Southeast Center for Agricultural Health and Injury Prevention

Final Progress Report

CDC/NIOSH Cooperative

Agreement 5U54OH007547-15

2011 – 2016

Submitted by

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Prevention, and Education

Project Start/End:
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Terms and Abbreviations	
AFF	Agriculture, Forestry and Fishing
AgHERE	Agricultural Health, Education, and Research Exchange
AR	Arkansas
ASH	Graduate Certificate in Agricultural Safety and Health Project
ATV	All-terrain vehicle
BSN	Bachelor of Science in Nursing
CARERC	Central Appalachian Region Education and Research Center
CDC	Centers for Disease Prevention and Control
CDC	Centers for Disease Control and Prevention
CE	Continuing Education
CEO	Chief Executive Officer
CPH	College of Public Health
CROPS	Cost Effective Roll-Over Protective Structure
ECO	Evaluators/Coordinators/Outreach group
EOP	Economics of Prevention
EOP2	Economics of Preventing Injuries to Adolescent and Adult Farmers Project
EVAL	Center Evaluation Core
FFA	Future Farmers of America
FL	Florida
FRLE	Farm and Rural Life Experience Survey
FSE	Farm Safety and Economics Survey
FTE	Full-time equivalent
GA	Georgia
HAP	Health of Agricultural Populations
ICCI	Innovative CROPS Curriculum Intervention Project
ISASH	International Society for Agricultural Safety and Health
KAAE	Kentucky Association of Agricultural Educators
KTA	Kentucky Thoroughbred Association
KTFMC	Kentucky Thoroughbred Farm Managers' Club
KY	Kentucky
LTFW	Latino Thoroughbred Farm Worker Safety and Health Project
MS	Mississippi

Terms and Abbreviations	
MSD	Muscular-skeletal disorder
NAEP	Nurse Agriculture Education Project
NAEP2	Nurse Agriculture Education Project Follow up
NASD	National Agricultural Safety Database
NC	North Carolina
NIOSH	National Institute for Occupational Safety and Health
NURSE-AP	Education/Translation: Nurses Utilizing Research, Service, Education and Practice
NY	New York
OUTREACH	Center Outreach Core
PI	Principal Investigator
PILOT	Center Pilot/Feasibility and Emerging Issues Project
PPE	Personal protective equipment
RN	Registered nurse
ROPS	Roll-over protective structure
SCAHIP	Southeast Center for Agricultural Health and Injury Prevention
TTS	Thinking, Talking and Acting Safely Survey
UK	University of Kentucky
US	United States
VTI	Virtual Tractor Inspection
3D	Three dimensional

Center Abstract

The Southeast Center for Agricultural Health and Injury Prevention (SCAHIP), founded in 1992, works to improve the safety and health of agricultural, forestry and fishing (AFF) workers and their families in 10 states in the US Southeast: Kentucky, Tennessee, Alabama, Mississippi, North Carolina, South Carolina, Florida, Georgia, West Virginia, and Virginia. Agriculture consistently ranks among the most dangerous occupations in the US and farming is one of the few industries in which family members who often share the work and live on the premises are also at risk for fatal and non-fatal injuries. Every year hundreds of farmers and farm workers die from on-the-job injuries. Nationally, data from 2014 identifies that AFF recorded the highest fatal injury rate of any industry sector at 24.9 fatal injuries per 100,000 full time equivalent (FTE) workers, up 9% from 2013. This toll is over 8 times higher than the all-industries rate of 3.3 per 100,000 FTE workers. The increase in AFF fatalities was led by fatalities involving agriculture workers (up 12%) and fatalities involving logging workers (up 31%). The AFF sector also continues to record much higher rates of non-fatal occupational injuries than the all-industry average: 112 cases per 10,000 FTE US workers in 2012 (all industries average), compared to 192 per 10,000 FTE workers in AFF. Over the past two decades, tractor roll-overs have been the leading cause of farmworker deaths. On average, 113 youth less than 20 years of age die annually from farm-related injuries. Most of these deaths occurred to youth 16-19 years of age with the majority involving tractors and all-terrain vehicles. There are also economic and social losses associated with these injuries. Every day about 167 agricultural workers suffer from lost work time due to injuries with many of these injuries becoming permanent. These incidents cost time and money to any organization, but the collateral damage could impact hundreds of families. SCAHIP is located at the University of Kentucky (UK), a land-grant campus that houses the Colleges of Agriculture, Medicine, Nursing, Public Health and Arts and Sciences among others all on one campus. This unique situation allows for multidisciplinary collaboration from agriculture, public health, epidemiology, biology, engineering, education, forestry, communications, nursing, medicine, and Cooperative Extension within UK as well as across universities in the Southeast. The Center's theme, “Multidisciplinary partnerships to improve agricultural safety and health in the Southeast," targets vulnerable farm, forestry and fishing populations while addressing persistent and emerging agricultural/forestry and fishing safety concerns unique to the 10 southeastern states in its region. Since 1992, the Center has had substantial impact on the prevention of injuries from tractor overturns, reduction of logging injuries and fatalities, surveillance and risk evaluation of emerging issues, the development of widespread multidisciplinary training to increase the number of professionals skilled in addressing health and safety issues faced by agricultural workers and their families and the extension of its outreach programs to address the health and safety needs of the agricultural, forestry and fishing industry.

Administrative and Planning Core (D Mannino)

CDC/NIOSH Cooperative Agreement
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Description

The Administrative and Planning core of the Southeast Center provides leadership in the planning and implementation of all National Institute for Occupational Safety and Health (NIOSH)-funded projects and activities. The primary aim of the core is to orchestrate and "anchor" the Center's various research, prevention/intervention, and education/translation, outreach and evaluation. The core allows the Center to pursue an effective team science approach to agricultural, forestry and fishing occupational safety and health throughout our 10-state service region: Kentucky, Tennessee, Georgia, Alabama, Virginia, West Virginia, North Carolina, South Carolina, Mississippi, and Florida.

Specifically, the Administrative and Planning core aims to:

- provide clear, highly visible leadership across diverse Center projects and activities;
- ensure skilled administrative support for all Center projects and programs;
- facilitate Center cohesiveness, effectiveness, and reach through an established infrastructure for internal and external communication, continuous program monitoring, and strategic planning;
- ensure good stewardship of sponsor funding, pilot project awards, and other fiscal resources through systematic and transparent budget, accounting and reporting procedures.

The scientific leadership of the Center's Administrative and Planning Core includes a combination of senior investigators with extensive experience both inside and outside the world of agricultural health, along with junior investigators working both in the Center Core and in the research projects. The Core faculty and staff include David Mannino, MD, Director, Wayne Sanderson PhD, Deputy Director, Richard Ingram, DrPH, Evaluator, Joan Mazur, PhD, Outreach Coordinator, Susan Westneat, MA, Epidemiologist, Christin Kane, BS, Budget and Finance Officer, Lynda Charles, BA, Program Coordinator and Ashley Rockwell, Administrative Associate.

David Mannino, MD, Professor and Chair of the Department of Preventive Medicine and Environmental Health stepped in as the interim Director (2012) and, ultimately, the permanent Director (2014) of the Center. Dr. Mannino has a long interest in occupational safety and health, having done his pulmonary fellowship at NIOSH in Morgantown, West Virginia. His initial publication looked at respiratory disease in farmers. He is an internationally regarded expert in respiratory diseases, including those related to occupational exposures, and brought his unique expertise and influence to the final three years of this project. For example, a respiratory component was added to the fourth year of the Latino Thoroughbred Farmworkers project and one of the funded pilot projects during this cycle investigated respiratory impairment in agricultural workers.

Wayne Sanderson, PhD, joined the Southeast Center as Deputy Director in 2009. Dr. Sanderson was the former Director of the NIOSH-funded Great Plains Center for Agricultural Health at the University of Iowa (2002-2009). Prior to joining the faculty of the University of Iowa in 2002, Dr. Sanderson worked for the Centers for Disease Control and Prevention (CDC), including as Chief of the Industrial Hygiene Section in the Industrywide Studies Branch. One of his last assignments with the CDC was as an investigator of anthrax contamination of US Postal Service offices in Washington, DC, and during his distinguished career he has earned numerous

awards from the United States Public Health Service, from which is he is a retired Captain (2006). In addition to serving as Deputy Director of the Southeast Center, and the Principal Investigator (PI) of Training program and the Pilot/Feasibility program, Dr. Sanderson is currently faculty in the Department of Epidemiology in the UK College of Public Health, and served as interim dean from June 2014 through November 2015.

In 2014, Richard Ingram, DrPH assumed the role of Evaluator for the Center. As a graduate of the Doctoral program at the University of Kentucky, he brings a great deal of energy and enthusiasm to the Center. One of his early endeavors was consolidating the evaluation metrics for all of the active projects into the University of Kentucky online data collection system. He subsequently supervised the 2014 Stakeholders' Needs Assessment Survey completion and analysis.

The Southeast Center added an international influence with the arrival of Dr. Byounggap Kim, a visiting scientist from South Korea. He will be at the Southeast Center from 2015 to 2017 focusing on collisions between farm equipment and road vehicles. He is being completely sponsored by the South Korean government.

Other major activity supported by the Administrative and Planning Core included:

- Relocation of Center. In 2013, Dr. Mannino supervised the relocation of the Southeast Center from its off campus location to a 1,381 square foot office suite on campus. Dr. Mannino was able to negotiate with the University's Vice President for Research an agreement that a portion of the rent savings from this move could be reinvested in Center infrastructure and pilot projects (a total of $72,000 over 3 years). More importantly, this was an opportunity for the Center staff and faculty to be physically closer to key collaborators on campus. With the move, most of the UK-based collaborators are less than a 10-minute walk from their primary office to the Southeast Center.
- Supporting the launch of the Central Appalachian Regional Education and Research Center (CARERC). The Central Appalachian Regional Education and Research Center was established on July 1, 2012, under CDC/NIOSH Cooperative Agreement 1T42 OH010278-01. CARERC is the newest of only 18 such university-based occupational safety and health training programs in the United States, and one of 3 that have an associated Agricultural Safety and Health core. Dr. Wayne Sanderson, the Deputy Director of the Southeast Center, serves as the Director of CARERC, and key staff resources are shared between the Centers. CARERC supports students in 5 different concentrations, including Agricultural Safety and Health.
- Selected to host the 2016 International Society for Agricultural Safety and Health (ISASH) Conference. In 2014, the Southeast Center was selected as the host site for the 2016 ISASH conference, held in Lexington, Kentucky. This is one of the largest meetings of agricultural health and safety researchers and practitioners. Dr. Deborah Reed, one of the Southeast Center Primary Investigators in 2011-2016, served as one of the officers in ISASH.
- Supported the completion of a Stakeholders' Needs Assessment Survey. The Evaluation Core team completed the stakeholder survey in early 2015. The results of this survey have proved instrumental in guiding the Center in setting its research agenda.

External Advisory Committee. Members of the Southeast Center External Advisory Committee have helped to ground the actions of the Center in a "real world" vision shaped by their diverse experiences and perspectives with regard to production agriculture, forestry, and commercial fishing and aquaculture. Committee members lent their expertise to the Center's annual Pilot/ Feasibility/Emerging Issues Program, assisting with the scientific review process and assessing project relevance, quality, and "fit." Members during the 2011—2016 funding cycle were as follows:

- John Etherton, PhD; founder and CEO, Center for Safer Solutions; Morgantown, Virginia
- Javier Gonzalez, MA; Abraham Baldwin Agricultural College; College Assistance Migrant Program; Tifton, Georgia
- Frances Henderson, RN, EdD; former Dean of Nursing, Alcorn State University; Ridgeland, Mississippi
- Becky Fields, PhD, RN; Assistant Professor, College of Nursing, University of Tennessee; Knoxville, Tennessee
- Jeffrey Levin, MD, MSPH; Director, Southwest Center for Agricultural Health, Injury Prevention, and Education Professor and Chair of Occupational and Environmental Medicine; University of Texas Health Science Center; Tyler, Texas
- Dennis J. Murphy, PhD; Distinguished Professor of Agricultural and Biological Engineering; Penn State University, Pennsylvania
- Marsha Purcell; Director, Program Development; American Farm Bureau Federation; Washington, DC
- Rosa Martin; Community Programs Director, Area Health Education Center; Lexington, Kentucky
- Donald Mitchell; Private beef cattle farmer, Midway, Kentucky

Consistent with its focus on agriculture, forestry and fishing in the southeastern United States, the Center's research portfolio involved partnerships with organizations that have been actively involved in the conception, design, and/or support of projects including the National Association of Agricultural Educators, FFA, Farm Bureau Federation/Ag in the Classroom (Georgia and North Carolina), AgriSafe, and the Rural Nurse Organization.

Working relationships among these and other stakeholders and researchers from multiple disciplines undergird the core projects funded during the Center's 2011-2016 cycle:

Research Core Project:

- Latino Thoroughbred Farm Worker Health and Safety (LTFW) (PI: Swanberg)

Prevention/Intervention Core Projects:

- Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP 2) (PI: Mazur)
- Cost-Effective Roll-Over Protective Structures (PI: Vincent) originally a pilot project and added as an administrative supplement in 2014

Education/Translation Core Projects:

- Nurses Utilizing Research, Service, Education, and Practice (NURSE-AP) (PI: Reed)
- Graduate Certificate in Agricultural Safety and Health (ASH) (PI: Mazur)

Other cores overseen by the Administration and Planning core:

- Evaluation Program-(EVAL) Director: Richard Ingram, DrPH
- Outreach Program – (OUTREACH) Director: Joan Mazur, PhD
- Pilot/Feasibility and Emerging Issues Program- (PILOT) Director: Wayne Sanderson, PhD

In the past five years, under the guidance of the Administrative and Planning core SCAHIP has improved agricultural safety and health as indicated by the following highlights:

- 27 graduate students trained in Agricultural health.
- Over 560 nurses, farmers, and agricultural professionals trained through the NURSE-AP project.
- Nearly 500 students in the CROPS program, with 64 CROPS installed on previously unprotected tractors.
- Successful implementation of the Economics of Prevention Program (EOP2), training nearly 500 current and future educators in KY, GA, MS, AR, and NC.
- Successful completion of the Latino Thoroughbred Farm Worker Health and Safety project, with 225 participants, including 80 who participated in a respiratory component in the summer of 2014.
- Successful funding of 18 pilot projects, including two which matured to full project funded in the 2016-2021 cycle.

SCAHIP has a long history of successful dissemination of its findings. Since its founding in 1992, the Center (including its directors, staff, funded investigators, and students) has had over 200 peer-reviewed publications, as well as over 270 abstracts, posters, or presentations at meetings. It has also funded 48 pilot grant projects since 1998. During the 2011-2016 grant cycle, the Center had 35 publications, in addition to 137 abstracts, posters, or presentations at meetings. The Center has also funded 18 Pilot/Feasibility/Emerging Issues projects during this cycle, including two that are part of its current grant cycle. In the digital era, another measure of exposure is presence in social media, such as Facebook, Twitter, and YouTube, where the Southeast Center has had an increasing presence over this cycle, with 7,000 visits in 2013 and nearly 10,000 in 2015. Funded and administered through the Center's administrative core, the SCAHIP website provides convenient online information about Center projects, personnel, and resources. Visitors may download information and forms from these pages, and obtain copies of archived resources such as health and safety briefs and Spanish-language materials.

Cumulative Inclusion Enrollment Table

N/A

Gender and Minority Inclusion Table

N/A

Inclusion of Children

N/A

Materials for Other Investigators

N/A

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Evaluation Core (R Ingram)

CDC/NIOSH Cooperative Agreement
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Description

The primary purpose of the evaluation program is to assess and measure how well the Southeast Center is progressing toward its goals, which fully align with NIOSH Agriculture, Forestry, and Fishing (AFF) priorities for engaging stakeholders; building surveillance capacity; addressing the needs of vulnerable workers/populations at risk; implementing integrative, transdisciplinary approaches to agricultural occupational safety and health; pursuing national policy activities aimed at reducing occupational injuries and deaths in the AFF sector; and ensuring the translation of research to practice (R2P). The evaluation program provides systematic quality monitoring and outcomes assessment for Center projects and activities in order to document the Center's immediate and long-term impacts on agricultural occupational safety and health in the southeastern United States.

Specifically, we aimed to (1) evaluate the overall effectiveness and impact of the Center in reducing and preventing occupational disease and injuries among agricultural workers and their families as a result of the Center's transdisciplinary efforts; (2) evaluate the impact of the Center in agricultural safety and health and on its community partners through our research core; (3) evaluate the impact of the Center through its education/translation core; (4) evaluate the impact of the Center through its prevention/intervention core; and (5) collaborate with other NIOSH-funded Agricultural Centers toward development of a uniform, scientifically rigorous evaluation framework across the Agriculture, Forestry, and Fishing Initiative. This evaluation strategy maximizes the synergy and cohesiveness among the Southeast Center's projects and cores while providing an objective, holistic tool for continuous quality improvement and trajectory-correction *vis a vis* Center aims.

For the 2011-2016 period, the Evaluation core monitored and reported the current and ongoing progress and regional, national, and international impact of all SCAHIP programs through systematic and widespread tracking in an organized, easily reportable database. Activities tracked include: classroom research subjects from EOP II and CROPS projects—not only their progress through the program but post program activities including their work placement (county specific) after program completion. This post program tracking allowed us to gauge state and county-wide impact of knowledge gained in the research programs. Project-specific publication numbers, citation numbers and journal impact are also tracked, as well as oral, poster, other professional presentations. Number and type of attendees at presentations was also monitored. These combined activities provided actual numbers to measure the continued impact of our funded programs and trace the web of regional/national/international influence.

The Evaluation core also created and maintained an up-to-date email roster of stakeholders across all 10 states, which includes representation from each of the ag/forestry/fishing industries. The roster is used to conduct periodic online stakeholder surveys to solicit opinions regarding important health and safety issues across agriculture/forestry/fishing industries. This information is used to guide funding decisions for pilot projects as well as to ensure ideas for future research proposals are meeting the health/safety needs of the region. Questions about use of various forms of media are also included to assure the SCAHIP methods of disseminating information/results are appropriate and usable.

Stakeholder Survey

An online stakeholder survey was developed and distributed to the roster. Results for most recently reported year are as follows:

In 2015, data collection yielded 358 responses across the 10-state region and across industries. Respondents provided rich open-ended data on what they deem to be the topic areas of concern in health and safety across the industries of agriculture, forestry and fishing. This

information provides vital feedback to the outreach core as well as guides pilot project funding and future proposal development. In addition, valuable information about smart phone and access to and interest in social media has been collected on the survey, supporting the Center's social media development plans.

Evaluation data was collected by a number of complementary means, including the stakeholder survey, visits to the sites of individual research projects by a center research assistant, and querying individual center and project staff regarding the submission of the products from Center related activities for presentation or publication.

Data collection specific to center and project activities focused on the successful completion of planned activities, as well as the amount and scope of specific activities (e.g. number of meetings, stakeholder feedback). Data collection related to outputs will focus on metrics such as the amount of peer reviewed publications or presentations submitted by project and center staff, and the number and strength of partnerships developed. Data related to outcomes was harder to collect given that the outcome metrics are harder to quantify in many cases. However, stakeholder interviews were conducted by a Center research assistant to gauge success in areas such as increased capacity, the development of new partnerships etc.

Robust analytic methods were used to analyze and interpret evaluation data. Notes collected during interviews were transcribed, coded and analyzed for themes and content. Inter rater reliability was established by having each set of data coded by two researchers independently. Quantitative data, such as that from the stakeholder survey and project investigator queries, was analyzed using both traditional (descriptive analysis, univariate and bivariate analysis etc.) and novel approaches (e.g. social network analysis). Analytical software used included NVivo, SAS and SPSS.

The core of the utilization focused evaluation approach used by the Southeast Center is assuring that evaluation relates are useful to and used by stakeholders. Internal stakeholders, such as project staff, were presented with biannual reports, reflecting project progress relative to identified goals. This allowed each project to assure it was making progress relative to project activities, outputs and outcomes. In addition, final reports were completed for each project, which provided project staff with insight regarding successes, areas for improvement, and unexpected occurrences/outcomes.

External stakeholder engagement is a core aspect of all activities contained in the Southeast Center's evaluation plan, but it plays an especially important role in dissemination efforts. The Center's outreach team, led by Dr. Mark Swanson, helped with the diffusion of research findings to stakeholders. The Center continued to take advantage of dissemination venues it currently uses, such as farm related publications newsletters, and radio. However, evidence from the latest stakeholder survey indicates that nearly 80% of respondents owned a smartphone, and that more than 50% were likely to access YouTube, text messages, Facebook and Apps for health and safety information. Accordingly, the Center will further explore the most effective way to disseminate information through these channels as well. In addition, Southeast Center affiliated personnel continued to disseminate research results through traditional channels such as peer review journals, conference presentations and issue briefs.

The Southeast Center continues to send out annual stakeholder surveys to gather data to check on progress of current activities and areas of potential research and activity in the future. The most recent surveys ask for qualitative and quantitative descriptions of farming and farm-related

activities. Questions include years working in and living on AFF operations; total years involved in AFF; job title; state; safety concerns; and media consumption habits.
The stakeholder survey is continually refined to gather the most useful data possible. It is distributed through the updated AFF listserve, which is also maintained by the Evaluation team. Surveys are also distributed by other media including texting and paper copies.

Cumulative Inclusion Enrollment Table

Program Director/Principal Investigator (Last, First, Middle): Ingram, Richard

Inclusion Enrollment Report

Study Title: Evaluation Core

Total Enrollment: 358 **Protocol**

Grant Number: 5U54OH007547-15

PART A. TOTAL ENROLLMENT REPORT

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not	Total
Hispanic or Latino	0	0	0	0 **
Not Hispanic or Latino	0	0	0	0
Unknown (individuals not reporting ethnicity)	107	251	0	358
Ethnic Category: Total of All Subjects*	107	251	0	358 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	0	0	0
White	0	0	0	0
More Than One Race	0	0	0	0
Unknown or Not Reported	107	251	0	358
Racial Categories: Total of All Subjects*	107	251	0	358 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not	Total
American Indian or Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	0	0	0
White	0	0	0	0
More Than One Race	0	0	0	0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of Hispanics				**

Gender and Minority Inclusion Table

See Cumulative Inclusion Table above

Inclusion of Children

No subjects under the age of 21 were included

Materials for Other Investigators

Materials generated from the Evaluation Core are available on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Outreach Core (Outreach) (J Mazur)

CDC/NIOSH Cooperative Agreement
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Description

Outreach is the systematic process by which the Southeast Center (SCAHIP) works to maximize communication and collaboration between its faculty and staff and stakeholders in agriculture, forestry, and commercial fishing. Successful Southeast Center outreach has earned the interest and trust of stakeholders; that is, their frequent contact of the Center for information, advice, and/or practical tools for enhancing worker safety. This ongoing exchange of information and ideas fosters the timely dissemination of knowledge and the translation of practice to research, research to practice. Stakeholders include farm owners and operators, hired workers, commodity and labor representatives, insurers, equipment dealers, rural health care providers, and fellow researchers in agricultural occupational safety and health.

The Specific Aims for Outreach were to:

1. Develop/enhance a direct outreach network to reach end users
2. Develop and manage the SCAHIP Outreach Network of Partner Organizations by working cooperatively with partner organizations such as the Cooperative Extension Service, trade groups, professional associations, and businesses serving the agricultural workforce to reach end users; and
3. Support development of the Next Generation National Ag Safety Database, continue to provide both financial and informational resources to Conceptual Arts, Inc., the technical provider and web host for NASD

The farming, forestry, and fisheries industries are all characterized by relatively few workers per firm. Ninety percent of US farms are small family operations, with under $250,000 in annual sales, on which most of the labor is provided by the operator and spouse. In 2008, the most recent year with available U.S. Census data, over 80 percent of logging firms had nine or fewer employees, and almost 60 percent had fewer than five employees. In the fishing industry, the predominance of small firms is even greater, with 92 percent of establishments reporting fewer than five employees. This large number of small operations creates difficulties in outreach activities, making not only contacting but even identifying individuals in need of safety information extremely challenging.

Outreach by the SCAHIP focused on two primary audiences – end users of safety information in targeted employment fields, and professionals in trade groups, industry associations, and the Cooperative Extension Service who have established relationships with end users. SCAHIP's direct contact with end users used a variety of media outlets to disseminate targeted safety information and also used newer social media approaches. These included the AgCenters YouTube Channel, eXtension® and SCAHIP's Facebook® and Twitter® outlets. SCAHIP also partnered with Extension Specialists in the land grant colleges in the southeast United States to develop and disseminate safety-oriented best practices for focus industries. This strategy was informed by social marketing, the use of commercial marketing techniques to achieve social goals. While the Outreach core did not conduct full-scale social marketing campaigns, the strategies were informed by such social marketing concepts as a careful analysis of the target audience, paying close attention to the costs to individuals of adopting the desired behavior, an understanding of secondary target audiences that can help encourage behavior adoption, effective placement of messages to facilitate their uptake, and other tenets of social marketing.

While outreach efforts remained flexible to take advantage of opportunities to address newly emerging or highly publicized threats to agricultural safety throughout the region, the majority of effort were focused on three primary target audiences – small farmers, independent logging companies, and small scale fisheries. The 2014 SCAHIP Stakeholder Survey of the agricultural,

forestry and fishing industries highlighted some of the overriding safety and health concerns expressed by stakeholders. In all three industries, machinery and equipment safety was the top area of concern, mentioned by over 70 percent of respondents for each industry. Tractor safety and animal safety were also safety concerns mentioned by respondents in each industry, with a wide range of safety issues specific to each industry comprising the remainder of the responses.

Each year, the Outreach team met with the External Advisory Committee to identify health and safety priorities within agriculture, logging, and fisheries for the coming year. These priorities guided the focus of all outreach.

The Outreach Core also worked cooperatively with partner organizations such as the Cooperative Extension Service, trade groups, professional associations, and businesses serving the agricultural workforce to reach end users. This network supplemented the use of multiple media formats to contact the end user of safety information. By leveraging the existing contact networks that other organizations including the Cooperative Extension Service, trade and professional organizations, and specialty businesses already have with farmers, loggers, and fishers, the Outreach Core efficiently disseminated evidence-based practices in the southeast region. An important concept in social marketing is the importance of trusted spokespersons and partners to deliver behavior change messages. While many small farmers, loggers, and fishers may not have any idea who SCAHIP or even NIOSH are, they are likely to know their local Cooperative Extension agent, or an official from a relevant trade or professional organization operating in their state or region. Using these agents to help deliver evidence-based safety messages can significantly increase the trust individuals have in the accuracy, feasibility, and desirability of the advocated practices.

The Outreach program used purposeful, trans disciplinary approaches for print, online, and face-to-face delivery of safety and health information and training materials to farm/forestry/fish industry owners and operators, hired workers, and the membership organizations, businesses and agencies that serve them. This translation of research activity to real-world application was developed in response to priority health and safety topics identified by input from agriculture/forestry/fishing stakeholders across the 10 state region.

Output/Outcomes

The Outreach program during the 2011-2016 funding cycle was very successful in meeting its mission to provide vital information and support to its stakeholders throughout the 10-state region. The program used purposeful, trans disciplinary approaches for print, online, and face-to-face delivery of safety and health information and training materials to farm/forestry/fish industry owners and operators, hired workers, and the membership organizations, businesses and agencies that serve them. Improved access to stakeholders including Hispanic farm workers and other vulnerable populations was a priority. Materials were developed to ensure that farm safety instruction, guidelines, and other prevention activities were culturally, linguistically, and educationally appropriate and achieved the widest possible diffusion of Center knowledge and research findings, including evidence-based “Simple Solutions”, work organization strategies, and best practices for farm safety and health.

Top output and outcomes include:

- A multi-Center outreach strategy developed with collaborations with the Northeast Center (Cooperstown, NY) the High Plains and Intermountain Center (Colorado State University) and Conceptual Arts, Inc., (Gainesville, FL) on expansion of the National Agricultural Safety Database (www.nasdonline.org) as the top online source for

stakeholder access to resources and tools identified, developed, and evaluated by the NIOSH Agricultural Centers. The program with its strong ties to the University of Kentucky's instructional design program used state-of-the-art technology to package, market, and distribute field-tested agricultural occupational safety and health materials and tools. resulted in updated materials to support agricultural health & safety professionals in the field, crucial digital linkages to social media efforts at all the other Agricultural Centers (e.g. USAgCenter YouTube Channel) and the development of the Next Generation of NASD training tools that include a Web 2.0 'template' for interactive training designed specifically for inspection *tasks* for agricultural safety and health

- A direct output came from direct engagement with stakeholders through a newly designed online survey that asked for input on health and safety areas of importance in the AFF sector. Over 350 responses were collected from across the 10 state region and AFF sector. Stakeholder connection was also made through attendance at local, regional, and national meetings, through faculty and staff members' service on community boards and committees, and through the Center's annual Pilot/Feasibility and Emerging Issues Program, which extended the Center's reach throughout our 10-state region.
- Outreach via Integration of Agricultural Safety Materials in Public Schools: Curriculum Integration. We continued our partnership with three large agricultural education programs in Kentucky. The *Virtual Tractor Safety Walk-Around Inspection CD ROM* was used as required curriculum material in agricultural mechanics classes. These outcomes resulted from Outreach Director and Center research faculty, Dr. Mazur's ongoing work with the Kentucky Association of Agricultural Educators (KAAE). An additional outcome was The Kentucky Department of Education/Career & Vocational Division's designed pilot project that used the NASD tool (described below) for performance assessments for students in high school agricultural mechanics classes that emphasize farm safety units as part of new state required curriculum standards.

- In spring 2014 five additional school districts in KY assembled and installed CROPS on 10 local farmers' tractors. The innovative program (first funded by the Center in 2012) expanded to integrate NIOSH Cost Effective ROPS Installation Plans in agricultural mechanics classes in 11 schools in Kentucky, Tennessee and North Carolina. A clearly measurable outcome, to date, nearly 500 students from 19 schools have participated. This high impact program has installed 64 CROPS on previously unprotected tractors. The CROPS Curriculum Guide, developed in fall 2014, was implemented at the KY, TN and NC sites. (output and outcome).

- Three digital documentaries were uploaded to the YouTube Channel (USAgCenters YouTube Channel). The Center's website has received nearly 8000 visitors, 10,412 visits and 78,578 hits in 2015 including visitors from all over the world including among others Germany, Brazil, and Vietnam; Facebook has generated *76* followers; Twitter 18 followers. The SCAHIP EOP2 project's website showed growth over the 2011-2016 cycle reaching 16, 358 views in 2015 compared to 15,014 in 2014.

- The YouTube video on Occupational Nursing went up to 402 hits. Two webinars were developed and presented: *Aging and Farming: Understanding "Normal"*. 2014 ArgAbility National Training Workshop, webcast 12-2-14. This invited presentation drew 49 participants, and was the highest ever rated training segment for this organization. *"This*

is my world": Perspectives of Senior Farmers and Their Families on Risk and Behavior. AgriSafe webinar. Feb 25, 2015, a one hr CE drew 64 participants.

- An onsite usability test of the Virtual Tractor Inspection (VTI) was conducted with four agricultural education classes and their teacher at a Kentucky high school in December 2014. With these tools NASD will be able to provide training and documentation of performance that can lead to various certifications, such as continuing education (CE) or training certifications.

- Dr. Mazur was a collaborator on the "Safe Children on Georgia Farms: A Statewide NAGCAT Training Program through GWIAA" grant. Dr. Mazur in collaboration with the National Children's Center worked to 'grow' regional Child Safety initiatives with links to various regional Agricultural Centers. Four workshops with follow ups (output) began in March, 2015 and were completed in 2016.

- In 2015-16, presentations have reached 764 stakeholders and nearly 1000 safety materials have been distributed as part of presentations and events.

- SCAHIP Twitter followers have increased from 60 to 112. Citation numbers and website/Facebook hits indicate the Center's online reach to over 1500 individuals during the 2015-2016 year alone. Social media messages included bitly urls in an effort to track hits to those sites. In fact, the bitly/HazardRidge link received a total of 94 hits within a few days of posting the link. The most shared post focused on mower safety and reached 1,256 people.

Southeast Center electronic outreach at a glance:

SCAHIP website
EOP2 website
SCAHIP Facebook page
CROPS Facebook page
NURSE-AP Facebook page
SCAHIP twitter account
CROPS twitter account
NURSE-AP video
US Ag Centers (cross-center collaboration)

Cumulative Inclusion Enrollment Table

N/A

Gender and Minority Inclusion Table

N/A

Inclusion of Children

N/A

Materials for Other Investigators

Materials generated from the Outreach Core are available on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Pilot/Feasibility and Emerging Issues Program (PILOT) (W. Sanderson)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

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Project Start/End:
09/30/2011—03/31/2017

Report Date:
09/30/2017

Description

The purpose of the Pilots and Feasibility Projects Program (PILOT) is to support timely, relevant research, prevention, and education/translation projects that focus on improving the occupational safety and health of agricultural workers in our 10-state region: AL, GA, KY, MS, NC, SC, TN, FL, VA, and WV. Through the Pilot and Feasibility Program, the Center has linked occupational safety and health collaborators from a variety of institutions in our region to address important issues. The program also reflects our collective years of success in: (1) supporting collaborative, "catalyst" type projects aimed at addressing persistent or emerging safety and health problems in agriculture, forestry, and fishing; (2) fostering the professional development and research skills of new investigators and junior faculty; and (3) testing innovative approaches that can be used in larger studies aimed at reducing or eliminating agriculture injuries and deaths.

The Southeast Center's Pilot and Feasibility Program was a combination of research support and outreach to our stakeholders (workers and their families involved in the farming, forestry and fishing industries). The program served a dual purpose; in addition to providing funds for short-term projects addressing agriculture health and safety problems in the region, the program also acted as a means to expand the Center's influence and visibility throughout a region spanning 800,000 square miles—much of the area rural. The PILOT program worked in tandem with the Center's Outreach Core to maintain close connections with a diverse stakeholder community as well as the Evaluation core to guide the selection of relevant projects that meet stakeholders' needs.

Since 1998, the PILOT program has focused on regional priorities with special consideration given to projects that:

- were likely to have a sustained, measurable impact on safety and health in production agriculture, forestry, and fishing in the Southeast region;
- improve occupational disease and injury surveillance;
- address the needs of vulnerable populations such as ethnic minorities, persons with low literacy and limited English proficiency skills, and workers with low socioeconomic status;
- hold the potential for creating innovative solutions to persistent and/or emerging problems such as ag- and forestry-machinery injuries, noise-induced hearing loss, lower back injury and other musculoskeletal disorders, hazardous dust and chemical exposures, respiratory diseases, heat-related diseases, and protection from emerging infectious diseases;
- facilitate the adoption, and sustained use of primary prevention tools such as equipment and machinery modifications.

Outputs/Outcomes

Since 1998, SCAHIP has funded 48 pilot projects across our region. During the 2011-2016 funding cycle, SCAHIP funded 18 pilot projects for investigators from ten different institutions, showing our commitment to the sustainability of research throughout our region. The impact and significance of the PILOT program is evident by the fact that two research projects funded in the Center's current 2016-2021 cycle were initiated as pilot projects funded by SCAHIP. The 18 pilot projects funded during the 2011-2016 grant cycle are briefly described below.

1. Project Title: Integration of Cost-Effective ROPS (CROPS) Construction and Installations into Agricultural Mechanics Courses

PI: Stacy Vincent, PhD, Agricultural Education, College of Agriculture, University of Kentucky
Relevance: This study fostered the translation of research to practice (R2P) among agricultural educators and next-generation farmers while helping to institutionalize proven instructional techniques for helping students recognize the high costs of injuries and the cost-effectiveness of prevention. This pilot project led to our current CROPS project, which is a core research project within the Center. This project is leading to the training of vocational students and the implementation of hundreds of ROPS on tractors.

2. Project Title: Emergency Tractor Shut-Off using a Voice Command System
   PI: Glen Rains, PhD, Associate Professor, Department of Biological and Agricultural Engineering, University of Georgia
   Relevance: Results increased knowledge about the complexity of automatically sending a *help signal* when the tractor operator is not responding or has not returned to his or her seat within a specific time period. Improved voice-recognition technology can benefit older farmers and farmers with disabilities increasing the AgrAbility of the rural workforce. The development of this technology was shared with farm equipment manufacturers.
3. Project Title: Tomato Worker Ergonomics: REBA Panel Evaluation of Video
   PI: Ken Silver, D.Sc. Associate Professor of Environmental Health, East Tennessee State University
   Relevance: This study developed a technique for assessing ergonomic hazards of tomato harvesters using video technology. The results of this study are being used to design larger ergonomic studies of workers in production agriculture.
4. Project Title: Sun Protection Behaviors among Hispanic Farmworkers
   PI: Greg Kearney, DrPH, MPH; Department of Public Health, Brody School of Medicine, East Carolina University
   Relevance: This study assessed the exposures and protective measures taken by farm workers to reduce sun exposure and risks for heat stress and skin damage. The study evaluated the effectiveness of new worker training, deployment patterns, and field and plant technologies.
5. Project Title: Effects of Obesity on the Work and Safety of Farmers
   PI: Sharon Hunsucker, RN, MSN, ARNP, PhD; UK College of Nursing
   Relevance: This study supported Dr. Hunsucker's PhD dissertation, supported by the CARERC. It showed the problems caused by the obesity epidemic reducing the ability of farmers to conduct some farm tasks. The project was used to develop outreach modules for healthy diets.
6. Project Title: West Virginia Logger Hazard Awareness and Injury Risk Perception
   PI: Mark Fullen, EdD, CSP; Safety & Health Extension; West Virginia University
   Relevance: According to the US Census Bureau, nearly 83% of all logging employers employed from 1 to 10 workers. This study developed safety training programs targeted to employers whose safety typically eludes OSHA oversight. This pilot project led to the development of our current study of loggers, which is a core research project within the Center.
7. Project Title: Occupational Exposure to Endotoxins in Airborne Particles in Kentucky's Equine Industry
   PI: Jooyean Hwang, PhD, Department of Public Health, Western Kentucky University
   Relevance: Investigators measured the concentration of endotoxin in personal inhalable dust samples on various livestock farms. The results showed that certain tasks lead to elevated levels of endotoxin in the ranges associated with respiratory diseases. This study led to the development of a larger study to more thoroughly evaluate exposures

associated with certain tasks and the effectiveness of respiratory protection to reduce exposure.

8. Project Title: Farm Safety and Health Intervention Among Rural Youth, Farmers and Farm Workers in Western North Carolina
   PI: Paula Faulkner, PhD; Department of Agribusiness, Applied Economics and Agro-science Education, North Carolina A&T
   Relevance: Over 100 youths and 200 farm families from three counties in Western North Carolina participated in a farm safety and health intervention training program. This projected initiated a longer term project to evaluate the effectiveness of inter-generational safety training to reduce farm injuries.
9. Project Title: Assessment of Occupational Safety and Health Needs and Development of Intervention Opportunities for the North Carolina Aquaculture Industry
   PI: Michael Behm, Department of Technology Systems/ North Carolina Sea Grant, East Carolina University
   Relevance**:** The goal of this pilot study is to identify occupational health and safety needs and to develop opportunities for intervention for the North Carolina aquaculture industry. This is an industry which has received very little evaluation of safety and health hazards.
10. Project Title: Characterizing Exposures to Physical Risk Factors Among Reforestation Hand Planters
    PI: Mark Schall, PhD, Industrial and Systems Engineering, Auburn University
    Relevance: This project evaluated various work tasks involved in reforestation. Hours of video were studied and used to improve the tools used and work-rest regiment of reforestation workers. These workers often plant thousands of trees using poorly designed tools over long shifts.
11. Project Title: Triazine Herbicides and Birth Defects in Kentucky
    PI: Steve Browning, PhD, Assistant Professor, Department of Epidemiology, UK College of Public Health
    Relevance: This study created an exposure database of triazine herbicide concentrations in municipal, well, and surface waters in Kentucky. The exposure matrix by county is being linked to birth defects note on birth certificates from 2000 to 2014. Triazine herbicides are considered endocrine disrupting chemicals and have been associated with fetal anomalies in animals. This study contributes new knowledge about agrichemical exposures and potential environmental health effects.
12. Project Title: Transmission of Bacteria between Livestock and House Sparrows and the Potential Pathogenic Risk to Farm Workers
    PI: David Westneat, PhD, Professor, Morgan School of Biological Sciences, University of Kentucky
    Relevance: Through this pilot effort, antibiotic resistant bacteria were discovered in the feces of birds captured on livestock farms. The number of antibiotic resistant organisms was associated with the use of antibiotics used prophylactically in animal feed. The increasing prevalence of antibiotic resistant organisms in the environment is a growing concern. The results of this pilot study were used to develop a larger study of antibiotic resistant organisms colonizing the intestinal flora of workers on farms.
13. Project Title: A Pilot Study of Malathion, Atrazine, Carbaryl and Chlorpyrifos in the Breast Milk of Women in Suburban and Agricultural Communities of Central Florida
    PI: Marie Bourgeois, PhD; Center for Environmental/Occupational Risk Analysis and Management, University of South Florida
    Relevance: This study measured metabolites of selected pesticides in the breast milk of women in rural Florida communities. The study contributed to current biomarker studies, including the NHANES study, of environmental contaminants. The analytical techniques

developed for this study are useful for larger scale studies of biomarkers for pesticides in breast milk.

14. Project Title: Equine Immune Response to Leptospiral Infection
    PI: Craig Carter, DVM, Veterinary Diagnostic Laboratory, University of Kentucky
    Relevance: After evaluating over 16,000 blood serum samples from horses in Kentucky, Leptospiral organisms were found in blood serum samples of horses almost exclusively in four watersheds in central Kentucky. The results of this study support the hypothesis that Leptospirosis is transmitted among horses through water. The results were used to propose a study of horse farm workers for immunologic evidence of Leptospirosis infection and to propose interventions to prevent waterborne spread of the disease among horses. Lepstospirosis is known to cause fetal abortions among thoroughbred horses.
15. Project Title: Fit to Farm: Protecting Agriculture's Number 1 Asset – The Farmer
    PI: Jessica Wilburn, RN, MSN, AgriSafe Network of North Carolina, East Carolina University
    Relevance: Rural health nurses who routinely visit farm families to provide health care services served as the investigators in this study. They assessed the physical fitness and limitations of farmers for performing farming tasks. Obesity was found to be a prevalent, and increasing problem among North Carolina farmers. The investigators used the results of this study to develop diet and exercise recommendations.
16. Project Title: Modeling Trainer Behavior with Advanced Toolbox Training for Loggers
    PI: Mathew Smidt, PhD; School of Forestry and Wildlife Sciences, Auburn University
    Relevance: This project developed behavioral-based training for improving the safety practices of loggers on the job. The focus was on training trainers of loggers to prevent injuries.
17. Project Title: Environmental Impacts on Effectiveness of Permethrin-Treated Clothing Used by Foresters to Prevent Mosquito Bites
    PI: Stephanie L. Richards, MSEH, PhD; Environmental Health Sciences Program, East Carolina University
    Relevance: Reviewers of the NIOSH AFF program noted that "agricultural and forestry workers are the veritable 'canary in the mineshaft' when zoonotic disease outbreaks occur, given their proximity to animal and avian hosts." NIOSH has been urged to "encourage targeted surveillance" and identify "worksite practice(s) that could reduce or eliminate known sources of zoonotic disease, while also encouraging analysis into zoonotic workforce risk." This study tested the effectiveness of pesticide-treated clothing to prevent mosquito bites.
18. Project Title: Assessing the Effectiveness of Audience Response System Technology in Pesticide Applicator Training
    PI: W. Gregory Cope, PhD, Professor and Extension Leader, Department of Environmental and Molecular Technology, North Carolina State University
    Relevance: This study tested and evaluated a new instructional technology to improve the knowledge and knowledge retention of certified pesticide applicators in NC.

PILOT grantees were encouraged to present the results of their studies at professional conferences and publish the results. Pilot projects from the 2011-2016 cycle have already generated 20 peer reviewed publications and 45 presentations at national/international conferences. Each year SCAHIP provides travel support if funds are available. Also, SCAHIP supports research symposia hosted by collaborating with Universities and Centers in our region. In November 2016 SCAHIP co-hosted a Research Symposia featuring presentations by past PILOT awardees. These activities have been well-attended, and led to research and training collaborations in our region. SCAHIP and the CARERC hosted an occupational health and

safety research symposium in April 2017 in collaboration with the NIOSH-funded University of Alabama-Birmingham ERC, the University of Auburn, the University of South Florida ERC, and the new University of Florida Agriculture Health and Safety center. This symposium provided a forum for the presentation and discussion of research from our Core and PILOT funded projects. SCAHIP plans to co-sponsor this symposium annually. Pilots have shown other successful returns. The CROPS project is moving proven solutions into the field. Starting with initial pilot funding of $15,000 in 2012 this project has grown exponentially. Drs. Vincent and Mazur expanded the innovative program to integrate NIOSH Cost Effective ROPS Installation Plans as metal working, construction and welding projects in agricultural mechanics classes in 11 schools in Kentucky, Tennessee and North Carolina. To date, nearly 500 students from 19 schools have participated. This high impact program has installed 64 CROPS on previously unprotected tractors. The CROPS Project Teacher's Guide developed in fall 2014 is being implemented at the KY, TN and NC sites. The CROPS project is institutionalizing field-tested instructional techniques for helping current and next-generation farmers recognize the high costs of injuries and the cost-effectiveness of prevention through design. This highly successful pilot and administrative supplement continues to expand and is a research project funded in the 2016-2021 cycle. Pilot projects from previous funding cycle (2006-2011) demonstrate the success of the Center leadership in identifying projects that over the long term continue to yield a positive return on investment and in particular the Center's mission to address issues facing vulnerable populations. The Latino Thoroughbred Farm Worker project (LTFW), a 2011-2016 Center research project and expansion of the 2009-2011 funded pilot project "Proyecto de Salud de los Trabajadores del Campo: Latino Farm Worker Health," used lay health promotores as interviewers in their survey of Latino horse farm workers, establishing a network of trained health educators to involve in future Center outreach efforts with this hard-to-reach, vulnerable population. Pilot projects funded during the 2011-2016 cycle reflect the Center's commitment to innovative science with attention to agriculture, forestry and fishing (AFF) across its 10 state region. The 18 pilot studies funded underscore SCAHIP's commitment to building sustained partnerships with regional stakeholders and other university-level researchers while, at the same time, generating new knowledge and innovations in teaching, training, and technology. The projects extend across 7 of the 10 states in the southeast region and include collaborations across agencies (USDA, AgriSafe), extension programs, universities, departments and disciplines including Public Health, Biological Sciences, Veterinary Science, Agriculture, Agricultural Engineering, Nursing, Toxicology, and Environmental Health.

Cumulative Inclusion Enrollment Table

N/A

Gender and Minority Inclusion Table

N/A

Inclusion of Children

N/A

Materials for Other Investigators

Full copies of the Pilot Projects, including final reports are available on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Latino Thoroughbred Farm Worker Health and Safety (LTFW) (J. Swanberg)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

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Project Start/End:
09/30/2011—03/31/2017
Report Date:
09/30/2017

Abstract

The Latino Thoroughbred Farm Worker Health and Safety (LTFW) sought to improve the occupational safety and health of Latino workers by reducing work organization hazards on horse farms. Data were collected via surveys and in-depth interviews with horse farm representatives and through face-to-face surveys conducted by trained lay health promoters with 305 Latino farmworkers. The majority of workers on thoroughbred farms were Latino; among Latinos, the majority were married males, with an average age of 37 and an average of 15 years in the U.S. These workers are at high risk of occupational injury. 43 percent had experienced one in the past year, most of which were caused by routine horse-related tasks, musculoskeletal discomfort, sprains/strains, and injuries to the upper and lower extremities. In addition, workers were at risk for respiratory symptoms in excess of the general population. Numerous work factors were associated with worker occupational health: using dust masks infrequently was associated with respiratory symptoms; long work weeks, long tenure, and poor work safety climate were associated with musculoskeletal discomfort; and work-related stress, having an unfair supervisor, or a non-Spanish speaking supervisor were associated with serious injury in the past year.

This project was committed to reducing the impact of work organization factors by creating and disseminating educational materials. All materials have been disseminated locally and nationally through a media campaign targeting local and national equine and Latino worker-focused outlets. At the time of reporting, over 6,828 of these and other materials have been distributed to farms, tracks, and Latino outreach organizations. In addition, numerous farms have expressed their commitment to enacting new practices based on the materials and the recommendations therein (e.g., one farm now reimburses workers for their purchase of steel-toe boots).

Background

Agriculture is among the most dangerous industries for occupational injury and illness with fatality and injury rates seven times the national average. Within agriculture, animal production is particularly dangerous. The national rate for injury and illness among workers in animal production is 6.9 per 100, compared to 5.3 for all agricultural workers. Latino workers comprise the majority of farmworkers and often experience greater risk, making them a NIOSH priority. Although data on the degree to which Latino farmworkers experience occupational injuries and illnesses is limited, research indicates that Latino farmworkers are at high risk for fatality, injury and illness due to their disproportionate assignment to high-risk tasks; differences in work practices; inexperience; lack of information about health, safety and legal rights; linguistic and cultural barriers in communication and training; lack of enforcement of safety standards; and fears of retaliation associated with reporting unsafe working conditions.

Of the 2 million horse owners in the United States, 238,000 are involved in horse breeding. In 2007, the National Agricultural Statistics Survey reported a national inventory of 4,028,827 horses, 506,503 of which were sold in that year. Nationwide, horse breeding employs 460,000 full-time workers, with Latino and foreign-born workers representing over two-thirds of workers in animal handling and other front-line farm positions. Despite the critical role that horse production plays in many states' agricultural economies, minimal research has assessed the health risks of its workers.

The few studies that have been conducted on worker health and hazardous conditions have mostly been conducted in foreign settings or with horse trainers or riding instructors. These studies suggest that hazards on horse farms include dusty work environments, animal kicks, bites and falls, and repetitive pulling on upper extremities. Although these studies have contributed greatly to our understanding of hazards present in horse production, none of them looked directly at Latino workers.

Kentucky ranks first in the nation for production of horses and 'other animals'. As such, Kentucky offers access to a large number of horse farms, workers and supporting organizations.

Aims

The Latino Thoroughbred Farm Worker Health and Safety (LTFW) sought to improve the occupational safety and health of Latino workers by reducing work organization hazards on horse farms. To address this goal, four aims were achieved:

1. Identify job hazards and work organization factors inherent within horse production;
2. Systematically describe Latino workers employed on horse farms in Kentucky and the type and context of illness, injuries and near miss incidents they experience;
3. Determine how work organization factors may increase exposure to and interact with job hazards as well as occupational illness, injury and near misses among Latino workers;
4. Develop and disseminate educational safety and health materials for horse farm managers and Latino horse workers.

Methods

The methodology includes the involvement of an Advisory Council, as well as interviews and worker surveys.

Two advisory councils were formed to provide guidance and feedback into all phases of the research process. The Equine Industry Advisory Council consisted of representatives of Lexington-area equine and business associations. The Community Advisory Council included members from local health and social service agencies. Their advice guided the overall direction of the study, and they were able to ensure that the content and language of the survey and educational materials was appropriate for its intended audience. Their endorsement of the project also facilitated the project's ability to impact in the target communities.

Farms were eligible to participate in the study if they: (1) bred or boarded thoroughbred horses, (2) employed at least one Latino worker, and (3) were located in Kentucky. The employer representative was eligible if s/he was at least 18 years of age and was the farm owner, manager, or human resources administrator (e.g., Human Resources Manager, office manager) at the recruited farm.

A sampling frame of 82 thoroughbred farms was developed and populated using names of farms identified by the Industry Advisory Council to match estimated distributions of farm size in the region: 70 percent employ less than 10 workers (small farms), 15 percent employ 11–25 workers (medium farms), and 11 percent employ more than 25 workers (large farms). Because there is no known database that reports horse farm size by number of employees, farm size was estimated by advisory council members according to the above definitions. Farm size was either confirmed or corrected in the interview.

Eighty-two farms were invited via letter to participate. Twenty (24 percent) were ineligible or were not reachable by phone. Of the remaining 62 farms, 32 completed the phone interview (52 percent response rate) and 26 participated in both the phone and the face-to-face in-depth interview (42 percent participation rate); at this point saturation was reached. Three main types of data collection strategies were used to gather information on thoroughbred farms: a phone interview, an in-depth, semi-structured, face-to-face interview, and the collection of de-identified injury logs or other self-collected data from farms. In addition, the interviewer collected copies of de-identified workers' compensation claims, Occupational Safety and Health Administration (OSHA) reporting logs, and internal farm injury logs.

Latino thoroughbred farmworkers were recruited and interviewed via a purposive sampling strategy in the community. A randomized sampling approach was rejected because no list of workers in the industry existed. Site-based sampling by residence was not feasible because workers live in dispersed areas; site-based sampling by work site was also not feasible because the survey contained sensitive questions about work, and participants may have felt that their jobs would be in jeopardy. Eligible workers self-identified as Latino; were > 18 years of age; and had worked at a thoroughbred farm for at least nine months in the past year.

Between July and September 2014, an additional 15-minute survey and spirometer test were administered to 80 Thoroughbred farmworkers recruited using the same techniques described above. Two of the four trained Promotoras that collected data for the worker survey also collected data for the survey/spirometer portion of the study.

Four lay health promoters Promotoras performed in-person interview-administered questionnaires to a total of 225 Latino thoroughbred workers; two of them also recruited and administered a shorter survey and spirometer test to 80 Thoroughbred workers.

Findings

Aim 1: Identify job hazards and work organization factors inherent within horse production. Horses were the most dangerous aspect of work on the farm, accounting for the majority of injuries from farm injury logs and worker injury reports; routine tasks (e.g., leading a horse) most frequently led to injury. Personal protective equipment (PPE) was not commonly available to Latino workers apart from gloves; neither was training, even for those handling pesticides or medicines. Further, the average safety climate was below the scale midpoint and most workers reported feeling work-related stress.

Aim 2: Systematically describe Latino workers employed on horse farms in Kentucky and the type and context of illness, injuries and near miss incidents they experience. According to farms, farmworkers tended to be male, Latino, and foreign-born (mostly from Mexico, but 27 countries were represented). Most of our Latino worker sample were male, married, had a middle school education or less, and were parents. Their average age was 35, with an 11-year tenure on horse farms, and 15 years in the US. Less than a third spoke English well, a third understood English well, and a quarter read English well; however, two-thirds had managers who spoke some Spanish.
Latino workers experienced a high burden of occupational injury (43%), musculoskeletal discomfort (MSD) (85%), and respiratory symptoms (62%) in the past year. In addition, 18% experienced an injury receiving medical attention, 26% experienced a near miss incident, and among the 80 Latino workers who performed spirometry tests, a quarter (27%) showed abnormal pulmonary function.

Aim 3: Determine how work organization factors may increase exposure to and interact with job hazards as well as occupational illness, injury and near misses among Latino workers. Numerous work organization factors were related to occupational health outcomes. Wearing a dust mask infrequently was associated with twice the odds of respiratory symptoms. Long work weeks, more experience, and perceiving a poor work safety climate were associated with increased likelihood of musculoskeletal discomfort. Work-related stress, long tenure, perceiving one's supervisor as unfair, and having a non-Spanish speaking supervisor were associated with experiencing a serious injury in the past year.

Aim 4: develop and disseminate educational safety and health materials for horse farm managers and Latino workers on horse farms. Managers wanted to see three things from this work: the findings, what other farms were doing, and training materials for non-English speaking workers. Therefore, we created:

1. A series of 10 research briefs communicating study findings in a concise, visual, format that offers management tips and resources pertinent to each finding
2. *From the Field,* a promising practices report that provides farms with information from their peers about health and safety practices and recommendations from the scientific literature or from other industries in an organized, clean format
3. *Safety on the Farm*, a graphic, bilingual illustrated training guide for thoroughbred farm work that was created using iterative feedback from over 80 industry and community representatives
4. A project website to house all materials

Conclusions

To date, 5,886 various safety and health materials including 1,250 physical copies of *Safety on the Farm* have been distributed to farms, tracks, and organizations that service Latino workers. Their dissemination has been strategic, targeting organizations and publications with social capital in the industry (Kentucky Thoroughbred Farm Managers' Club, KTFMC; Kentucky Thoroughbred Association, KTA). In fact, these organizations were on our advisory council so they would be co-owners and aids in planning, recruitment, interpretation, and dissemination. Our materials have also been featured in 6 local, 14 national, and 2 international media outlets targeting the industry or its workers. Over the life of the project, 23 local, 39 national, and 4 international outlets have reported on it, some of which have as many as 60,000 subscribers in all 50 states. Traffic to the website shows high interest: 6,792 page views (5,365 unique) and 494 documents have been downloaded as of September 5, 2017.

Numerous farms have indicated their interest in following recommendations laid out in the materials, showing their potential for immediate impact on worker exposure. One farm with more than 200 employees has initiated a program reimbursing workers for their steel-toe work boots. Several farms expressed surprise by the worker respiratory symptom findings and affirmed they will offer, recommend, and use dust masks on their farm. Our materials also provide resources for fit testing, maintaining and purchasing masks. Numerous organizations that provide training to farms use our materials as a basis for programming.

Our findings pertaining to work organization and occupational safety and health—e.g., long hours, communication and relationship quality with supervisor, work-related stress significantly increased odds of poor health—provide important information to a growing body of work. Our method of employing lay health promoters as researchers may be utilized with hard-to-reach populations in all disciplines.

Outputs/Outcomes

Potential outcomes. All project materials aim to influence farm policy and practice and improve worker health and safety if utilized. Each is a tool for improving safety by serving as a key component of a health and safety training program (*Safety on the Farm*), or by providing detailed recommendations rooted in our research, the literature, and farms' lived experiences (*From the Field*, research briefs).

Intermediate Outcomes. The following Intermediate outcomes have been achieved
A group of Chief Financial Officers through the KTA used the materials to inform farm policies
BGFC, a non-profit providing outreach to thoroughbred farmworkers and KEMI, a workers' compensation firm covering most horse farms statewide both use materials to inform programming.

Many farms stated they will implement project recommendations (e.g., one farm with >200 employees now reimburses workers for steel-toe boots, another will use color-coded labels to distinguish hazards or chemical classes). Numerous farms will use *Safety on the Farm* as a worker training guide.

18 manuscripts/theses were written and 28 presentations were given to academic or professional audiences; team was represented at 11 community/industry events. Project manuscripts have been cited 49 times in the literature. In addition, 6,828 safety materials were disseminated.

The numerous farms that are changing farm policies and initiating training programs based on study materials demonstrate a reduction in exposure for all workers at those farms.

Selected Publications

Clouser JM, Swanberg J, Bush A, Gan W: [2017] Associations of Work Stress, Supervisor Unfairness, and Supervisor Inability to Speak Spanish with Occupational Injury among Latino Farmworkers. Journal of Immigrant & Minority Health, in press.
Swanberg J, Clouser JM, Gan W, Flunker JC, Westneat S, and Browning SR: [2016] Poor safety climate, long work hours, and musculoskeletal discomfort among Latino horse farm workers. Archives of Environmental & Occupational Health: 1-8.
Swanberg J, Clouser JM, Bush A, Westneat S, Reed D: [2015] Understanding work organisation factors on thoroughbred farms in southeastern United States. International Journal of Agricultural Management 5: 4-13.
Clouser JM, Swanberg JE, and Bundy H: [2015] Keeping workers safe: Does management risk perception match PPE provision? American Journal of Industrial Medicine 58: 886-896.

Cumulative Inclusion Enrollment Table

Program Director/Principal Investigator (Last, First, Middle): Swanberg, Jennifer

Inclusion Enrollment Report

Study Title: Latino Thoroughbred Farm Worker Health and Safety (LTFW)

Total Enrollment: 362 **Protocol**

Grant Number: 5U50OH007547-15

PART A. TOTAL ENROLLMENT REPORT

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not	Total
Hispanic or Latino	55	261	1	317 **
Not Hispanic or Latino	14	31	0	45
Unknown (individuals not reporting ethnicity)	0	0	0	0
Ethnic Category: Total of All Subjects*	69	292	1	362 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	2	0	2
White	69	290	1	0
More Than One Race	0	0	0	0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of All Subjects*	69	292	1	362 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not	Total
American Indian or Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	2	0	2
White	69	290	0	290
More Than One Race	0	0	0	0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of Hispanics	69	292	0	362 **

Gender and Minority Inclusion Table

See Cumulative Inclusion Enrollment Table above

Inclusion of Children

No subjects under age 21 included in the study

Materials for Other Investigators

Materials generated by the Latino Thoroughbred Farm Worker Health and Safety Study are available on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP2) (J Mazur)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

Principal Investigator

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Project Start/End:
9/30/2011 – 3/31/2017

Report Date:
09/30/2017

Abstract

Agriculture consistently ranks among the most dangerous occupations in the United States. Every year hundreds of farm workers die from on-the-job injuries. In 2015 alone, 401 farmers and farm workers died from a work-related injury, resulting in a fatality rate of 19.2 deaths per 100,000 workers, a rate seven times higher than the average fatality rate in the private sector. Startlingly, many of these deaths occur in the youngest workers. On average, 113 youth younger than 20 die annually from farm-related accidents. Most of these deaths occur in youth 16-19 years of age. Tractors and All-Terrain Vehicles cause the majority of these injuries. Besides the tragic personal costs of losing family members and friends to injury or fatality, there are economic and social losses to take into account. Every day about 167 agricultural workers suffer from lost-work time due to injuries, many of which become permanent. These largely preventable events cost time and money, but the collateral damage impacts hundreds of families. The school is at the center of most rural communities. Proven safety intervention models show that reaching at risk teens and adult farmers where they work and meet is the most effective means of delivering important safety information.

Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP2) used a unique approach to reach at risk teens where they are each day -- in their high school classroom. The crux of this innovative program is a “train the teacher” approach that engages pre-career teachers and future agriculture industry professionals in their graduate school classrooms. By providing training to recognize and understand occupational risks, hazards, injury prevention strategies, and the social costs of injuries, the EOP2 program equipped these individuals to become safety advocates in their classrooms and communities. The project was innovative by combining farm safety and economics within mandated core content of high school curricula, including agricultural education, using the latest technologies; an immersive 3D game, virtual tractor inspections, interactive online story simulations, interactive Excel $_{TM}$ Cost Tools, digital documentaries, WebQuests and podcasts. Over the course of the project a total of 426 graduate students were in the EOP2 program. Of these 311 received the specialized curriculum. Once graduated, teachers interact with and influence hundreds of students in the course of a school year – impact that extends over the course of many years of their teaching careers. Students in agricultural education classes typically become local community leaders and continue to grow the culture of farm safety in their rural communities.

Background

EOP2 was the culmination of over a decade of work by agricultural health and safety researchers at the Southeast Center for Agricultural Health & Injury Prevention. The project grew out of several earlier projects, the Kentucky ROPS Project and the Preventing Farm Injury to Rural Youth project. Joan Mazur, EOP2 investigator, then a senior researcher on ROPS Project, relayed her experiences living on a farm in rural Washington County, KY. All the teenagers that got off the bus on her ridge were *not* in agricultural education classes. Rather they were general education students, some in advanced placement courses on track for college entrance. Yet, they got right off that bus and onto tractors on their farms. The school is at the center of most rural communities. Proven safety intervention models show that reaching at risk teens and adult farmers where they work and meet is the most effective means of delivering important safety information. Dr. Mazur suggested to reach a larger population of rural youth exposed to farm hazards that farm safety simulation materials be linked to the required state core content standards in high school social studies (economics), math, physics, and English (interview assignments and portfolio writings) classes. With this insight, the strategy to integrate important agricultural safety materials into required high school curriculum was born. Mazur, a professor in Curriculum & Instruction had years of experience working in public schools and took the lead on developing those collaborations. The crux of the EOP2 strategy is the "training the teacher/training" approach. Training pre-career teachers and agricultural industry professionals while they are in their graduate programs (training the teacher), provides them with the insight, training and curriculum to allow them to later act as safety advocates in their communities and classrooms. Follow up interviews reveal that future teachers and youth leaders are effective agricultural safety advocates. EOP2 provides these future teachers and other agricultural industry professionals who will have contact with at-risk youth and adult farmers with increased safety awareness, accessible curriculum and a sense of responsibility as change agents in the rural communities in which they will work following graduation.

Aims

- Targeting Agricultural Education programs in the Southeast, increase the number of pre-career professionals trained in the use of online simulations, cost tools, and digital instructional materials that emphasize the cost-effectiveness of injury prevention.
- Expand access to the Economics of Prevention: Social & Individual Costs course by making it available online in interactive Web formats.
- Develop and field test new highly-engaging digital intervention products, including an internet game template and virtual tractor inspections that motivate youth at high risk of injury to identify hazards and take preventive measures.

Methods

The EOP2 Program used an innovative train-the teachers strategy to promote safety awareness and use of low-cost injury-prevention strategies. Working in college classrooms in Arkansas, Florida, Kentucky, Mississippi and North Carolina, EOP2 investigators presented their specially designed curriculum to pre-career graduate students enrolled in teacher preparation, agricultural economics or other graduate level courses. These students were trained in using the innovative curriculum comprised of digital interactive games, simulations that actively engaged them with farm work and farm life allowing them to make safety decisions when using farm equipment, driving on rural roads, using ATVs or riding horses, interactive Excel cost tools that graphically

depicted the individual and social costs of ANY injury; strategies and lesson plans for use in both agricultural education AND general education subjects such as social studies, physics, math and English. All instructional materials were linked to required state core content standards; Next Generation Learning and Technology use supported through the inclusion of digital documentaries, podcasting and use of Web 2.0 databases.

The EOP2 program also included a research component to explore and validate program effectiveness. Using an intervention/control repeated measures design, the study had some classes receiving the online program materials, while other classes served as a control group, not receiving the intervention materials. However, all students completed the pre-intervention Farm and Rural Life Experience (FRLE) demographic measure, and at both the beginning and the end of the semester, also completed the Thinking, Talking and Acting Safely (TTS), stages-of-change measure, and the Farm Safety and Economics (FSE) test.

Specific measures used in the pre and post semester data collection included:

Farm and Rural Life Experience Survey – a 30 item demographic measures that documented students' rural and farming-related experience, injury exposure and history.

Thinking, Talking and Acting Safely – a stages of change behavioral intentions measure given to both intervention and control students at the beginning and end of the semester.

Farm Safety and Economics – a 32 item test that assessed knowledge of both farm safety and cost of farm safety decision making given to both intervention and control students at the beginning and end of the semester.

Injury Simulation stories – provided to intervention group students only. Online narrative simulations that outlined events leading up to and following an injury event.

Cost tools – provided to intervention group students only. The Interactive Cost Tools helped students conduct an economic cost analysis of the injury event shown in the injury simulation, as well as a cost-effectiveness analysis of actions that could prevent the injury.

Hazard Ridge – provided to intervention group students only. This interactive 3D video game taught preventive safety measures and how to navigate challenges in real time.

Another key project innovation was the Online Data Collection. This system enabled a course instructor to have *instant access* to real-time, self-report surveillance data that students report in their pre-test measures. Thus these data collection instruments could be used *formatively* so that an instructor who is using the EOP2 Educational Materials can access and understand, for example, the *prior knowledge and experiences* of their students with agricultural injury and rural community life experiences. It cannot emphasized strongly enough the power of these data to bring real world stories and experiences into the classroom discourse.

Findings

Over the course of the project a total of 422 graduate students were in the EOP2 program across the 5 states. Of these 311 were in the intervention group that received the specialized curriculum.

Demographic and exposure to farm hazards

The analysis of the Farm and Rural Life Experience (FRLE) demographic survey show 45% of students were male and on average 22.1 years old. 54% of students had lived on farms, 67% had worked on farms. 91% of the students reported visiting farms of friends and/or family members.

The FRLE also provided data related to injury surveillance: 26% of respondents reported a tractor overturn involving self, family, or friend. 4% reported a highway motor vehicle and farm equipment collision for self/family/friend. 39% reported a self/family/friend suffered a head injury from a fall, with ATV, motorcycle, horseback riding falls the most common. 36% reported temporary hearing loss to self/family/friend from exposure to loud noise with 16% reporting permanent hearing loss from loud noise to self/family/friend. 21% reported an injury that resulted in financial loss.

Behavioral Intention

The Thinking, Talking and Acting Safely (TTS) measured behavioral intention. Statistically significant increases in the TTS scores were found for intervention students compared to the controls. There was also a significant interaction effect for both intervention and control groups. Students who *did not* live or work on a farm scored higher, regardless of being an agriculture or non-agricultural major.

Knowledge of Farm Safety Practices and Economics

The Farm Safety and Economics (FSE) measure determined students' knowledge of the individual and social costs of farm injury and the cost effectiveness of interventions that would prevent injury. Results for the FSE measure mirrored results for the TTS attitude and behavioral intention measure. Statistically significant increases in the knowledge of the economic consequences and social costs of injury and the cost effectiveness of preventative measures were found for intervention students compared to the controls. The intervention group scored significantly higher than the controls with a significant interaction effect for both groups. Students who *did not* live or work on a farm scored higher, regardless of being an agriculture or non-agricultural major.

Conclusions

Data show many pre-career professional rural youth leaders have experiences with such injuries regardless of whether or not they have lived or worked on farms. The pre-career teachers and other agriculture industry professionals trained in EOP2 who will have contact with at-risk youth and adult farmers have acquired increased safety awareness that informs a sense of responsibility as change agents in the rural communities in which they will work following graduation. The EOP2 project was innovative in its focus on all teachers who may have contact with rural youth exposed to farm hazards, not just those teachers for example in agricultural education or economics classes in high schools. Many students who are exposed to farm hazards are *not necessarily* taking agricultural education courses but live or work on farms in their rural communities just the same.

Outputs/Outcomes

Over the course of the project a total of 422 graduate students were in the EOP2 program. Of these 311 were in the intervention group that received the specialized curriculum. Once graduated, teachers interact with and influence hundreds of students in the course of a school year – impact that extends over the course of many years of their teaching careers. Students

in agricultural education classes typically become local community leaders and continue to grow the culture of farm safety in their rural communities. The Social Costs of Agricultural Injury & Economics of Prevention course will continue to be offered, as a sustainable product of the project.

The EOP2 project generated tangible outputs in the creation and sustained marketing and dissemination of state of the art curriculum suitable for high school and college level teaching as well as adult training within rural communities. Instructional materials are in use in high schools and university classrooms in Kentucky, Florida, Mississippi, Arkansas, North Carolina and Georgia. EOP2's An Economics of Prevention website (eoponline.org) archives all curriculum outputs available for distribution including:

Hazard Ridge video game: this interactive 3D video game teaches teens preventive safety measures and how to navigate challenges in real time. In 2016, Hazard Ridge won Bronze in the 2016 International Serious Play Awards for its' outstanding ability to deliver high quality engagement and offer measurable assessment elements. See website at:seriousplayconf.com/2016-serious-play-awards/. Hazard Ridge has received 12, 302 page views and 5, 448 visitors.

Virtual Tractor Inspection (VTI): a web-based course teaches students to rate the safety of various tractor models through an online portal. Students are placed into real-life situations so they learn to evaluate tractors for safety based on visual information alone. During the 2014-2016 school years, 264 agricultural education students completed the VTI online learning modules and the 20-item final assessment.
Story Simulations: are online in CaseMate – a web-based application that does TWO things critical for instruction: 1) delivers the simulation in sections that display decision points and provide instant feedback; 2) students' responses are recorded as performance measures that reveal understanding and misconceptions about safety practices.

Interactive Excel Cost Tools: help students conduct an economic cost analysis of the injury event depicted, as well as a cost-effectiveness analysis of actions that could prevent the injury.

Digital Documentaries: Empowering the Farmer's Voice: Using digital movies as a means of engaging students in the human side of injury prevention and how much injuries cost both individually and socially is a hallmark of the EOP2 approach.

Ag Safety Podcasts: Using podcasting as a means of engaging students in the human side of injury prevention and how much injuries cost both individually and socially is also part of the EOP2 approach. The 3 minute podcasts are an excellent way to engage students in the agricultural safety narrative and connect them to the actual risks and costs of injury.

WebQuests: allow students to explore databases for various injuries and ask students to take the role of an insurance claims adjuster investigating a farm injury incident. They evaluate the costs and liabilities and how preventable the injury may have been.

Selected publications and proceedings

Cole HP, Myers MM, Westneat SC, Mazur JM, Watson JM: [2016] Rural Kentucky High School Students' Exposure to ATV Riding and Injuries. J Agromedicine. 21(1):5-14. doi: 10.1080/1059924X.2015.1106995.

Mazur J, Vincent S, Watson J, Westneat S: [2015] Integrating Cost-effective Rollover Protective Structure Installation in High School Agricultural Mechanics: A Feasibility Study. J Agromedicine. 20(2):149-59. doi:10.1080/1059924X.2015.1009665. PubMed PMID: 25906273.

Mazur J, Meister J, and Hoagland, R: [2014] Hazard Ridge: A Serious Gaming Intervention for Preventing Injury to Rural Farm Youth. Proc of the 19th International Conference on Computer Games: AI, Animation, Mobile, Educational & Serious Games Louisville, KY, July 28 – 30.

Cumulative Inclusion Enrollment Table

Program Director/Principal Investigator (Last, First, Middle): Mazur, Joan

Inclusion Enrollment Report

Study Title: Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP2)

Total Enrollment: 422 **Protocol**

Grant Number: 5U50OH007547-15

PART A. TOTAL ENROLLMENT REPORT

Ethnic Category	Sex/Gender			
	Females	**Males**	**Unknown or Not**	**Total**
Hispanic or Latino	0	0	0	0 **
Not Hispanic or Latino	0	0	0	0
Unknown (individuals not reporting ethnicity)	232	190	0	422
Ethnic Category: Total of All Subjects*	232	190	0	422 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	0	0	0
White	0	0	0	0
More Than One Race	0	0	0	0
Unknown or Not Reported	232	190	0	0
Racial Categories: Total of All Subjects*	232	190	0	422 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not	Total
American Indian or Alaska Native				0
Asian				0
Native Hawaiian or Other Pacific Islander				0
Black or African American				0
White				0
More Than One Race				0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of Hispanics				**

Gender and Minority Inclusion Table

See Cumulative Inclusion Enrollment Table above

Inclusion of Children

Sixty-two of the 422 students included in the EOP2 project were under the age of 21. Proven safety intervention models show that reaching at risk teens and adult farmers where they work and meet is the most effective means of delivering important safety information.
Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP2) used a unique approach to reach at risk teens where they are each day -- in their high school classroom. The crux of this innovative program is a “train the teacher” approach that engages pre-career teachers and future agriculture industry professionals in their graduate school classrooms. By providing training to recognize and understand occupational risks, hazards, injury prevention strategies, and the social costs of injuries, the EOP2 program equipped these individuals to become safety advocates in their classrooms and communities.

Materials for Other Investigators

Materials from the EOP2 project can be accessed on the SCAHIP website:

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Administrative Supplement: Cost-effective Roll-over Protective Structures (CROPS) (S Vincent)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

Principal Investigator

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Project Start/End:
09/30/2011—03/31/2017

Report Date:
09/30/2017

Abstract

The 2014 - 2015 Administrative Core Supplemental: Cost-effective Roll-over Protective Structures (CROPS) advanced both the effectiveness and cost-effectiveness of roll over protective structures (ROPS) on farm tractors. ROPS, combined with safety belts, are 98 percent effective in preventing tractor operator deaths. The CROPS project's goal was to reduce the number of tractor related injuries and fatalities in farm communities in the southeast by becoming a part of the culture of agricultural education programs. This project extended the impact of the Kentucky CROPS pilot project originally funded through SCAHIP pilot funding into additional Kentucky school districts (a total of 8 rural Kentucky counties including 3 Appalachian districts) and two additional states, North Carolina and Tennessee. The CROPS project was the result of a collaboration with investigators from SCAHIP's Economics of Preventing Injuries to Adolescent and Adult Farmers (EOP2) research project. Lessons learned from navigating research data collection within secondary school systems, designing effective safety programs to embed in public school curriculum, as well as collaboration on survey measures was critical to the success of the CROPS project. This high impact program took safety guidelines from NIOSH research translating them into actual practice implementation in high school Agricultural Power Equipment & Mechanics programs. Students identified community need for CROPS installations and through a supervised project, constructed and installed the CROPS. Increased installations of CROPS reduced exposure to crush and roll over injury and fatality in the targeted communities. Since the program began, 19 agricultural education programs in Kentucky, Tennessee and North Carolina have participated, involving nearly 500 students. Combined, they built and installed 64 CROPS, protecting over 200 lives.

Background

Agriculture consistently ranks among the most dangerous occupations in the United States. Tractor overturns, the leading cause of farming related injuries or deaths kills 96 people per year on average. The National Agricultural Tractor Safety Initiative reported that annually 110 deaths occur from tractor overturns and another 52 deaths occur when operators fall from moving tractors or run over second riders or bystanders. Tractor related fatalities account for fully one-third of agricultural-related deaths. And for each fatality, there are an estimated 40 tractor-related injuries. An average of 113 youth die annually from farm-related injuries. Approximately 23 percent of fatal injuries to youth involved machinery. Roll Over Protective Structures (ROPS) in combination with seat belts are known to be 98% effective in preventing tractor operator deaths from overturns and ejections from the tractor seat. Unfortunately, the percentage of ROPS equipped tractors has stubbornly remained flat. Farm Safety Surveys from both 2006 and 2011 show that 50 percent of the nation's farm tractors lack ROPS. What accounts for the persistence of non-ROPS equipped tractors? The combination of smaller family farms, older, non-ROPS equipped tractors and the costs of retrofitting older model tractors with ROPS are the most often cited reasons for the persistence of non-ROPS equipped tractors. In recent years NIOSH has sought to address the problem of cost in ROPS retrofits through the design and testing of Cost Effective ROPS plans (CROPS). These plans and information about construction materials and installation for several brands and models of tractors are available on the NIOSH website**.** The goal of this study was to educate students about safe farming and to reduce the number of tractor related injuries and fatalities in farm communities in the southeast, targeting high poverty areas in Appalachia. The CROPS project sought to reduce the number of tractor related injuries and fatalities in farm communities in the southeast by becoming part of the culture of agricultural education. The primary strategies to prevent farm injury and fatality were (1) the reduction of exposure to hazard (unprotected tractors without ROPS) through Cost-effective Roll Over Protective Structure (CROPS) installations, (2) changes in behavioral intention to engage in safe farm practices for youth aged 15-20, and (3) long term school-community partnerships that sustain a culture of farming safety and ongoing CROPS installations.

There are 8000 Agricultural education programs in the U.S. with more than 500,000 students. The majority of these students plan futures in agriculture, either on their own family farm operations or in agribusiness or other agricultural careers. Preparing these future farmers and agriculture professionals to engage in a culture of safety has become an increasingly important part of agricultural education programs. The 2014 Administrative Core Supplemental: Cost-effective Roll-over Protective Structures (CROPS) advanced both the effectiveness and cost-effectiveness of roll over protective structures (ROPS) on farm tractors. This project sought to reduce exposure to tractor overturn hazards in rural Kentucky counties through the installation of cost-effective ROPS on unguarded tractors using plans from the NIOSH CROPS website; tested the feasibility of integrating CROPS construction and installation projects into required Agricultural Mechanics classes in four rural high school education programs; conducted a pre-post evaluation of knowledge/awareness of CROPS and increased skill in constructing and installing CROPS, using surveys of approximately 500 agricultural education students in the four schools, interviews with teachers, and analysis of project logs; and finally, disseminated findings from this study with educators nationally and at the state level.

The CROPS project was the result of a collaboration with EOP II researchers. Lessons learned from navigating research data collection within secondary school systems, designing effective safety programs to embed in public school curriculum, as well as collaboration on survey measures have been critical to the success of the CROPS project.

AIims

This project replicated and extended the impact of the Kentucky CROPS pilot project originally funded through SCAHIP feasibility funding into additional Kentucky school districts (including 3 Appalachian districts) and two additional states Tennessee and North Carolina. The project integrated NIOSH CROPS plans and installations in high school Agricultural Power Equipment & Mechanics programs. Students identified community need for CROPS installations and through a supervised project, constructed and installed the CROPS. Increased installations of CROPS reduced exposure to crush and roll over injury and fatality in the targeted communities.

Specific aims were:

1. Develop social media and marketing strategies to increase students' and public knowledge & awareness.
2. Design and conduct teacher professional development workshops for CROPS construction and installation.
3. Design and distribute CROPS curriculum into the classrooms
4. Address implementation issues, if any, associated with the CROPS projects.
5. Track the number of CROPS installations pre- and post the project implementation year
6. Evaluate and validate the effectiveness of the curriculum innovations on student knowledge, attitude and behavioral changes related to the hazard of unprotected tractors

Methods

The goal of this study was to reduce the number of tractor related injuries and fatalities in farm communities in the southeast, targeting high poverty areas in the Appalachian region using three primary strategies to prevent farm injury and fatality: (1) the reduction of exposure to hazard (unprotected tractors without ROPS) through CROPS installations, (2) education to foster changes in behavioral intention to engage in safe farm practices and (3) school-community partnerships that sustain a culture of farming safety. The CROPS project used a pre-post intervention-control repeated measure study design to validate the effectiveness of the curriculum innovations, the teacher training & professional development and the crowd-funding strategies on attitudes, perceived social norms and behavioral changes in valuing, constructing and installing CROPS to reduce exposure to the hazard of unprotected older model tractors in the Southeast.

Findings

CROPS project collaboration with another SCAHIP project produced the Rural Life and Experience Summary used to collect exposure data from 500 high school students on incidents happening not only to the student but also their family/friends, providing a better estimate of the prevalence of injury and illness related to tractor overturns, falls and hearing loss. A third of the students reported: a tractor overturn incident; injuries from falls from horses or atvs. 48.7% of CROPS students reported temporary hearing loss from exposure to loud farm-related noise; 5% reporting permanent hearing loss to either themselves or family/friends.

Conclusions

The CROPS project addressed the value of integrating CROPS plans into the Power and Mechanics classes in high school agricultural education programs. The strategy of integrating tractor safety into existing high school curriculum proved effective, resulting in positive knowledge gain and recognition of the importance of installing ROPS on unguarded tractors. Not only have students found the real-world connection of the curriculum to their lives and community, the program has also allowed them to apply their knowledge to an often ignored safety issue that can have a deeply personal impact.

A student reported: "There was a tragedy in my family without a ROPS. My dad got killed a couple of years ago. So after that and now that I've had this experience, we've got a ROPS on our tractor now. We're going to help out other people so that they have a ROPS also, so that nothing else happens to anybody else….." And an Agriculture Mechanics teacher reported: "Definitely a big impact. I could really tell la difference this year when we had our tractor driving…..Now they understand, so now they do wear a seat belt. Actually, the seat belt on the tractor tore up. They wouldn't even drive it until we got it fixed."

Outputs and Outcomes

- The CROPS project moved proven solutions (ROPS) into the field with the installation of CROPS on unguarded tractors. Cost-effective Roll-over Protective Structures (CROPS) advanced both the effectiveness and cost-effectiveness of roll over protective structures (ROPS) on farm tractors. This project integrated NIOSH CROPS plans and installations in high school Agricultural Power Equipment & Mechanics programs. Students identified community need for CROPS installations and through a supervised project, constructed and installed the CROPS. Increased installations of CROPS will reduce exposure to crush and roll over injury and fatality in the targeted communities. To date, nearly 500 students from 19 schools have participated in the program. The impact of this project was the construction and installation of 64 Cost-effective Roll Over Protective Systems as designed by NIOSH on unprotected older model tractors in rural, resource- depleted communities in Kentucky (a total of 8 rural Kentucky counties including 3 Appalachian districts), Tennessee and North Carolina.

- A CROPS Curriculum Guide, developed in fall 2014 through collaboration with agricultural mechanics teachers and NIOSH representatives, was implemented at the KY, TN and NC sites.

- The CROPS project also generated new knowledge regarding fatal and non-fatal farming-related injuries and illness. CROPS project collaboration with another SCAHIP project, Economics of Prevention (EOP2) produced the Rural Life and Experience Summary used to collect exposure data from 500 high school students on incidents happening not only to the student but also their family/friends, providing a better estimate of the prevalence of injury and illness related to tractor overturns, falls and hearing loss. A third of the students reported: a tractor overturn incident; injuries from falls from horses or atvs. 49 percent of CROPS students reported temporary hearing loss from exposure to loud farm-related noise; 5% reporting permanent hearing loss to either themselves or family/friends.

- The CROPS program collaborated with Dr. Preston Byrd, assistant professor of agricultural education, specializing in teaching and learning strategies in agricultural mechanics, from Clemson University. Dr. Byrd visited CROPS program schools to

inspect the CROPS products using an EPOCH 650, a portable ultrasonic flaw detector. Dr. Byrd generated an inspection checklist from the blueprints of the CROPS systems. Data from this was used for quality control and teacher professional development. As of fall 2016, each participating agriculture mechanics teacher established a crowd-funding campaign with their students. With the assistance of the research team's Crowd-Funding Training Guide, participating teachers' classes developed their crowd-funding website. The website allows the agriculture mechanics programs to request funds for implementing the CROPS curriculum beyond the scope of the study. The crowd-funding page can be linked to social media sites that the agricultural education program may have. Once it is published onto a social media site, anyone can share onto their own site for others to aid in the awareness and fundraising. Also, social media profiles have been created on Facebook, Twitter, and Instagram to provide students with a platform to discuss safety-related topics, share ideas and opinions, and learn more about CROPS. Thus far, the CROPS Facebook page has 124 followers, Twitter 26 followers, and Instagram 202 followers.

- A valuable outcome of the CROPS project was the launch of the project into a five year research project. Data from the CROPS project led to design, submission and funding of the Innovative CROPS Curriculum Intervention (ICCI) as part of the 2016-2021 SCAHIP cycle. The ICCI project will implement and validate the effectiveness of an innovative, comprehensive tractor safety curriculum in agricultural power mechanics classes in Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia. Specifically, the ICCI will include annual teacher training, online interactive teaching materials, community outreach and project-based CROPS construction and installation of publically available NIOSH CROPS plans combined with a social media crowd-funding campaign. The curriculum, training procedures and social media strategies from the CROPS administrative supplement will be implemented with teachers and students in 75 rural communities will participate in the project. Over the course of five years, if the school partnership linkages and crowd funding social media campaign are implemented successfully to self-support additional CROPS, 7500 at-risk high school youth will engage in the construction/implementation of 750 CROPS. Risk of exposure to tractor overturn hazard would be reduced for an estimated 3000 individuals who would use those tractors for farming.

Cumulative Inclusion Enrollment Table

Program Director/Principal Investigator (Last, First, Middle): Vincent, Stacy

Inclusion Enrollment Report

Study Title: Administrative Supplement: Cost-effective Roll-over Protective Structures (CROPS)

Total Enrollment: 486 **Protocol**

Grant Number: 5U50OH007547-15

PART A. TOTAL ENROLLMENT REPORT

Ethnic Category	Sex/Gender			
	Females	**Males**	**Unknown or Not**	**Total**
Hispanic or Latino	0	0	0	0 **
Not Hispanic or Latino	0	0	0	0
Unknown (individuals not reporting ethnicity)	73	413	0	486
Ethnic Category: Total of All Subjects*	73	413	0	486 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	0	0	0
White	0	0	0	0
More Than One Race	0	0	0	0
Unknown or Not Reported	73	413	0	0
Racial Categories: Total of All Subjects*	73	413	0	486 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not	Total
American Indian or Alaska Native				0
Asian				0
Native Hawaiian or Other Pacific Islander				0
Black or African American				0
White				0
More Than One Race				0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of Hispanics				**

Gender and Minority Inclusion Table

See Cumulative Inclusion Enrollment Table above

Inclusion of Children

All of the students included in the CROPS project were under the age of 21. The goal of this study was to educate students about safe farming and to reduce the number of tractor related injuries and fatalities in farm communities in the southeast, targeting high poverty areas in Appalachia. The CROPS project sought to reduce the number of tractor related injuries and fatalities in farm communities in the southeast by becoming part of the culture of agricultural education at the high school level.

Materials for Other Investigators

Materials from the CROPS project can be accessed on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Nurses Utilizing Research, Service, Education and Practice (NURSE-AP) (D Reed)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

Principal Investigator

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Project Start/End:
09/30/2011—03/31/2017

Report Date:
09/30/2017

Abstract

A recent National RN Survey reports that there are over 2.5 million nurses employed in nursing positions. The largest increased in advanced practice is among nurse practitioners, many of whom practice in rural settings. By equipping nurses and others with the appropriate information about agricultural health and safety, the NURSE-AP project provided farm communities with evidence-based health care and health promotion delivered by nurses working in transdisciplinary teams. NURSE-AP created a novel platform for nurses to network about agricultural health and safety through evolving multi-media communications, direct mentorship and the facilitation of professional connections. This project was highly innovative because it used multiple strategies and settings to educate a massive group of front line health care professionals to develop and deliver tailored evidence-based health care and health promotion to farm communities. New and enduring partnerships were formed that continue to support better health outcomes for farmers and their families. The long-term impact of the NURSE-AP program is significant, having the ultimate potential to impact the practice of 2.5 million registered nurses, 254,000 nurse students per year and the health of the agriculture populations they serve.

Background

The NURSE-AP was a five-year educational/translational project focused on three critical barriers to health care for farmers: delayed access to research findings that are needed to develop and deliver evidence-based nursing care, lack of programs tailored to local farm culture and needs, and the limited number of nurses with expertise in agricultural health and safety. NURSE-AP was the culmination of over a decade of work by Dr. Deborah Reed at the Southeast Center for Agricultural Health & Injury Prevention. The project grew out of several earlier projects, the Nurse Agriculture Education Project (NAEP) and the follow up NAEP2. NAEP was initiated in 2001 to increase awareness of nurses in the southeast US about agricultural health and safety issues. It established a baseline of the awareness of agricultural health and safety among schools of nursing in the 13-state Southeast region. The focus was on building relationships in targeted schools and finding ways to infuse agricultural issues in curriculum and research. The first effort resulted in a small critical mass of academically based nurses who provided the foundation for the project and who continued to work with the NURSE-AP project. In NAEP2 (2006-2011), the project expanded nationwide in response to inquiries the team received from across the nation. A central networking resource list serve, Agricultural Health, Education, and Research Exchange (AgHERE) was developed to improve communication. The project's flexibility allowed it to be instantly responsive to the changing needs of the nursing and agriculture industries and to quickly translate research to nursing education, research and practice. In 2010, Dr. Reed recognized the need for focusing on nurses in clinical practices and for adding distance learning and social media as more efficient methods of reaching the growing number of nurses with interest in agricultural health and safety. The NURSE-AP project provided new strategies for rapid translation of research findings to clinical practice. The US has over 2.5 million practicing registered nurses and over 254,000 current baccalaureate students. The explosion of nurse numbers requires mass scale instructional methods and rapid information dissemination to nurse clinicians and academics. Funding was designed for specific nurse specialties, to strengthen the newly begun collaborations with clinical nurses, and to continue to develop and mentor nurse educators, researchers and students. With the distribution of nursing knowledge moving from traditional classrooms to online learning, NURSE-AP explored the preferences of nurses to determine the best formats for dissemination of new knowledge and for nursing education resulting in a strong social media campaign, webinars, podcasts and blogs. The ultimate goal was to provide farm communities with evidence-based health care and health promotion delivered by well-informed nurses up to date on current issues and health promotion strategies specific to agricultural health and safety. NURSE-AP provided a novel platform for nurses to network about agricultural health and safety through evolving multi-media communications, direct mentorship and the facilitation of professional connections. This project was highly innovative because it used multiple strategies and settings to educate a massive group of front line health care professionals to develop and deliver tailored evidence-based health care and health promotion to farm communities.

Aims

- Collect, package, and deliver state-of-the art farm health and safety research to clinical and academic nurses and students using emerging e-learning technologies and social media.
- Develop innovative strategies for nurse students and other students to develop expertise in agricultural health and safety.
- Increase the capacity of nurses to develop and deliver tailored health programs for local farm constituencies.
- Strengthen and increase a networked cadre of agricultural health nurses in practice, education, and research settings that can sustain the project post-funding.
- Disseminate health and safety education directly to farm communities

Methods

The NURSE-AP project designed, marketed and maintained a novel platform for nurses to network about agricultural health and safety through evolving multi-media communications, direct mentorship and the facilitation of professional connections. This project was highly innovative because it used multiple strategies and settings to educate a massive group of front line health care professionals to develop and deliver tailored evidence-based health care and health promotion to farm communities. Driven by feedback from nurse educators and nursing students the NURSE-AP project tested new e-learning platforms to provide agricultural health and safety training. Five schools of nursing in KY, TN, AL and LA served as the initial sites with collaborations later reaching to schools across 22 states. The project has the ultimate potential to impact the practice of 2.5 million registered nurses, 254,000 nurse students per year and the health of the agriculture populations they serve.

Findings

<u>Successful collaboration and team building.</u>

The NURSE-AP program demonstrated success with its novel platform, a combination of communication and education continually evolving from feedback from the nursing and farming communities. During the 5-year period, 11 nursing faculty members in the School of Nursing at Western Kentucky University have been engaged with this project, including research, service learning projects, and community outreach projects. 163 RN to BSN students have developed, implemented, and evaluated teaching plans for fourth grade students at the annual Progressive Agriculture Safety Day®, an initiative of the Progressive Agriculture Foundation. 157 BSN pre-licensure nursing students have either taught a class or served as group leaders at Safety Day. In summary, over 300 future nurses have been exposed to the dangers associated with agriculture and strategies to ensure a safer work environment for farmers and their family members.

Such collaborations led to the development of a 3-credit hour course. The Agricultural Nursing (WKU346) course was offered to students at Western Kentucky University, first as a traditional class, then as an online learning class. 47 students completed the elective course in its three offerings, with over 90% attesting they could use this new knowledge in their practice. The complete syllabus has been distributed to universities across the nation that requested it. The course modules were also used to develop the two Continuing Education (CE) offerings.

Program Sustainability

13 nurse faculty members were engaged in the project in addition to the nurses originally in the NURSE-AP. These faculty engaged in service learning projects with their students, and four faculty members have engaged in agricultural health research since they began working with their project mentors. Through this project we have established a successful cadre of nurses with expertise in agricultural safety and health. 17 nurses have contributed to the publications attributed to the project. Of those, 15 had not published or studied agricultural health and safety prior to their involvement. Many of the undergraduate students work in south-central KY and continue to network with each other, building further practice capacity.

The Facebook page has proven to be our best continuing networking tool. Although designed for nurses, the NURSE-AP team quickly realized that organizations that serve farmers also wanted the Facebook information, and the farmers themselves requested access. The page was opened to the public, resulting in widespread distribution of research, education, and service listings that are frequently shared by the page's followers. The most popular post reached over 1,500 people. The Facebook page will be continued through funding provided by the TN AgrAbility program and the University of Kentucky College of Nursing.

Successful distribution of health and safety education directly to farm communities.

Although nurses and other health professionals remained at the center of the project, after requests from farm communities NURSE-AP expanded its reach to include farmers themselves. These activities directly reached farmers, nurses, and agricultural support professionals. The NURSE-AP team collaborated with six farm groups to provide health and safety information. NURSE-AP continues to provide information to farm organizations and groups upon request through a variety of funding sources, including the agricultural community and local interest groups. With the increased number of nurses who have been engaged with NURSE-AP there are many more nurses available to answer these requests in their own communities.

Conclusions

This 5-year project yielded new nurses who are trained to recognize the unique health issues of farmers, their families, and their communities. It supported the advanced preparation of nurse faculty, nurse PhD students, and other graduate students. It provided a platform for networking with other nurses, other health professionals and the greater agricultural community across the globe. The project leaders were responsive to the greater agricultural community and adjusted its resources to reach out to the agricultural community itself. Project participants were highly productive in peer reviewed publication (17 articles) and other outreach. Two new research projects focused on the increasing stress and depression among the farm community have been launched with plans to expand this research. This project demonstrated the research to practice that can be accomplished when multiple disciplines work together with the farm community. This project has a direct impact on farmers and their families across the U.S. as noted by the new associations with multiple farm organizations and the continued work with media and other institutions. It shows the hunger that farm families have for health and safety information delivered by nurses who understand and appreciate their work. The presentations have a global reach and the new on-line course (NUR234) will continue to influence the practice of new nurses.

Outputs/Outcomes

The NURSE-AP project generated a tangible output in the creation and sustained marketing of its communications platform strategy. The project initially used an email listserv to nurses and later transitioned to a Facebook page (AgNURSE) that grew to 232 followers by the end of the project period. Two free, online, continuing education (CE) nurse programs are now publicly available on the KY Train (public health CE training platform). The NURSE-AP team collaborated with an instructional designer, a videographer, and two nursing faculty members to produce another CE, *The Nursing Response to Mental Health Issues in Agriculture Population.* This CE used interactive technology and field expert videos. 100% of the expert and RN reviewers "strongly agreed or agreed" that the program content was interesting, and 95% of the RN reviewers indicated they intended to make at least one practice improvement as a result of the CE program.

A 3-credit hour graduate nursing course was developed on Agricultural Nursing WKU NUR345 Agricultural Health Nursing. The CE programs are: *Providing Cultural Sensitive Healthcare for Anabaptist (Amish, Mennonite, etc.) Populations* (# 1068571) and *Mental Health Issues in Agricultural Populations (*# 1068945). Available free at https://ky.train.org.

Publications

Abell, CH, Evans, C, Alexander, L, Bourne, K. & Jones, MS: [2016] A unique clinical experience for RN to BSN students: Providing farm safety education. Journal of Nursing Education 55(9), 544.

Garrett-Wright, D, Main, ME & Jones, MS: [2016] Anabaptist community members' perceptions and preferences related to healthcare. Journal of Amish and Plain Anabaptist Studies, 4(2): 187-200.

Eastman, A: [2015]: Adapting care to culture: Aging in agriculture. Ky Nurse 63(3): 8.

Coles, J: [2014]: Appreciative inquiry: an emerging approach to delivering quality nursing care. Ky Nurse 62(1): 7.

Main E & Jones MS: [2014] Linking community partners to increase tetanus immunizations among farmers. Workplace Health and Safety 62(11): 476-481.

Reed, DB, Allen-Bryant, K, & Hunsucker, S: [2014] Worker Demographics and Implications for OHNs In: Fundamentals of Occupational and Environmental Health Nursing: AAOHN Core Curriculum, Fourth Edition (eds. Moore, R & Moore, PV), OEM Press.

McCallum, DM, Murphy, S, Reed, DB, Claunch, DT, & Reynolds, SJ: [2013] What we know about the effectiveness of farm safety day programs and what we need to know. J Rural Health 29(1): 20-29. PMID: 23289651

Jones, MS, Main, ME & Garrett-Wright, D: [2013] A collaborative educational innovation in an old order Mennonite community. Journal of the National AHEC Organization XXIX(1): 24-27.

Maciuba, SM*, Westneat, SC, & Reed, DB: [2013] Active coping, personal satisfaction, and attachment to land in older African-American farmers. Issues in Mental Health Nursing 34(5):335-43. doi: 10.3109/01612840.2012.753560. PMID: 23663020.

Heaton, K, Azuero, A, Phillips, J, Pickens, H*, Reed, D: [2012] The effects of arthritis, mobility, and farm task on injury among older farmers Nursing Research and Reviews (2): 9.

Reed. D.B., Rayens, M.K., Conley, C.*, Westneat, S., & Adkins, S.M. (2012) Farm elders define health as the ability to work. Workplace Health and Safety 60(8): 345-351.

Marcum, JL, Browning, SR, Reed, DB, Charnigo, RJ: [2011] Farmwork-Related Injury Among Farmers 50 Years of Age and Older in Kentucky and South Carolina: A Cohort Study, 2002-2005. J Agric Saf Health 17(3): 259-273.

Marcum, JL, Browning, SR, Reed, DB, Charnigo, RJ: [2011] Determinants of work hours among a cohort of male and female farmers 50 years and older in Kentucky and South Carolina (2002-2005). J Agromedicine 16(3): 163-173.

Posters

Eastman, A. & Reed, DB: [2016] *Health status of Kentucky's senior farmers*. Posters-at-the-Capitol. Frankfort, KY. February 25, 2016.

Boots, SR:]2016] *Zero minutes to post – the time for Ag safety on social media is now*. International Society for Agricultural Safety and Health (ISASH) annual conference. Lexington, KY. June 27-29, 2016.

Garrett-Wright, D, Main, ME, Jones, MS & Reed, DB: [2016] *Enhancing healthcare for an emerging agricultural population: Anabaptist perceptions of health can healthcare services.* International Society for Agricultural Safety and Health (ISASH) annual conference. Lexington, KY, June 27-29, 2016.

Jones, MS, Main, E, Wright, DG, & Reed, DB: [2015] *Using technology to respond to the stress and mental health concerns among farmers and their families*. [Poster]. International Society for Agricultural Safety and Health (ISASH) annual conference. Normal, IL. June 21-24, 2015.

Jones, MS, Reed, DB, & Honaker, A: [2014] *An agricultural health nursing course designed for distance education*. Poster presentation. Kentucky Rural Health Association (KRHA) Conference, Bowling Green, KY, September, 2014.

Jones, MS, Reed, DB, & Honaker, A: [2014] *An agricultural health nursing course designed for distance education*. Poster presentation. Kentucky Nurses Association (KNA) Convention, Louisville, KY, October, 2014.

Cumulative Inclusion Enrollment Table

Schools of Nursing have been the units of analysis for this project. Based on a review of the aggregate data provided by the schools on their student composition we estimate:

Gender: 13% male; 87% female
Race: 4.6% African American; 89.5% White, 5.9% other or not disclosed

These data are provided for informational purposes only as there were no individual student data obtained with this project.

Gender and Minority Inclusion Table

Schools of Nursing have been the units of analysis for this project. Based on a review of the aggregate data provided by the schools on their student composition we estimate:

Gender: 13% male; 87% female
Race: 4.6% African American; 89.5% White, 5.9% other or not disclosed

These data are provided for informational purposes only as there were no individual student data obtained with this project.

Inclusion of Children

N/A

Materials for Other Investigators

Materials from the NURSE-AP project can be accessed on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A

Graduate Certificate in Agricultural Safety and Health (ASH) (J Mazur)

CDC/NIOSH Cooperative Agreement
5U54OH007547-15

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Project Start/End:
09/30/2011—03/31/2017

Report Date:
09/30/2017

Abstract

Service providers and clinical professionals in rural communities regularly encounter workers, patients or colleagues who live and work on farms. Current knowledge of agricultural safety and health issues is essential to serving these individuals well. However, agricultural education, public health, and gerontology, higher education and professional preparation programs rarely include a focus on health and safety issues related to living and working on farms. It has been shown that healthcare professionals and professionals in other agricultural disciplines are able to influence the work practices of farmers and agricultural workers. Continuing professional education at the post-secondary level is a solution that targets rural populations and advances the Healthy People 2010 goal to increase the quality and years of healthy life as well as goals related to surveillance, vulnerable workers, outreach/communications and partnerships, agricultural safety and agricultural health. The Graduate Certificate in Agricultural Safety and Health (ASH) program, addressed the need for the preparation of professionals to serve the needs of agricultural populations. A particular focus involved working with faculty to design and prepare course content in the Certificate anchor course Health of Agricultural Populations (HAP) for offering as online course modules. The ASH program, housed within the University of Kentucky (UK) College of Public Health took advantage of UK's unique make up as a land-grant university with Colleges of Agriculture, Medicine, Nursing, Engineering, Public Health, Social Work, Communications, and Education on a single campus. This allowed the ASH program to draw upon the expertise of professionals across multiple disciplines as the courses are designed and taught. Recruitment into the ASH Graduate Certificate program showed a steady increase in enrollment with a total of 35 students enrolled in ASH courses in 2016, compared to 33 students enrolled in 2015, all increases from the 28 students who were enrolled in 2013. Student evaluations have been positive, showing the content to be relevant and well presented. This steady increase in enrollment across the 2011-2016 project period show the sustained interest in the topic area. The quality and quantity of student activity through capstones, presentations, publications, and most important, employment in occupational health and safety positions shows the sustained impact of the program.

Background

According to the US Bureau of Labor Statistics, the agriculture, forestry, and fishing (AFF) industry experiences the highest rate of work-related fatalities in the United States--24.9 fatalities per 100,000 workers per year, as well as high rates of nonfatal injuries--15.5 per 100,000 workers per year. A number of programs to reduce these rates have been attempted, with relatively limited success. Many of these programs involved education programs such as: farm safety day camps, health fairs, workshops, seminars, and short training courses provided at farm association, cooperative, or extension meetings. These programs appear to increase base awareness and knowledge among agriculture populations, but have had limited effect on changing the safety and health behaviors of agricultural workers and farm families. While other industries have been impacted by occupational health and safety regulations, the AFF industry has not. Also, workers in other industry sectors benefit from having frequent health and safety training which is constantly reinforced by health and safety professionals whose duty it is to make sure the worksite and worker performance is safe and healthy every day. Farmers and agricultural workers rarely have such people assigned to watch over their well-being. They are simply provided rare, periodic training and then left to their own devices to work safely when back at work. According to a national assessment of the occupational safety and health workforce, future demand for occupational safety and health services will significantly outstrip the number of professionals with the necessary training, education, and experience to provide such services. In the landmark document Agriculture at Risk: a Report to the Nation it was reported that the services of up to 1000 agricultural hygienists, 1000 physicians and 8000 nurses trained in agricultural health were needed to address the health and safety needs of the agricultural community—a goal which has clearly not been met. Many of the farms in the southeastern United States remain small family-owned businesses whose workers have little contact with traditional occupational safety and health agencies such as OSHA and NIOSH. Southern Appalachian communities are particularly isolated from education, training and services available elsewhere. In the mid-1970s, there was a growing initiative to place health care professionals in rural areas. However, there was little effort to train them about specific rural health problems, such as agricultural occupational health. The Southeast Center recognized the need to prepare public health practitioners and researchers who are highly knowledgeable and skilled in the prevention of occupational injury and illness among workers in production agriculture, forestry, and commercial fishing, and who are able to engage in prevention activities as part of larger, transdisciplinary teams. The ASH program is unique with its blending of traditional public health course work with training relevant to the occupational safety and health of agricultural populations. The long range goal of this project was to provide the essential education required to address the critical shortage of agricultural occupational health and safety professionals, particularly in the Southeast. The aim was not only to produce well informed practitioners, but leaders and researchers for the next generation of agricultural safety and health (ASH) specialists. Specifically this program provided ASH training to a greater number and broader array of professionals who provide healthcare, equipment, supplies, commodities, and public health services to people in the AFF industry. Few institutions in the United States offer graduate level courses that educate safety and health professionals and others about agricultural occupational safety health or that place agricultural safety and health in a public health context. The ASH program builds upon a transdisciplinary approach providing diverse skills to address a broad range of health and safety problems in the AFF industry. The absence of other transdisciplinary programs preparing public health practitioners in agricultural safety and health is noteworthy. The ASH program fills that gap, particularly for the Southeast region of the US, an area of intensive agriculture and forestry.

Aims

- To develop a cadre of post-career professionals knowledgeable in the principles of agricultural, forestry and fishing safety and health.
- To implement a graduate level certificate in Agricultural Safety and Health emphasizing the novel approach of progressive inquiry learning and research-to-practice skills.

Methods

The ASH program offers a sequence of rigorous coursework comprised of 15 hours of content (5 graduate level courses) designed to prepare professionals who can work effectively to promote health and prevent injury among agricultural populations and to provide services to rural populations at risk for agricultural health issues and/or occupational injury.

Dr. Mazur assisted by Ms. Ellen Bloomfield, an experienced instructional designer and educator (and doctoral candidate in Instructional Systems Design at the University of Kentucky), designed and developed the online 'anchor' course for the ASH Program – Health of Agricultural Populations (HAP). This rigorous course emphasizes inquiry and problem solving using sound research methods to investigate a variety of agricultural health and safety issues. HAP addresses the threats and hazards that impact the health, safety and productivity of farmers, members of farm families, hired farm workers, and others who live or work in agricultural environments, such as crop and livestock production, timber production and commercial fishing. Coursework includes on-site classes, guest lectures from national experts in various agricultural health and safety topics (using teleconferencing tools), farm visits and collaborative group investigations that employ scientific field research methods. During the fall 2015 semester (August-December 2015), weekly digital video taping of on-site and teleconferenced guest lectures through the use of the Adobe Connect Telecourse delivery system was conducted. As of spring 2018 these digital lectures will be reviewed, edited and made available in the online course learning management system. All courses in the ASH program are continually streamlined as necessary to better meet the aims of the program and emerging health and safety issues in the AFF industry.

Findings

Recruitment into the ASH Graduate Certificate program showed a steady increase in enrollment with a total of 35 students enrolled in ASH courses in 2016, compared to 33 students enrolled in 2015 all increases from the 28 students who were enrolled in 2012. Student evaluations have been positive, showing the content to be relevant and well presented.

Conclusions

The steady increase in enrollment across the 2011-2016 project period show the sustained interest in the topic area. The quality and quantity of student activity through capstones, presentations, publications, and most important, employment in occupational health and safety positions shows the sustained impact of the program.

Output/Outcomes

A fine-tuned and continually updated curriculum has been developed for the HAP course as shown in the syllabus below. Topic areas change based on the fluctuating state of the AFF industry to address emerging issues. All lectures (output) are expected to be available in digital format beginning in spring 2018.

Class	Month	Date	Topic	Problem Set Due
1	Sep	2	Agricultural Populations – Special Populations at Risk – Who is a Farmer? (Sanderson & Purschwitz)	
2	Sep	9	Agricultural Machinery and Transportation Hazards (Purschwitz)	
3	Sep	16	Traumatic and Musculoskeletal Injuries in Agriculture, Forestry, and Fishing – (Bunn & Purschwitz)	#1
4	Sep	23	Infectious Diseases - Zoonoses (Sanderson)	
5	Sep	30	Dust and Gas Exposures (Sanderson)	
6	Oct	7	Exposure to Agricultural Chemicals (Sanderson)	#2
7	Oct	14	Respiratory Diseases (Sanderson)	
8	Oct	21	Cancer Risks for Agricultural Populations (Browning)	
9	Oct	28	Exposure to Physical Agents – Noise and Radiation (Sanderson)	#3
10	Nov	4	Skin Diseases / Personal Protective Equipment (Prince, Purschwitz, and Sanderson)	
11	Nov	11	Behavioral and Psychosocial Risks (Mazur)	#4
12	Nov	18	Health and Safety Hazards in the Fishing Industry (Carruth / Duburow)	
13	Nov	25	Health and Safety Hazards on the Timber Industry (Stringer / Sanderson)	#5
14	Dec	2	Rural Healthcare and Agricultural Health Resources (Borders / Purschwitz / Sanderson)	
15	Dec	9	Presentation of Site Visit Reports – Course Review	#6
--	Dec	16	**Final Examination at regular class time period**	

Output and outcomes can be clearly measured by the success of our program's graduates.

Selected thesis topics

- Occupational Dust Exposure and Chronic Obstructive Pulmonary Disease
- Reported Injuries and Fatalities in the Kentucky Master Loggers Training Program
- Equine Leptospirosis Seroprevalence in the Central and Bluegrass Regions of Kentucky from 1993- 2015
- Undiagnosed COPD and Restrictive Lung Disease Among Rural Workers
- Evaluating the Association between Atrazine and Other Triazine Herbicides and Non-Hodgkins Lymphoma in Kentucky (2005-2009)
- Barn exposures and associated respiratory symptoms in Latino horse workers
- Central nervous system effects of occupational exposures in agricultural workers
- Hispanic Agricultural Workers: The Nexus of Demographics, Employment Characteristics, and Health
- Risk Factors Associated with Severe Injuries in Inland Aquaculture Farms

Employment/internships

- Surveillance Epidemiologist/Data Manager and ORISE Fellow to the Enteric Disease Branch's FoodNet Team at the CDC
- Threat Preparedness Coordinator position at the Health Department in Charleston, West Virginia
- CDC's Epidemic Intelligence Service (EIS) two year fellowship.
- Research Coordinator at Inova Fairfax Hospital in Falls Church, VA.
- Director of the Division of Environmental Epidemiology, Virginia Department of Health at the Virginia Health Department.
- Epidemiologist with the Tennessee Department of Health in the Health Surveillance and Bioinformatics branch.
- California Public Health Department's Environmental Health Investigations Branch Epidemiology fellow (Cal-EIS)
- Epidemiologist at UK's Kentucky Injury Prevention and Research Center
- Communicable Disease Investigator.at County Health Department

Publications

Swanberg, JE, Clouser, JM, Gan, W, Mannino, DM, and Flunker, J: [2015] Individual and occupational characteristics associated with respiratory symptoms among Latino horse farm workers. . *American Journal of Industrial* Medicine, 58(6), 679-687. doi: 10.1002/ajim.22452

Swanberg, J, Clouser, J, Bush, A, Westneat, S: [2016] From the Horse Worker's Mouth: A Detailed Account of Injuries Experienced by Latino Horse Workers, J Immigr Minor Health Jun; 18 (3): 513-521. doi: 10.1007/s10903-015-0302-1.

Presentations

Siegel, M, Starks, SE, Sanderson, WT, Hoppin, J.A, Gerr, F: "Organic solvent exposure and neuromotor performance in agricultural workers" Oral presentation at the 2016 International Society of Agricultural Safety and Health Conference (ISASH), Lexington, KY. June, 2016.

Bush, A, Swanberg, JE, Clouser, JM, Gan, W, Browning, S, Westneat, S: "Work organization factors and injuries among Latino workers: What increases risk of injuries on horse farms?" Oral presentation at the 2016 International Society of Agricultural Safety and Health Conference (ISASH), Lexington, KY. June, 2016.

Collins, Devon: (Mar 2016)" Evaluating the Relationship of Inhalable Particulate Exposures by Occupational Categories, in Relation to Lung Function, Among Kentucky State Fair Patrons" oral presentation at the Southeastern States Occupational Network (SouthON) Conference 2016.

Flunker, John: (Mar 2016)" Poor Safety Climate, Long Work Hours, and Musculoskeletal Discomfort among Latino Horse Farmworkers" oral presentation at the Southeastern States Occupational Network (SouthON) Conference 2016.

Siza, Charlene (April 2016) "Equine Leptospirosis Seroprevalence in the Central and Bluegrass Regions of Kentucky from 1993-2015." Poster presentation at College of Public Health Research Day at the Center for Clinical and Translational Science Annual Conference, Lexington, KY.

Holsinger, CE, Mannino D, Collins D: "Occupational Dust Exposure and Chronic Obstructive Pulmonary Disease: A pilot study". Poster presentation at American Public Health Association. 2015.

Siegel, M: "Risk of visual impairment in individuals with a history of a farming, forestry, or fishing occupation." Poster presentation at the 143rd APHA Annual Meeting and Exposition in Chicago, IL. November, 2015.

Cumulative Inclusion Enrollment Table

Program Director/Principal Investigator (Last, First, Middle): Mazur, Joan

Inclusion Enrollment Report

Study Title: Graduate Certificate Program in Agricultural Safety and Health

Total Enrollment: 96 **Protocol**

Grant Number: 5 U54 OH007547-15

PART A. TOTAL ENROLLMENT REPORT

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not	Total
Hispanic or Latino	0	0	0	0 **
Not Hispanic or Latino	62	34	0	96
Unknown (individuals not reporting ethnicity)	0	0	0	0
Ethnic Category: Total of All Subjects*	62	34	0	96 *
Racial Categories				
American Indian/Alaska Native	0	0	0	0
Asian	2	2	0	4
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	6	0	0	6
White	54	32	0	86
More Than One Race	0	0	0	0
Unknown or Not Reported	0			0
Racial Categories: Total of All Subjects*	62	34		96 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not	Total
American Indian or Alaska Native	0	0	0	0
Asian	0	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0	0
Black or African American	0	0	0	0
White	0	0	0	0
More Than One Race	0	0	0	0
Unknown or Not Reported	0	0	0	0
Racial Categories: Total of Hispanics	0	0	0	0 **

Gender and Minority and Inclusion Table

See Cumulative Inclusion Enrollment Table above

Inclusion of Children

No subjects under age 21

Materials for Other Investigators

Materials generated from the Graduate Certificate project are available on the SCAHIP website.

Equipment Inventory Report

N/A

Final Invention Statement and Certification

N/A