertiary high-impact outcome involved the project PI being invited to speak at the American Dairy Science Conference in Ontario, Canada in June of 2023 on facilitating academic-extension research partnerships to address dairy farm worker health and safety issues. After the presentation, several international researchers and extension agents in attendance expressed their interest in collaborating on future dairy worker health and safety initiatives.



Addressing Health Disparities among Commercial Fishermen by Implementing a Community-Based Intervention

PI: Shannon Guillot-Wright, PhD

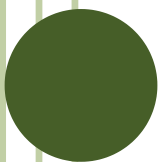
University of Texas Health Science Center at Houston



Despite working in one of the most dangerous industries, commercial shrimp fishermen (shrimpers) are an understudied population. In 2019, the fishing industry exhibited an occupational fatality rate nearly 40x higher than the national average, which reflects hazardous working conditions, strenuous labor, long work hours, and harsh weather. In the Gulf of Mexico, vessel disasters and falls overboard account for nearly 80% of fatalities, with nearly 50% of deaths occurring in the shellfish industry. At any given time, there are approximately 23,000 commercial fishermen in the Gulf of Mexico, with a vast aging, low socioeconomic status (SES), and im/migrant population of workers. Moreover, vast research shows that aging, low SES, and im/migrant workers experience marginalization and precarity at higher rates than their counterparts. The disproportionately high number of fatalities among shrimpers in the Gulf of Mexico is a major concern for the field of public health, yet little is known about the social and structural contributing factors to injury. Therefore, over the past year, the research team has been conducting qualitative interviews with shrimpers throughout Texas and Louisiana to examine individual, cultural, and structural factors that contribute to higher rates of injury. Based on the results from year 1, the team will develop and pilot-test an expansion of our 'Docside' Clinic and evaluate its effectiveness.



'Docside' workers providing services to commercial fisherman in Galveston, TX.



Integrating Motor Vehicle Crash and Injury Data in AgFF Surveillance and Research

PI: Eva Shipp, PhD

Texas A&M University

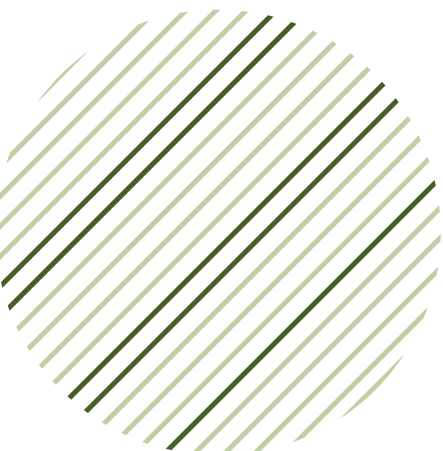


This project builds on the Southwest Agricultural Crash Surveillance System (SW AgCrash) by extending the regional crash database (AR, LA, NM, OK, TX) and developing metrics to assist in the monitoring of fatal and nonfatal injuries in AgFF workers in this region. Methods include traditional biostatistics, free-text analytics, including machine learning methods, and stakeholder capacity building approaches. The database currently houses over 9 million records (2005-2022 depending on the state). Over 10,500 of these records are farm or logging related based on fields in the structured data. In the current reporting period, the team also updated and expanded the fatality AgFF dashboard to cover the entire U.S. and presented it at the NIOSH NORA Agriculture, Forestry, and Fishing Sector Council meeting.

In the last reporting period, the largest accomplishment was the progress made analyzing the free-text narratives. First, the project informed a methodology for automatically deidentifying the crash narratives for Texas, which will be shared with state data stakeholders. Second, two machine learning models were tested BERT and RoBERTa to auto-analyze narratives for injury indicators. Since the results were compelling and had promise for practical applications, they formed the basis of an abstract for presentation at the next American Medical Informatics Association meeting.



Regional Crash Database Site



FEASIBILITY/PILOT STUDIES

During year one, two feasibility studies were funded, each of which had graduate students serving as principal investigators. This directly supports the SW Ag Center's goal of engaging early-stage investigators and mentoring new researchers in agricultural safety and health.

mentoring professionals

Devin Wright of Sprout New Orleans sought to evaluate an agricultural navigator program focused on assisting producers in accessing recovery resources following a natural disaster such as a hurricane. In this program, peer-navigators support other agricultural producers in identifying and applying for relief resources following an emergency. The project also sought to measure the mental health impacts on participants and navigators. Ms. Wright is a PhD candidate at Tulane University and was mentored by Dr. Reggie Ferreira.



Devin Wright, BA



Rachel Hale, MA

The second project was led by Rachel Hale at the University of Arkansas for Medical Sciences. The focus of her study was assessing the vulnerability of small farmers to extreme weather events and climate change. By understanding the current health status of farmers alongside their beliefs and risk perceptions concerning the climate and their health, they seek to inform future interventions to address adverse physical and emotional health outcomes. Ms. Hale is a PhD student at the University of Arkansas for Medical Sciences. Her mentor is Keneshia Bryant-Moore.

OUTREACH CORE

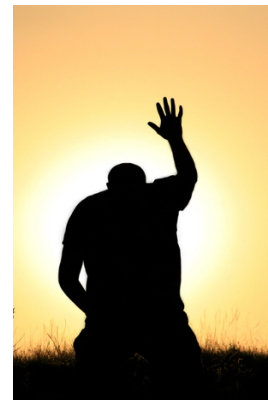


Over the last year, the SW Ag Center has continued its partnership with the Texas Department of Agriculture (TDA) and the AgriSafe Network to provide stress assistance to the AgFF industry across Texas. This has provided the outreach team the opportunity to share much needed information on resiliency, mental health, and suicide prevention. These efforts have included various trainings, presentations, news interviews, and content development through radio ads, videos, and printed materials.

WHAT'S NEXT

The SW Ag Center awarded a \$10,000 Outreach Mini Grant to Texas AgriLife Extension to create a testimonial video promoting mental health awareness and suicide prevention. This became Episode 4 of the Home Safe Home series that originated in 2022. This episode tells the story of one farmer's experience with mental health, losing a loved one to suicide, and how he was able to save a life before it was too late. The video went on to receive Gold in the video category for the National Health Information Awards. (thumbnail from video pictured above)

In the next 12 months, the partnership with TDA will focus on promoting mental health and suicide prevention among youth-based organizations and faith-based organizations with new campaign images, messages, and outreach engagements. Images with animals and silhouette will be used to appeal to diverse audiences.





CROSS CENTER COLLABORATION

The SW Ag Center collaborated with the Northeast Center for Occupational Health and Safety to offer rollover protection system (ROPS) retrofits to producers in Texas. The Jesse Jones Distinguished Professorship Endowment provided \$15,000 to fund the equipment reimbursements. Eight producers participated in the program and retrofitted their tractors. A video was produced highlighting the first producer to benefit from the [National ROPS Retrofit Program](#). In the video, Ed Sorrow (pictured above with family), describes how witnessing a fatal tractor rollover as a teenager motivated him to protect himself and his family.



“I grew up on a farm, driving tractors as soon as I could... Many times, operating equipment without necessary safety equipment. Now that I have grandkids..., I felt it was really important to protect them as much as possible. When I heard of this program, I immediately signed up, hoping I’d qualify someday. This John Deere 4020 is a family tractor that I could not part with, one that I wanted to make as safe as possible for myself, and future family owners. Thanks for the ROPS Rebate Program!” -Gary Kusak, Texas ROPS Rebate Program participant (pictured left)



OSU Staff instructing youth in ATV safety.

OUTREACH MINI GRANTS

The SW Ag Center awarded five outreach mini grants (OMGs) in 2022-2023 through two full year awards and three mid year awards. OMGs were active in Texas, Oklahoma, and Louisiana. OMG summaries are provided below.

Oklahoma 4-H ATV Rider Course

Project Leader: Ravyn Bevard,
Oklahoma State University

Goal: To educate youth and adults in the safe operation of ATVs through hands-on training

Outcome: Trained 313 youth and 6 adults

Louisiana 4-H Youth Water Safety Program

Project Leader: Adam O'Malley,
Louisiana State University

Goal: To develop a water safety program for 4-H students

Outcome: 216 youth campers completed the water safety educational program

AgriLife Extension Farmer/Rancher Mental Health Impact Video

Project Leaders: Miquela Smith & Tiffany Dowell-Lashmet, Texas A&M AgriLife Extension

Goal: To produce a testimonial video of a Texas producer with a lived experience related to stress or mental health challenges

Outcome: An award winning video; Home Safe Home: Episode 4 featuring Grant Heinrich; over 2,700 views since October 2023

Assessing the Occupational Health and Safety Needs of Oklahoma Urban Food Producers

Project Leader: Joshua Campbell,
Oklahoma State University

Goal: To improve the understanding of occupational health and safety needs of urban ag producers in OK and to pilot an Extension training

Outcome: Data analysis in process

Health Sustainable Food Sources

Project Leader: Misty Day, Seminole High School, TX

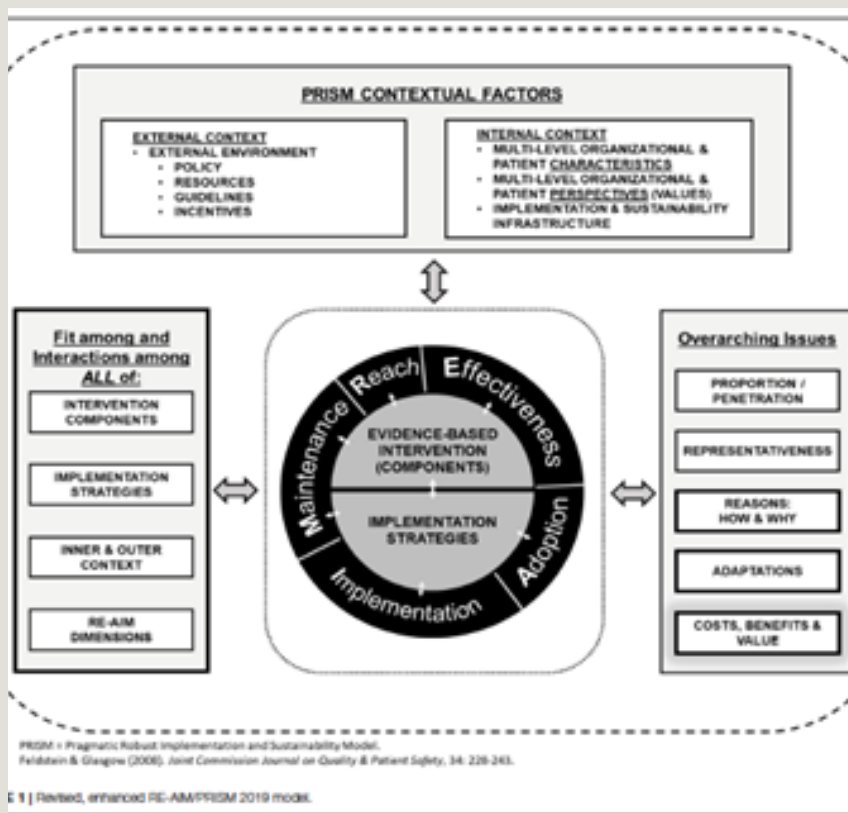
Goal: To teach ag students to safely set up an aquaculture operation

Outcome: 32 students participated in the development of an aquaculture operation with an emphasis on OSHA workplace safety standards

EVALUATION

The Contribution Analysis (CA) conducted during the previous cycle (Newbill, 2023 in press) gave evidence of the success of the SW Ag Center in program implementation. Also, the data reflected the maturity of the Center to react efficiently and with alacrity to emergent disruptions during the COVID-19 pandemic.

Because of the continuity of success, the question for the current cycle became, “How to evaluate a mature program?” The answer infuses CA with dissemination and implementation science approaches to concentrate on the translation of research to practice and to not neglect the importance of context in that translation.



Specifically, the evaluation program embraces NIOSH implementation science research (https://www.cdc.gov/niosh/bcsc/pdfs/implementationresearch_508.pdf), and uses PRISM contextual elements (e.g., Practical, Robust, Implementation, Sustainable Model) integrated with the RE-AIM framework (Reach, Effectiveness, Adoption, Implementation, Maintenance; <https://re-aim.org/>) to guide evaluation of outputs and intermediate outcomes.

CONTACT US

Name	Role	Phone	Email
Vanessa Casanova, PhD	Center Director PI-Research Project	903-877-1408	vanessa.casanova@uttyler.edu
David Douphrate, PhD, MPT, MBA, CPE, CSP	Deputy Director PI-Research Project	979-436-0574	douphrate@tamu.edu
Kevin Moore, PhD, MBA, ASP	Feasibility Studies Co-PI PI-Research Project	405-744-8423	kevin.moore@okstate.edu
Jeffrey Levin, MD, DrPH	Senior Advisor	903-877-7270	jeffrey.levin@uttyler.edu
Amanda Wickman, MBA	Program Director	903-877-5998	amanda.wickman@uthct.edu
Shelbie Lambert, MPH	Content Strategist	903-877-1440	shelbie.lambert@uttyler.edu
Kayla Shelton, MBA	Program Manager	903-877-1417	kayla.shelton@uttyler.edu
Sharon Newbill, PhD	Evaluator	505-269-9675	snewbill.folkstone@gmail.com
Vijay Boggaram, PhD	PI-Research Project	903-877-7780	vijayakumar.boggaram@uttyler.edu
Shannon Guillot-Wright, PhD	PI-Intervention Project	409-356-3781	shannon.p.guillotwright@uth.tmc.edu
Eva Shipp, PhD	Outreach Co- PI PI-Surveillance Project	979-436-9443	eshipp@tamu.edu



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