

FINAL PROGRESS REPORT

Title Page

Project Title

Nebraska Occupational Safety and Health Program

Principal Investigator

Tom Safranek, MD

tom.safranek@nebraska.gov

Co-PI

Derry Stover, MPH

Derry.Stover@nebraska.gov

402-471-2822

Institution

Nebraska Department of Health and Human Services

Division of Public Health, Office of Epidemiology

301 Centennial Mall South, Lincoln, NE 68509

Award Number

U600H010897

Project Dates

7/01/2016 - 06/30/2021

Report Date

02/01/2022

Table of Contents

Title Page.....	1
Table of Contents	2
List of Terms and Abbreviations	3
Abstract	4
Section 1: Significant and Key Findings	5
Specific Aims	6
Results and Discussion	7
Publications	20
Cumulative Inclusion Enrollment	21
Inclusion of gender and minority study subjects.....	21
Inclusion of Children.....	21
Materials available for other investigators.....	21

List of Terms and Abbreviations

ABLES	Adult Blood Lead Epidemiology and Surveillance
BLL	Blood lead level
BLS	U.S. Bureau of Labor Statistics
BRFSS	Behavioral Risk Factor Surveillance System
CFOI	Census of Fatal Occupational Injuries
CS-CASH	Central States Center for Agricultural Safety and Health
CSTE	Council of State and Territorial Epidemiologists
ELR	Electronic laboratory reporting
FTE	Full-time Equivalent Worker
HDD	Hospital discharge data
MSD	Musculoskeletal Disorder
NDHHS	Nebraska Department of Health and Human Services
NIOSH	National Institute for Occupational Safety and Health
NOSHHP	Nebraska Occupational Safety and Health Program
NWCC	Workers' compensation court
OHI	Occupational Health Indicator
OSHA	Occupational Safety and Health Administration
SOII	Survey of Occupational Injuries and Illnesses
UNL	University of Nebraska – Lincoln
UNMC	University of Nebraska Medical Center
WC	Workers compensation
WestON	Western States Occupational Network

Abstract

Project Title: Nebraska Occupational Safety and Health Surveillance Program

Principal Investigators: Derry Stover, MPH; Tom Safranek, MD

Contact information: Email: derry.stover@nebraska.gov

Award Number: U60OH009859

Project Dates: 7/01/2010 - 06/30/2016

Final Report Abstract:

The purpose of this project was to establish a Fundamental-Plus Nebraska Occupational Safety and Health Surveillance Program within the Nebraska Department of Health and Human Services. The goal of this project is to use surveillance data to generate new knowledge and develop new strategies for the prevention of work-related injuries, illnesses, and exposures. The Nebraska Occupational Safety and Health Surveillance Program (NOSHP) collected occupational health indicators and conduct analysis of surveillance data. Through collection, analysis and dissemination of data, we improved the knowledge of causes and conditions of occupational injury and illness. We responded to the COVID-19 pandemic by studying cases in meatpacking workers and collaborating with CDC, employers, and the Nebraska National Guard to enhance surveillance. We enhanced surveillance and filled existing gaps in our understanding of workplace chemical exposure through incorporating investigation and analysis of occupational poisoning due to pesticides, lead, and other chemicals. We generated and communicated information with our partners to guide interventions and develop recommendations for prevention. This was achieved through disseminating data and findings and conducting educational outreach. Our program maintained existing relationships and build new collaborations with local, state, and national stakeholders to further integrate occupational health into mainstream public health. An advisory committee consisting of state leaders in occupational health and safety was convened to prioritize program activities and provide input on emerging issues in Nebraska. Building partnerships and maintaining a network of stakeholders across the state resulted in better integration of occupational health and safety into mainstream public health.

Section 1: Significant and Key Findings

Aim 1: Collect, analyze, and interpret occupational health and safety data that capture injuries, illnesses, and workplace hazards.

The Nebraska Occupational Safety and Health Program (NOSHP) collected 20 occupational health indicators (OHIs) representing more than 150 measures spanning 20 years and submitted annual data to NIOSH. OHI data indicated Nebraska's occupational nonfatal injury and illness rate and fatal injury rate is higher than the national average. NOSHP conducted several data analyses and enhanced the collection of work information. The COVID-19 pandemic allowed an opportunity to study occupational aspects of the pandemic. We identified 3,438 confirmed cases and 14 deaths among meatpacking workers from April-May 2020. Data were submitted to NIOSH and CDC which resulted in three peer-reviewed publications that described the COVID-19 pandemic among meatpacking industry workers. These publications were used to justify the inclusion of meatpacking workers as priority workers under CDC's Advisory Committee on Immunization Practices (ACIP) COVID-19 vaccine priority groups.

Aim 2: Conduct surveillance of occupational poisonings incorporating in-depth investigations and analysis.

Project staff identified and investigated 459 adult blood lead poisoning cases by streamlining collection and management of case investigation data electronically linked with laboratory tests. We provided workers with education and prevention information to reduce lead exposures. Nebraska regulations were updated to include industrial chemicals to the reportable disease list. NOSHP continued pesticide poisoning surveillance, and developed protocols for investigation of occupational carbon monoxide poisonings.

Aim 3: Build and maintain partnerships and collaborations with state and federal agencies, local public health departments, non-profit organizations, and other occupational health and safety stakeholders.

NOSHP worked with internal and external stakeholders to improve integration of occupational health into mainstream public health. We collaborated with NIOSH and CDC to study occupational enteric diseases and COVID-19 among meatpacking workers. Staff collaborated with the Nebraska National Guard to develop systems to improve SARS-CoV-2 testing among meatpacking workers. We trained five public health students in occupational health and completed a study on musculoskeletal disorders among meatpacking workers.

Aim 4: Develop and disseminate surveillance data, findings, reports, prevention information, and best practices to workers, program partners, and the occupational health community.

Project work culminated in the 11 peer-reviewed journal articles on topics ranging from COVID-19, Total Worker Health, Occupational Poisoning, and Injuries. Staff completed five lectures to public health students and delivered four presentations to scientific conferences. Seven reports, newsletters, and dozens of social media messages centered on education stakeholders were disseminated to the public through the DHHS website and social media accounts.

Aim 5: Maintain an advisory committee that will meet at least yearly to prioritize activities of special importance to Nebraska.

Nebraska convened an occupational health advisory committee with representatives from state and federal government agencies, local public health, and non-profit organizations. One in-person advisory committee meetings were held during the project period, and two virtual meetings with stakeholders were held.

Translation of Findings

Translation and dissemination of findings was a cornerstone of this project and related to Aim 4. A total of 11 peer-reviewed journal articles were published during the project period. A primary event was the COVID-19 pandemic, which we studied and translated epidemiologic information regarding COVID-19 in meatpacking workers. We assessed effectiveness of risk mitigation measures in meatpacking plants and provided specific recommendations on reducing exposure to SARS-CoV-2 in meatpacking workplaces. If used by employers, these

interventions could help reduce the transmission of COVID-19. Occupational health indicators (OHI) and results of occupational surveillance data analyses were disseminated via report and electronic media to safety organizations, regulatory agencies, and local public health departments. These groups work directly with employees and employers and they have the ability to use program findings to prioritize and implement activities aimed at reducing the incidence of occupational injury and illness. OHI data were shared with the occupational health community via presentations, websites, and via a multi-state online OHI query system. Investigation of occupational adult lead poisoning cases involved developing strategies with employers and employees on exposure reduction. Poisoning prevention strategies were disseminated to workers via mail and public service announcements, and medical guidelines were shared with health care providers. Over the course of the project, several employees and employer adapted their work environments and practices to reduce lead exposure. Adult blood lead level data were also submitted to NIOSH and were included in CDC's MMWR Summary of Notifiable Noninfectious Diseases. If used, these findings can be applied to future planning activities to determine where interventions are most needed. Translation also occurred through dissemination occupational health and safety best practices to the occupational health community. We presenting our findings to occupational stakeholders at four scientific conferences. Our work also incorporated occupational health surveillance science into health education practices. We delivered five lectures on occupational health to students, and we trained five students public health in occupational health and safety. Finally, educational information delivered by the program to various groups can help reduce occupational risks and improve workplace practices. Through presentations, outreach, and stakeholder meetings, NOSHP used project findings to issue recommendations aimed at preventing occupational injuries and illnesses.

Research Outcomes and Impact

The Nebraska Occupational Safety and Health Program (NOSHP) further developed its occupational health surveillance program for the state of Nebraska. The project improved occupational health and safety in Nebraska by enhancing the capacity to track and prevent occupational injuries and illnesses. The increased availability of occupational health data and the dissemination of findings has the potential to impact stakeholders' outreach and intervention strategies (potential outcome). Occupational health indicator (OHI) data were shared with stakeholders during public health meetings and advisory committee meetings, which represented an increase awareness of OSH issues (potential outcome).

Through our work in adding industry and occupation to COVID-19 surveillance systems, the infectious disease and immunization programs changed their surveillance methods, which resulted in a change in surveillance practices (intermediate outcome). Nebraska data on COVID-19 cases among meatpacking workers helped support the CDC's Advisory Committee on Immunization Practices (ACIP) inclusion of meatpacking workers as a COVID-19 vaccine priority group. This lead to an intermediate outcome of surveillance used for policy. During the early COVID-19 months, we collaborated with the Nebraska National Guard to build data systems for communicating testing results during mass testing site for meatpacking workers. This resulted in an intermediate outcome as meatpacking employers used the testing results to inform strategic plant decisions, including cleaning, employee policies, and temporary closures. We also collaborated with internal public health programs to study workplace policies, which resulted in an investment from the Chronic Disease Program to further study Total Worker Health concepts (intermediate outcome).

In our work involving occupational lead poisonings, employers were provided training information on how to protect their workers from lead exposures and they took action on prevention interventions (intermediate outcome). Educating workers and adults with elevated blood lead levels on prevention strategies helped inform and provide information to reduce future exposures (intermediate outcome). We were successful in using surveillance data to justify adding heavy metal poisonings to Nebraska reportable disease regulations resulted in new regulations (intermediate outcome).

Section 2: Scientific Report

Specific Aims

Aim 1: Collect, analyze, and interpret occupational health and safety data that capture injuries, illnesses, and workplace hazards.

Aim 2: Conduct surveillance of occupational poisonings incorporating in-depth investigations and analysis.

Aim 3: Build and maintain partnerships and collaborations with state and federal agencies, local public health departments, non-profit organizations, and other occupational health and safety stakeholders.

Aim 4: Develop and disseminate surveillance data, findings, reports, prevention information, and best practices to workers, program partners, and the occupational health community.

Aim 5: Maintain an advisory committee that will meet at least yearly to prioritize activities of special importance to Nebraska.

Results and Discussion

Aim 1: Collect, analyze, and interpret occupational health and safety data that capture injuries, illnesses, and workplace hazards.

Occupational Health Indicators

NOSH successfully continued its occupational health surveillance program and enhanced its occupational health surveillance capacity using CSTE-developed occupational health indicators (OHIs). NOSH compiled 22 OHIs, representing more than 150 individual measures spanning 13 years from 2000 to 2017. Each project year, OHIs were submitted to NIOSH and CSTE by the required due date of June 30, with the exception of the 2020 year due to impacts of COVID-19. By the end of the project period, investigators successfully converted the Nebraska OHI data spreadsheet files into an OHI database in Microsoft Access. The database allows for OHIs to be analyzed in statistical software (SAS, Tableau), and trends of rates and numbers were analyzed each year.

Employment demographic data show important changes in Nebraska's employed population. The proportion of Nebraska's employed population aged 65 years or older fell from 7.2% in 2013 to 6.7% in 2017. The proportion of Nebraska's Hispanic employed population increased from 9.8% in 2013 to 10.3% in 2017. Nearly a quarter of Nebraska's employed population works in the Education and Health Services industry super-sector, and more than 1 in 5 are employed in Professional and Related Occupations. Between 2013 and 2017, the highest rate of fatal work-related injuries in Nebraska was in 2016, with 6.4 deaths per 100,000 workers. Nonfatal work-related injuries and illnesses continued to decline over the 5 year period. In 2017 an estimated 20,500 nonfatal work-related injuries and illnesses were reported by Nebraska private sector employers. Nebraska continues to have a higher rate of fatal work-related injuries compared to national average. Rates of nonfatal work-related injuries and illnesses were also higher compared to the United States.

Limitations

For OHI data, there is a lag time of at least 3 years using the current CSTE guidelines. Additionally, data reported are dependent on data release schedules by other data collectors and may be revised by Nebraska DHHS or other external data providers. Data collection methods can vary between years and between states, and data for the United States might not include data from all 50 states. These differences may limit direct comparisons between years and between Nebraska and national data for some indicators. There are limitations and considerations for the data sources used for each OHI, which are described in the CSTE Occupational Health Indicator guidance document available for download at <http://www.cste.org/group/OHIndicators>. It is important to note that OHI data do not necessarily capture the full spectrum of occupational illnesses and injuries, and some indicators are not shown. Other factors should be considered in interpretation of this data, including:

- Underreporting of occupational injuries and illnesses by employees and employers;
- Inadequate recognition of occupational injuries and illnesses by health care providers;
- Difficulties in attributing diseases with long latency from time of exposure to disease manifestation and/or from multifactorial causes (e.g., silicosis, lung cancer);
- Possible exclusion of at-risk populations from surveillance (e.g., self-employed, military);
- Misclassification and variations in coding the causes of injury, illness or death;
- Differences in underlying populations at risk (“denominators”).

Activity	Occupational Health Indicators
Outputs	Description
Database	Occupational Health Indicator Database (2000-2017)

Outcomes	Description
Outcome Class	Increased awareness of OSH issues
Outcome Type	OSH content in public meetings: Public health organizations
Outcome Description	OHI data were shared with stakeholders during public health meetings and advisory committee meetings which represented an increase awareness of OSH issues

Assessing Worker Health and Safety Policies to Enhance Total Worker Health

A Nebraska Worksite Wellness Survey was conducted in 2016 to provide information on worksite wellness policies and practices being implemented in businesses across the state. We collaborated with NDHHS Injury Prevention Program and Chronic Disease Program to design, administer, and analyze results from the Nebraska’s 2016 Worksite Wellness Survey. This information identified areas of need related to developing a comprehensive worksite wellness program for Nebraska businesses.

A summary of important findings of the 2016 Survey:

- 59% of worksites have a policy that requires employees to wear a seatbelt while driving or riding in a vehicle.
- Half of worksites (55%) have a workplace safety committee.
- 42% of workplaces in 2016 had adopted a policy that prohibits the use of e-cigarettes
- Smoking prevalence was highest among Food Preparation & Serving Related occupations.
- Highest binge drinking prevalence was reported in ‘Construction and Extraction’ occupations.

The survey results and report were disseminated to stakeholders and posted on the NDHHS website. A worksite wellness handbook for employers was also developed in conjunction with this survey results. The results were presented at the 2018 Council of States and Territorial Epidemiologists Meeting. One manuscript was published in a peer-reviewed journal in July 2019. Increasing our understanding of trends and adoption of workplace health policies provided new information about Nebraska’s work environment, and it allowed public health practitioners better to target businesses for Total Worker Health initiatives.

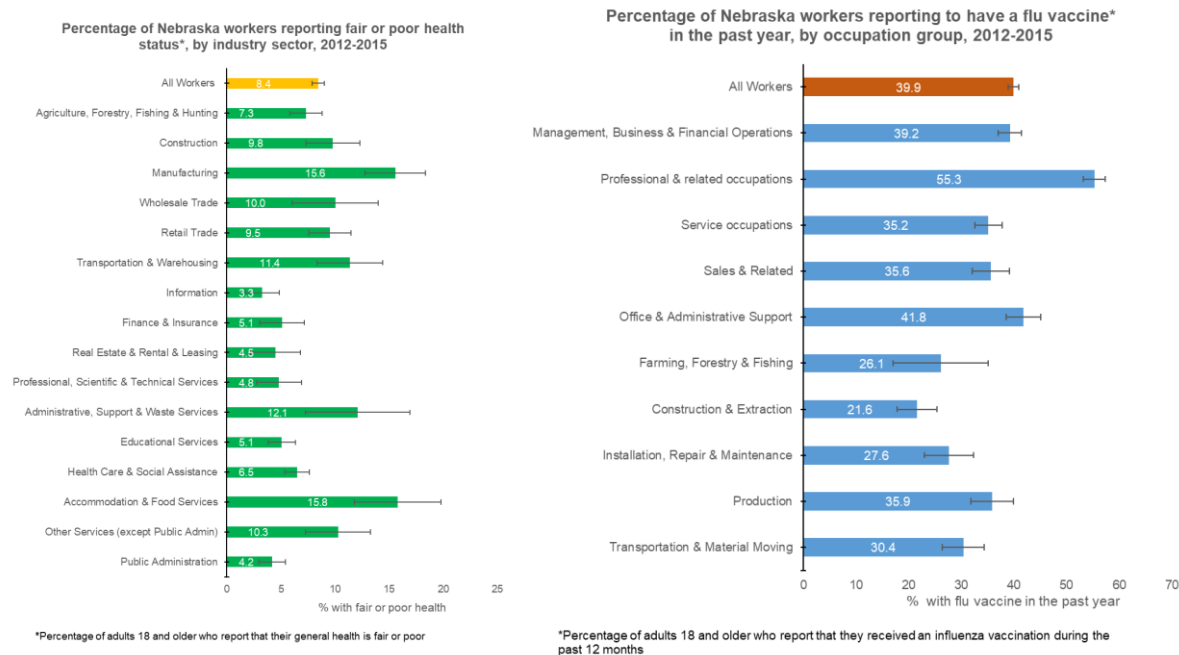
Activity	Assessing Worker Health and Safety Policies to Enhance Total Worker Health
Outputs	Description
Publication	Study was published in a peer-reviewed journal in July 2019.
Outcomes	Description
Outcome Class	Increased stakeholder investment in OSH research and service
Outcome Type	Support for or involvement in OSH research by: Public health organizations

Outcome Description	The collaboration between programs resulted in an investment from the Chronic Disease Program to further study OSH issues such as Total Worker Health concepts.
---------------------	---

Collecting industry and occupation information in BRFSS Data

The Behavioral Risk Factor Surveillance System (BRFSS) is the leading system of health-related telephone surveys that collect state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of preventive services. NOSHP worked with the Nebraska BRFSS program to include industry and occupation questions on the surveys for years 2015-2019. In these 5 years, state residents were asked to report their industry and occupation. Having industry and occupation allowed us to assess differences in health behaviors and risk factors between workers with different jobs and workplaces.

A large data analysis using Nebraska BRFSS data from 2012-2015 was conducted in 2018 which found several important findings. Compared to all workers, we found the prevalence of not having health care coverage or not having healthcare provider was significantly higher in construction, accommodation and food industries. Workers who were in construction and extraction occupation had significantly higher proportion of employees without healthcare coverage or not having healthcare provider. We also found, compared to all workers, workers from accommodation and food service industry reported to have significantly high prevalence fair or poor health status (16%), poor mental health (14%), and depression (27%). Of all the employees, employees who were in production occupation had significantly high prevalence of fair or poor health status (16%) and significantly low prevalence of cancer other than skin cancer (2%). Compared to all workers in Nebraska, workers in health care and social assistance industry, public administration sector or workers in professionals and related occupation reported to have higher prevalence of having flu vaccine in last one year. Workers in construction industry or who had construction and extraction business reported to have higher prevalence of not always wearing seatbelt, current cigarette smoking and binge drinking.



Activity Outputs	Collecting industry and occupation information in BRFSS Data Description
------------------	--

Publication Reports or other communications published by others

Outcomes Description

Outcome Class Increased stakeholder investment in OSH research and service

Outcome Type Support for or involvement in OSH research by: Public health organizations

Outcome Description The collaboration between programs resulted in an investment from the Chronic Disease Program to further study OSH issues such as Total Worker Health concepts.

COVID-19: Adding occupational data elements to COVID-19 data surveillance systems

NOSHP was heavily involved during Nebraska's COVID-19 public health response. Staff were integral in Nebraska's pandemic response in areas related to testing, data assessment and analysis, and prevention activities. In early 2020, it became apparent that SARS-CoV-2 would significantly affect workers and employers. We worked with infectious disease programs to design surveillance data surveillance system to include OSH data elements, such as a persons' industry, occupation, employer, and employer information (i.e. address). Program staff also developed training documents and materials for collecting proper industry and occupation. During calendar year 2020, approximately 45% of COVID-19 cases of working age (18-64) had a valid industry or occupation code. The results enabled NDHHS to describe COVID-19 cases by occupation and industry. An analysis was conducted on this topic in spring 2021 and an abstract was submitted and accepted to the 2021 APHA conference.

Furthermore, in 2021, the program was successful in collaborating with the DHHS immunization program to add industry and occupation to a State of Nebraska vaccine registration data system; however, the results of this data have not yet been analyzed as of October 2021.

Activity COVID-19: Adding occupational data elements to COVID-19 data surveillance systems

Outputs Description

New or expanded partnerships New partnerships with the infectious disease and immunization programs resulted in new OSH data collection opportunities.

Outcomes Description

Outcome Class Use of new surveillance methods by others

Outcome Type Changes in surveillance practices by public health agencies

Outcome Description Through the NOSHP's program work, the infectious disease and immunization programs changed their surveillance methods by adding industry and occupation to their surveillance and data registry systems.

COVID-19: Investigating and analyzing COVID-19 cases among meatpacking workers

During 2020, COVID-19 case outbreaks were reported nationwide among meat processing facility workers. NOSHP's inclusion of OHS information, including industry, occupation, and employer, enabled the identification and analysis of the cases that worked in the meatpacking sector. During 2020 and 2021, NOSHP conducted weekly analysis to provide DHHS leadership and governor's team numbers of cases, hospitalizations, and deaths among meatpacking workers in Nebraska. NOSHP also worked with CDC staff to enumerate and describe the COVID-19 pandemic among meatpacking workers. Through this collaboration with CDC, program staff identified 3,438 confirmed cases and 14 deaths among meatpacking workers from April-May 2020. Data were submitted to NIOSH and CDC which resulted in 3 peer-reviewed publications which described the COVID-19 pandemic among meatpacking an processing industry workers. These publications were used to validate the inclusion of meatpacking workers as priority workers under CDC's Advisory Committee on Immunization Practices (ACIP) COVID-19 vaccine priority groups.

Activity	COVID-19: Investigating and analyzing COVID-19 cases among meatpacking workers
Outputs	Description
Publication (Peer-reviewed)	MMWR: COVID-19 among workers in meat and poultry processing facilities—19 states, April 2020.
Publication (Peer-reviewed)	MMWR: Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities — United States, April–May 2020
Publication (Peer-reviewed)	Emerging Infection Disease: Coronavirus Disease among Workers in Food Processing, Food Manufacturing, and Agriculture Workplaces
Outcomes	Description
Outcome Class	Research used in setting standards, guidance or policy
Outcome Type	In mandatory standards, regulations, or legislation (proposed or adopted)
Outcome Description	The inclusion of Nebraska’s data in CDC MMWR reports on meatpacking outbreaks helped support the CDC’s Advisory Committee on Immunization Practices (ACIP) inclusion of meatpacking workers as a COVID-19 vaccine priority group.

COVID-19: Studying effectiveness of COVID-19 interventions among meatpacking workers

During the COVID-19 pandemic, NOSHP collected industry, occupation, and employer variables on all cases. Also, the University of Nebraska Medical Center conducted site visits for 13 meatpacking plants and collected information on interventions they carried out. UNMC created evidence-based guidelines for facilities and assembled a team of infectious disease and infection prevention and control (IPC) experts to provide onsite and virtual technical assistance to facilities to evaluate gaps in IPC practices and provide facility-specific IPC recommendations.

NOSHP staff collaborated with UNMC staff to assess the effectiveness of interventions. During April 1–July 31, 2020, COVID-19 was diagnosed in 5,002 Nebraska meat processing workers (attack rate 19%). After initiating both universal masking and physical barrier interventions, 8/13 facilities showed a statistically significant reduction in COVID-19 incidence in <10 days. We found characteristics and incidence of confirmed cases aligned with many nationwide trends becoming apparent during this pandemic: specifically, high attack rates among meat processing industry workers, disproportionately high risk of adverse outcomes among ethnic and racial minority groups and men, and effectiveness of using multiple prevention and control interventions to reduce disease transmission. The analysis was summarized and edited by NOSHP and UNMC staff and submitted to publication in CDC’s Emerging Infectious Diseases.

Activity	COVID-19: Studying effectiveness of COVID-19 interventions among meatpacking workers
Outputs	Description
Publication (Peer-reviewed)	Herstein JJ, Degarege A, Stover D, Austin C, Schwedhelm MM, Lawler JV, et al. Characteristics of SARS-CoV-2 Transmission among Meat Processing Workers in Nebraska, USA, and Effectiveness of Risk Mitigation Measures. <i>Emerg Infect Dis.</i> 2021;27(4):1032-1038. https://doi.org/10.3201/eid2704.204800
Outcomes	Description
Outcome Class	Other researchers build on knowledge to pursue additional research or service
Outcome Type	In scientific journals by authors outside NIOSH
Outcome Description	The study published in EID has been cited by 6 other articles since Nov 2021, including a meta-analysis.

Aim 2: Conduct surveillance of occupational poisonings incorporating in-depth investigations and analysis.

Enhancing adult blood lead level surveillance and investigations

NOSHP was successful in enhancing Nebraska's capacity to conduct adult blood lead level surveillance. We continued to use and build upon a public health investigation data collection form within the Nebraska Electronic Disease Surveillance System (NEDSS). The form allows investigators to collect exposure and worker information that is electronically linked with the blood lead level laboratory information. Investigators used this new data collection form to conduct a total of 459 new public health investigations for adults with blood lead levels above 5 mcg/dL. During these investigations, NOSHP contacted the patient's health care provider by phone and fax to provide medical management guidelines to ensure proper medical care and follow-up testing was conducted.

TABLE 1. ACTIVITIES RELATED TO ADULT BLOOD LEAD SURVEILLANCE IN NEBRASKA BY FISCAL YEAR

	Budget Period (Fiscal Year)					
	2016	2017	2018	2019	2020	Total
Number of adults BLL tests received by surveillance system	2481	2481	2481	2481	2481	2481
Number of adult EBLL investigations conducted	18	7	272	138	25	459
Number of EBLLs cases sent letters and prevention information	14	46	60	112	144	376
Submission activities to NIOSH ABLES Program	CY2014 data submitted	CY2015 data submitted	CY2016 data submitted	CY2017 data submitted	CY2018 data pending	

Activity	<u>Enhancing adult blood lead level surveillance and investigations</u>
Outputs	Description
Database	A database of adult blood lead level tests and investigations continues to grow with 5 more year of data.
Outcomes	Description
Outcome Class	Recommendations adopted by manufacturers, trade associations, or others
Outcome Type	Increased OSH-related training: Employers
Outcome Description	Investigating adult lead cases resulted in several meetings and communication with businesses who employ workers with elevated blood lead levels. These employers were provided training information on how to protect their workers from lead exposures.

Providing lead poisoning prevention information to workers with lead exposures

NOSHP staff partnered with local public health departments to provide workers and other adults with elevated blood lead levels (BLLs) with information related to lead exposure health effects and prevention recommendations. Adults with elevated BLLs were mailed notification letters that included the lead level, brief exposure prevention information, and recommendations for follow-up testing. Staff also included prevention information in the form of educational brochures in the mailing. A total of 51 adults with elevated BLLs were given prevention information via mail.

Activity	<i>Providing lead poisoning prevention information to workers with lead exposures</i>
-----------------	--

Outputs	Description
Education letters to workers	Letters and educational brochures to workers with elevated blood lead levels.
Outcomes	Description
Outcome Class	Increased awareness of OSH issues
Outcome Type	Communications products created by the organization
Outcome Description	Educating workers and adults with elevated blood lead levels on prevention strategies helps inform and provide information to reduce future exposures.

Adult blood lead level data submissions to NIOSH ABLES program

During the project, Nebraska ABLES submitted data for 2015, 2016, and 2017 to CDC NIOSH. De-identified data was submitted for all BLLs for adults aged 16 years and older, and a total of 3 annual data files were submitted to NIOSH (Table 3).

Activity	Adult blood lead level data submissions to NIOSH ABLES program
Outputs	Description
Database	NIOSH ABLES Database with Nebraska data

Enhancing occupational poisoning surveillance with regulations

During an update of Nebraska Reportable Disease Regulations, NOSHP was involved with updating several requirements to enhance surveillance of occupational poisonings. In the final version of the Nebraska regulations (Title 173 Chapter 1) which was promulgated in 2017, we added ‘poisoning or illness due to heavy metals’ to the reportable disease condition list. This change allows NDHHS to receive laboratory and case reports of poisoning due to heavy metals other than lead, such as arsenic, mercury, and cadmium. Once the regulation was adopted, NOSHP communicated with laboratories with this new reporting requirement. In 2019, NOSHP began receiving laboratory reports for heavy metal poisoning, and we began investigating cases related to abnormal heavy metal poisoning, and investigation protocols are currently under review. However, the COVID-19 pandemic delayed our efforts in implementing complete occupational heavy metal poisoning investigation protocols.

Activity	Enhancing occupational poisoning surveillance with regulations
Outputs	Description
Standards	Nebraska Reportable Disease Regulations (Nebraska Administrative Code 173 Chapter 1).
Outcomes	Description
Outcome Class	Research used in setting standards, guidance or policy
Outcome Type	In mandatory standards, regulations, or legislation (proposed or adopted)
Outcome Description	Adding heavy metal poisoning to Nebraska’s mandatory regulations enhances surveillance of occupational heavy metal poisoning.

Enhancing surveillance of pesticide illness and injury

Nebraska was one of 13 states participating in the NIOSH Pesticide Injury and Illness Surveillance Program. Pesticide illness case data for year 2011 were included in a CDC Morbidity and Mortality Weekly Report (MMWR) publication. The program participated in a NIOSH-lead multi-state project to study pesticide illnesses due to total release foggers, and Nebraska’s data were included in a manuscript published in 2018 in MMWR. We also responded to two additional pesticide-related data requests for information about glyphosate and chlorpyrifos. Surveillance data on occupational chlorpyrifos exposures were used in an official response to citizen organizations by the Nebraska Office of the Governor.

Activity	Enhancing surveillance of pesticide illness and injury
Outputs	Description
Databases	Nebraska SENSOR pesticide data from 2011-2013
Publication:	Liu R, Alarcon WA, Calvert GM, et al. <i>Acute Illnesses and Injuries Related to Total Release Foggers — 10 States, 2007–2015</i> . MMWR Morb Mortal Wkly Rep 2018;67:125–130.
MMWR	
Outcomes	Description
Outcome Class	Increased awareness of OSH issues
Outcome Type	Communications products created by the organization
Outcome	Nebraska’s participation in the SENSOR-Pesticides Program improves this multi-state surveillance system by providing unique health surveillance data that increases knowledge about occupational pesticide poisonings in the United States. Data are submitted to EPA for review and used for policy setting and standard for pesticides.
Description	

Enhancing public health investigation of occupational carbon monoxide poisonings

Occupational and non-occupational carbon monoxide (CO) poisonings are a reportable disease in Nebraska, however, guidelines for public health investigation were needed. We hosted a Masters of Public Health student to develop public health guidelines for investigating CO poisonings. A surveillance plan was developed and guidance was provided to local health departments through investigation protocols.

Activity	Enhancing public health investigation of occupational carbon monoxide poisonings
Outputs	Description
New or improved methods	Occupational carbon monoxide surveillance plan
Outcomes	Description
Outcome Class	Use of new surveillance methods by others
Outcome Type	Changes in surveillance practices by public health agencies
Outcome	<i>Carbon monoxide exposures pose a threat to workers. Public health investigation plans and guidelines give local disease investigators new tools to identify risk factors for occupational exposures. These guidelines allow risk information to be collected which improve work-related poisoning surveillance leading to improved education and prevention recommendations.</i>
Description	

Aim 3. Build and maintain partnerships and collaborations with state and federal agencies, local public health departments, non-profit organizations, and other occupational health and safety stakeholders.

Collaborating with NIOSH to study enteric diseases and occupational exposures

The Program enhanced its collaboration with NIOSH to study occupational animal exposures among cases of cryptosporidiosis and campylobacteriosis. Program staff provided assistance to NIOSH in the analysis planning, interpretation of findings, and manuscript drafting. Several cases of enteric diseases with occupational animal exposures were identified and described. A manuscript describing the findings was published in CDC’s MMWR publication.

Activity	Collaborating with NIOSH to study enteric diseases and occupational exposures
Outputs	Description

Publications: MMWR	Su C, Stover DT, Buss BF, Carlson AV, Luckhaupt SE. <i>Occupational Animal Exposure Among Persons with Campylobacteriosis and Cryptosporidiosis — Nebraska, 2005–2015</i> . MMWR Morb Mortal Wkly Rep 2017;66:955–958.
-----------------------	--

Outcomes	Description
Outcome Class	Increased stakeholder investment in OSH research and service
Outcome Type	Support for or involvement in OSH research by: Public health organizations Collaboration between NOSHP and NIOSH strengthens occupational health capacity.
Outcome Description	Findings and recommendations from the joint study have added information about occupational animal exposures and influence worker prevention strategies among the DHHS enteric disease epidemiology program.

Training students and increasing occupational health knowledgebase and skillsets for public health students

Nebraska hosted a number of students during the project period. Nebraska’s application to co-host two interns was successfully funded through the Occupational Health Intern Program (OHIP). Two interns received occupational health and safety orientation and dedicated training in surveillance. The program hosted a Masters of Public Health student for completion of a service learning project. The student received one-on-one training in occupational health surveillance, data interpretation, and conducted lead poisoning follow-back investigations which incorporated worker and physician interviews. We also hosted two MPH Graduate Assistant students from the University of Nebraska Medical Center and provided training in occupational health duties, from adult lead poisoning exposures to lead data analysis. Program staff also conducted three guest lectures to public health students about pesticides and occupational health surveillance.

Activity	Training students and increasing occupational health knowledgebase and skillsets for public health students
Outputs	Description
Trainees	5 Masters of public health graduate students were trained.
Outcomes	Description
Outcome Class	Increased stakeholder investment in OSH research and service
Outcome Type	Support for or involvement in OSH research by: Training and/or educational organizations
Outcome Description	By hosting and training students, and the program increased occupational health skillsets and knowledgebase for 5 graduate-level public health students. These students now work in public health and occupational health areas across the country.

Collaborating with partners to study musculoskeletal disorders among meatpacking workers

We collaborated with two occupational health interns and a worker advocacy organization (Nebraska Appleseed) and a worker union to examine musculoskeletal disorders among meatpacking workers. The project included a worker survey, focus groups, and measurement of hand strength tests among five workers. The project found injury rates among surveyed meatpacking workers were as high as 63%, and approximately 40% of workers surveyed had symptoms consistent with carpal tunnel syndrome. Out of five participates tested for hand strength, all showed reduced work capacity for grip strength and wrist-strength extension tests.

Activity	Collaborating with partners to study musculoskeletal disorders among meatpacking workers
Outputs	Description
Publication	Reports or other communications published by others

Outcomes	Description
Outcome Class	Increased awareness of OSH issues
Outcome Type	Advocacy activities: Worker organizations
Outcome Description	The meatpacking worker project resulted in improved knowledge of the causes and conditions of workplace injuries among this high-risk population. Hosting focus groups allowed workers to share worker health experiences, and five workers received direct intervention by providing the results of their work capacity measurement testing.

COVID-19: Collaborating with CDC COVID-19 field team to study meatpacking outbreaks

In the Summer of 2020, CDC sent a field team to Nebraska DHHS to support the response of COVID-19 outbreaks among meatpacking workers and facilities. NOSHP staff acted as a host to the 4-person response team and assisted with studying characteristics and risk factors of COVID-19 for meatpacking workers. NOSHP and CDC worked to develop a data collection tool in REDCap, and trained DHHS contact tracers to administer the detailed exposure questionnaire to a subset of COVID-19 cases in 3 counties. Among 1,216 Nebraska-resident meat processing facility workers tested, 375 (31%) had positive results. During May 8–25, case investigators attempted to interview the 349 workers who had positive test results and available phone numbers; five refused, 99 were not reached after five attempts, and four did not report symptom status, leaving 241 (69%) of the attempted interviews for analysis.

We found among the 241 interviewed workers, close contact with a visibly ill person (or person with diagnosed COVID-19) at work was reported by 70 (29%) workers; the most frequently reported close contact locations were production areas (74%) and cafeteria/break areas (51%). Among 167 persons who worked in the 14 days preceding symptom onset or testing, approximately half (46%) worked on the conveyor belt in harvesting (i.e., stunning, slaughtering, eviscerating, and halving), processing (i.e., cutting, preparing, and packaging), and rendering (i.e., converting waste animal materials into usable products), where they were in close proximity (<4 ft [<1.5 m]) to others.

Nearly one half of interviewed workers worked in close proximity to others highlighted the need for physical barriers between workers, physical distancing throughout the facility (especially locations prone to crowding, such as production areas and cafeterias or break areas), and consistent and correct use of masks to reduce transmission in the workplace.

NOSHP, its DHHS epidemiology partners, and CDC worked to analyze the data and develop a manuscript. The manuscript was reported in MMWR in August 2020/

Activity	COVID-19: Collaborating with CDC COVID-19 field team to study meatpacking outbreaks
Outputs	Description
Publication (Peer-reviewed)	Donahue M, Sreenivasan N, Stover D, et al. <i>Notes from the Field: Characteristics of Meat Processing Facility Workers with Confirmed SARS-CoV-2 Infection — Nebraska, April–May 2020</i> . MMWR Morb Mortal Wkly Rep 2020;69:1020–1022. DOI: http://dx.doi.org/10.15585/mmwr.mm6931a3
Outcomes	Description
Outcome Class	External organizations disseminate outputs
Outcome Type	DHHS surveillance data disseminated to employers
Outcome Description	NOSHP disseminated the results in a custom report for 1 specific meatpacking employer to help them identify and characterize risk factors among meatpacking employee.

COVID-19: Designing data systems for National Guard mass testing events for meatpacking work

During the early phases of the COVID-19 pandemic, meatpacking facilities were facing considerable outbreaks and transmission. NOSHP staff was instrumental in supporting the response to meatpacking outbreaks by designing an electronic data reporting system and form in REDCap to facilitate Nebraska National Guard testing for mass testing events at meatpacking facilities. A total of 5 mass testing events were held. The data system allowed workers to enter in their information, such as employee information, occupation, demographic info, and risk factors. The data was then used as an electronic laboratory requisition in order to link the patient information with the sample information when it was submitted to the Nebraska Public Health Laboratory. Results linking each patient by employee ID were also sent to meatpacking employers.

Activity	COVID-19: Designing data systems for National Guard mass testing events for meatpacking work
Outputs	Description
Technology	A new technology was used for collecting worker information during mass Sars-CoV-2 testing sites in order to link with sample results.
Outcomes	Description
Outcome Class	Recommendations adopted by manufacturers, trade associations, or others
Outcome Type	Changes to organizational mission and/or strategic plans by: Employers
Outcome Description	Meatpacking employers used the testing results to inform strategic plant decisions, including cleaning, employee policies, and temporary closures.

Building relationships with internal and external worker health and safety stakeholders

NOSHP participated in external stakeholder initiatives related to worker health and safety. Staff were members of the external advisory committee of the University of Nebraska Medical Center Central States Center for Agricultural Safety and Health and the University of Iowa's Healthier Workforce Center for the Midlands. Both of these centers are NIOSH-funded projects which NEOSH provided consultation and guidance through attendance of annual meetings.

TABLE 2. WORKGROUPS AND OTHER COLLABORATIVE ACTIVITIES

Title	Workgroup Organization	Meeting Frequency
BRFSS Data Users Group	Nebraska DHHS	Quarterly
Chronic Disease Workgroup	Nebraska DHHS	Various
CS-CASH External Advisory Board Meeting	NIOSH funded Ag Safety and Health Center	Annually
University of Iowa's Healthier Workforce Center for the Midlands	NIOSH-funded Total Health Center	Annually

Meeting with stakeholders

Before the project period began, NDHHS had a limited network of occupational health stakeholders. Throughout the project, we were successful in achieving Aim 4 through identifying and interacting with several new stakeholders to receive input and reach a tighter integration of occupational health into mainstream public health. In its first year NOSHP identified more than 75 partners throughout the state and staff met with many of those entities to discuss occupational safety and health concerns for Nebraska's workforce. We held in-person and teleconferences with several groups as listed below:

- Central States-Center for Agricultural Safety and Health (CS-CASH)
- University of Nebraska Medical Center, College of Public Health
- University of Nebraska-Lincoln (UNL) Pesticide Safety Education Office

- Nebraska Safety Council
- Nebraska Regional Poison Center
- Occupational Safety and Health Administration (OSHA), Omaha Area Office
- Nebraska Department of Labor (NDOL), Office of Safety
- Internal public health programs at Nebraska DHHS Division of Public Health
- Nebraska Workers' Compensation Court
- United Support and Memorial for Workplace Fatalities

Aim 4: Develop and disseminate surveillance data, findings, reports, prevention information, and best practices to workers, program partners, and the occupational health community.

NOSHP disseminated findings to stakeholders through several means, including the Nebraska Department of Health and Human Services website, presentations, posters, lectures, newsletter articles, and social media.

Peer-Reviewed Publications

Year	Citation
2021	Herstein JJ, Degarege A, Stover D, <i>et al.</i> Characteristics of SARS-CoV-2 Transmission among Meat Processing Workers in Nebraska, USA, and Effectiveness of Risk Mitigation Measures. <i>Emerg Infect Dis</i> 2021; 27 . doi: 10.3201/eid2704.204800
2021	Waltenburg M, Rose C, Victoroff T, <i>et al.</i> Coronavirus Disease among Workers in Food Processing, Food Manufacturing, and Agriculture Workplaces. <i>Emerging Infectious Disease journal</i> 2021; 27 . doi: 10.3201/eid2701.203821
2020	Donahue M, Sreenivasan N, Stover D, <i>et al.</i> Notes from the Field: Characteristics of Meat Processing Facility Workers with Confirmed SARS-CoV-2 Infection - Nebraska, April-May 2020. <i>MMWR Morb Mortal Wkly Rep</i> 2020; 69 :1020–2. doi: 10.15585/mmwr.mm6931a3
2020	Waltenburg MA, Victoroff T, Rose CE, <i>et al.</i> Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities - United States, April-May 2020. <i>MMWR Morb Mortal Wkly Rep</i> 2020; 69 :887–92. doi: 10.15585/mmwr.mm6927e2
2020	Dyal JW, Grant MP, Broadwater K, <i>et al.</i> COVID-19 Among Workers in Meat and Poultry Processing Facilities - 19 States, April 2020. <i>MMWR Morb Mortal Wkly Rep</i> 2020; 69 . doi: 10.15585/mmwr.mm6918e3
2019	Sedani A, Stover D, Coyle B, <i>et al.</i> Assessing Workplace Health and Safety Strategies, Trends, and Barriers through a Statewide Worksite Survey. <i>Int J Environ Res Public Health</i> 2019; 16 . doi: 10.3390/ijerph16142475
2019	Hensley J, Gonzalez S, Stover D, <i>et al.</i> Evaluation of ESSENCE Syndromic Definitions for ED Visits Related to Falls in Icy Weather. <i>Online Journal of Public Health Informatics</i> 2019; 11 . doi: 10.5210/ojphi.v11i1.9920
2018	Liu R, Alarcon WA, Calvert GM, <i>et al.</i> Acute Illnesses and Injuries Related to Total Release Foggers — 10 States, 2007–2015. <i>MMWR Morb Mortal Wkly Rep</i> 2018; 67 :125–130.
2017	Su C, Stover DT, Buss BF, Carlson AV, Luckhaupt SE. Occupational Animal Exposure Among Persons with Campylobacteriosis and Cryptosporidiosis — Nebraska, 2005–2015. <i>MMWR Morb Mortal Wkly Rep</i> 2017; 66 :955–958.
2016	Calvert GM, Beckman J, Prado JB, <i>et al.</i> Acute Occupational Pesticide-Related Illness and Injury - United States, 2007-2011. <i>MMWR Morb Mortal Wkly Rep</i> 2016; 63 :11–6. doi: 10.15585/mmwr.mm6355a3
2016	Alarcon WA, State Adult Blood Lead Epidemiology and Surveillance (ABLES) Program Investigators. Elevated Blood Lead Levels Among Employed Adults - United States, 1994-2013. <i>MMWR Morb Mortal Wkly Rep</i> 2016; 63 :59–65. doi: 10.15585/mmwr.mm6355a5

Non Peer Reviewed Publications and Reports

Year	Type	Title
2018	Report	DHHS, 2018. Data and Trends on Tobacco Use in Nebraska, 2017: Understanding the Burden of Tobacco.
2016	Report	Nebraska Occupational Health Indicators
2016	Report	2016 Nebraska Worksite Wellness Survey
2016	Newsletter	Worksite Safety Practices in Nebraska Worksites
2016	Newsletter	NIOSH Health Hazard Evaluations: Free Resource for Nebraska Worksites
2016	Newsletter	NIOSH eNews: Nebraska Releases Occupational Health Data Report

Presentations, posters, and lectures

Year	Title	Type	Event
2021	Occupational and Environmental Health	Lecture	Union College course for Physician Assistants
2020	Occupational and Environmental Health	Lecture	Union College course for Physician Assistants
2018	Binge Drinking Prevalence By Occupation Among Nebraska Adults	Presentation	2018 CSTE Annual Conference, West Palm Beach, FL
2018	Pesticides: Health Effects, Exposures, and Use	Lecture	UNMC MPH Course
2017	Environmental and Occupational Health Epidemiology	Lecture	Doane University Public Health Course
2017	Off the Road Again: Agricultural Injuries in Nebraska Related to All-Terrain Vehicles, 2012-2014	Presentation	2017 CSTE Annual Conference, Boise, ID
2016	Pesticides: Health Effects, Exposures, and Use	Lecture	UNMC MPH Course
2016	Working in Occupational Health: Lessons from Nebraska Newbie	Presentation	2016 WestON Annual Meeting, Denver, CO
2016	Workplace Injuries, Illnesses, and Fatalities	Presentation	Nebraska Safety Council Annual Meeting

Aim 5: Maintain an advisory committee that will meet at least yearly to prioritize activities of special importance to Nebraska.

Advisory Committee Meetings

The NOSHP successfully assembled an occupational health surveillance advisory committee and held 1 in-person committee meetings during the project.

Attendees

1. Duana Freeman- Workers' Comp Advocate with the UNICO group
2. Bob Reynoldson- UNICO group
3. Teresa Anderson – Local Health Dept., Grand Island
4. Cindy Kempt- Registered Nurse with Monsanto; President, Nebraska Association of Occupational Health Nurses Inc.
5. Sue Martin- President, Nebraska State American Federation of Labor- Congress of Industrial Organizations (AFL-CIO)
6. Jeff Funk- Area Director, Omaha Office – Occupational Safety and Health Administration

7. Ellen Duysen – Central States Center for Agricultural Safety and Health, University of Nebraska Medical Center, College of Public Health
8. Jamie Lilis – Public Information Officer, Nebraska Workers' Compensation Court
9. Christopher Cantrel – Safety Director, Nebraska Department of Labor
10. Alison Keyser-Metobo – Epidemiologist, NDHHS
11. Karen Smith – NE Regional Poison Control Center
12. Tanya Ford – United Support and Memorial for Workplace Fatalities (USMWF)
13. Ketki Patel – Epidemiologist, NDHHS
14. Nicole Osborne- NE Safety Council

Publications

Peer-Reviewed

Herstein JJ, Degarege A, Stover D, et al. Characteristics of SARS-CoV-2 Transmission among Meat Processing Workers in Nebraska, USA, and Effectiveness of Risk Mitigation Measures. *Emerg Infect Dis* 2021;27. doi:10.3201/eid2704.204800

Waltenburg M, Rose C, Victoroff T, et al. Coronavirus Disease among Workers in Food Processing, Food Manufacturing, and Agriculture Workplaces. *Emerging Infectious Disease journal* 2021;27. doi:10.3201/eid2701.203821

Donahue M, Sreenivasan N, Stover D, et al. Notes from the Field: Characteristics of Meat Processing Facility Workers with Confirmed SARS-CoV-2 Infection - Nebraska, April-May 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:1020–2. doi:10.15585/mmwr.mm6931a3

Waltenburg MA, Victoroff T, Rose CE, et al. Update: COVID-19 Among Workers in Meat and Poultry Processing Facilities - United States, April-May 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:887–92. doi:10.15585/mmwr.mm6927e2

Dyal JW, Grant MP, Broadwater K, et al. COVID-19 Among Workers in Meat and Poultry Processing Facilities - 19 States, April 2020. *MMWR Morb Mortal Wkly Rep* 2020;69. doi:10.15585/mmwr.mm6918e3

Sedani A, Stover D, Coyle B, et al. Assessing Workplace Health and Safety Strategies, Trends, and Barriers through a Statewide Worksite Survey. *Int J Environ Res Public Health* 2019;16. doi:10.3390/ijerph16142475

Hensley J, Gonzalez S, Stover D, et al. Evaluation of ESSENCE Syndromic Definitions for ED Visits Related to Falls in Icy Weather. *Online Journal of Public Health Informatics* 2019;11. doi:10.5210/ojphi.v11i1.9920

Liu R, Alarcon WA, Calvert GM, et al. Acute Illnesses and Injuries Related to Total Release Foggers — 10 States, 2007–2015. *MMWR Morb Mortal Wkly Rep* 2018;67:125–130.

Su C, Stover DT, Buss BF, Carlson AV, Luckhaupt SE. Occupational Animal Exposure Among Persons with Campylobacteriosis and Cryptosporidiosis — Nebraska, 2005–2015. *MMWR Morb Mortal Wkly Rep* 2017;66:955–958.

Calvert GM, Beckman J, Prado JB, et al. Acute Occupational Pesticide-Related Illness and Injury -United States, 2007-2011. MMWR Morb Mortal Wkly Rep 2016;63:11–6. doi:10.15585/mmwr.mm6355a3

Alarcon WA, State Adult Blood Lead Epidemiology and Surveillance (ABLES) Program Investigators. Elevated Blood Lead Levels Among Employed Adults - United States, 1994-2013. MMWR Morb Mortal Wkly Rep 2016;63:59–65. doi:10.15585/mmwr.mm6355a5

Conclusions

The overall objective of this application was to establish a Fundamental-Plus occupational health and safety surveillance program within the State of Nebraska. The Nebraska Department of Health and Human Services (NDHHS) had a capacity-building Fundamental Occupational Safety and Health Surveillance Program. The project allowed Nebraska to continue its work in identifying work-related injuries and illnesses, conducting analysis of data, and developing prevention and outreach strategies. The Fundamental-Plus program built upon our current activities and increased our capacity to assess occupational health injuries and illnesses, investigate work-related poisonings, develop recommendations, and implement public health interventions. Through collection, analysis and dissemination of data, we improved the knowledge of causes and conditions of occupational injury and illness. This work provided stakeholders and policy makers with information necessary to assess the magnitude of occupational morbidity and mortality, set research priorities, develop policies, and target interventions. As a Fundamental-Plus program, we filled existing gaps in our understanding of occupational exposures to enhance state and national surveillance systems. Building partnerships and maintaining a network of stakeholders across the state resulted in better integration of occupational health and safety into mainstream public health.

Cumulative Inclusion Enrollment

There was no cumulative inclusion enrollment.

Inclusion of gender and minority study subjects

Data were collected regardless of gender, or racial or ethnic origin. We received input from stakeholders and advocates of workers at higher risk of illness and injury, including but not limited to Hispanic workers, Non-English speaking workers, women, and older workers. There was no active enrollment of minority because existing data was used. In descriptive data analyses, we identified injury and illness numbers and rates by gender, age, race, and ethnicity when possible. When applicable, educational documents were translated into Spanish.

Inclusion of Children

Data was collected regardless of age. There was no active enrollment of children because existing data was used.

Materials available for other investigators

All Nebraska occupational health indicator aggregate data was stored in a Microsoft Access database and can be shared with other investigators and the public upon request by email or phone. OHI data were submitted to NIOSH annually, and were displayed on data dashboards on the CSTE website

<http://www.cste.org/?OHIIndicators>. OHI data and the findings of our analyses were also summarized in annual OHI reports and other technical reports and were made available to the public by posting online on the NDHHS website. Reports, educational materials, and other documents were also posted on the NDHHS website and the NIOSH State-based Occupational Health Surveillance Clearinghouse at <https://wwwn.cdc.gov/niosh-statedocs/>. Data and reports were also shared to several stakeholders through newsletters and social media post