Occupational Health in Louisiana: Review of Indicator Data, Sixth Edition

Louisiana Department of Health (LDH)/Office of Public Health (OPH)
Section of Environmental Epidemiology & Toxicology (SEET)
Occupational Health & Injury Surveillance Program in Louisiana (LOHIS)

MARCH 2019

For more detailed analyses of these indicators and other occupational health issues, visit OPH/SEET's website: http://ldh.la.gov/index.cfm/page/558. If you have an occupational issue to report or want more information about the program, send an email to workerhealth@la.gov.

LOUISIANA DEPARTMENT OF HEALTH
Public Health

List of Acronyms

AAOHN	American Association of Occupational Health Nurses
ACOEM	American College of Occupational and Environmental Medicine
ASSE	American Society of Safety Engineers
BLL	Blood lead levels
BLS	Bureau of Labor Statistics (Division of United States Department of Labor)
BRFSS/ACBS	Behavioral Risk Factor Surveillance Survey/Asthma Callback Survey (CDC)
CDC	Centers for Disease Control and Prevention
CFOI	Census of Fatal Occupational Injuries (Bureau of Labor Statistics)
CPS	Current Population Survey (Bureau of Labor Statistics)
CSTE	Council of State and Territorial Epidemiologists
EPA	Environmental Protection Agency (United States)
LAHIDD	Louisiana Hospital Inpatient Discharge Database
LDH	Louisiana Department of Health
LOHIS	Louisiana Occupational Health and Injury Surveillance
NAACCR	North American Association of Central Cancer Registries
NASI	National Academy of Social Insurance
NCHS	National Center for Health Statistics (CDC)
NHDS	National Hospital Discharge Survey (CDC)
NHSN	National Healthcare Safety Network (NHSN)
NIOSH	National Institute for Occupational Safety and Health (CDC)
OPH	Office of Public Health
OSHA	Occupational Safety and Health Administration
PCC	Poison Control Center (American Association)
SEET	Section of Environmental Epidemiology and Toxicology
SOII	Survey of Occupational Injuries and Illnesses (Bureau of Labor Statistics)

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Technical Notes & Data Source Descriptions

Behavioral Risk Factor Surveillance System (BRFSS) Asthma Callback Survey (ACBS)

The Behavioral Risk Factor Surveillance System (BRFSS), which began in 1984, is a cross-sectional telephone survey developed by the Centers for Disease Control (CDC) and conducted annually by participating states. BRFSS summarizes behavioral risk factor data, which may lead to premature chronic health conditions through lifestyle activities in adults and/or children, depending on which data the state opts to collect. The Asthma Callback Survey (ACBS), funded by the Air Pollution and Respiratory Health Branch (APRHB) within the National Center for Environmental Health (NCEH), is a series of asthma-related questions given to adult respondents ages 18 years and older who have self-reported asthma diagnoses.[1] Participants in the ACBS are called two weeks after completion of the primary BRFSS survey.
Limitations: Not all states participate in BRFSS every year, and there are variations in data collection quality and control. U.S. data for 2011 forward are not comparable with prior years' data, due to a new weighting method (which includes cell phone usage) called raking. Although Louisiana began participating in cellphone data collection in 2011 for BRFSS, ACBS data was still collected through landline use only from 2011 through 2014. Louisiana stopped collecting ACBS data after the 2014 survey following the discontinuation of the Louisiana Asthma Coalition Program.

Bureau of Labor Statistics (BLS): Workforce Demographics

Statistics on Louisiana's workforce distribution by demographic and employment characteristics were obtained from the Bureau of Labor Statistics' (BLS) Current Population Survey (CPS) and Geographic Profile of Employment and Unemployment.

Current Population Survey

The CPS is a monthly probability sample of about 60,000 households designed to represent the civilian non-institutional population of the U.S. It is conducted by the U.S. Census Bureau for the Bureau of Labor Statistics (BLS). The CPS collects information on demographics, employment status, weekly hours worked, and industry and occupation of each household member 15 years of age and older.
Limitations: Excluded from the survey are active-duty members of the military and inmates in institutions. The CPS undercounts certain racial or ethnic workers who do not have a permanent address or are migratory in nature. Because CPS estimates are based on a random sampling of the population rather than a complete census, they are subject to sampling error. There is a lag time of approximately 30-45 days between data collection and the release of basic data for public use. Supplemental data files may not be available for 6 to 18 months after data collection.

Geographic Profile of Employment and Unemployment

Each year, the BLS produces annual average employment information for census regions, states, and metropolitan areas in its "Geographic Profile of Employment and Unemployment" series. The profiles contain information on the employed and unemployed by select demographic and economic characteristics based on data from the CPS.
Limitations: The profiles exclude workers less than 16 years of age, active duty members of the military, and inmates in institutions.

Bureau of Labor Statistics (BLS): Census of Fatal Occupational Injuries (CFOI)

The ***Census of Fatal Occupational Injuries (CFOI)***, a Federal/State cooperative program administered by BLS, is charged with annually collecting detailed information on all work-related fatalities occurring in the U.S. The CFOI uses diverse State and Federal data sources to identify, verify, and profile fatal work-related injuries. Information about each workplace fatality (e.g., circumstance of the event, industry, occupation, type of machinery or equipment involved, and other worker characteristics) is obtained by cross-referencing source documents, such as death certificates, workers' compensation records, medical examiner reports, and police reports as well as news and other non-governmental reports. The year of death may not be the same as the year in which the fatal injury occurred.

Bureau of Labor Statistics (BLS): Survey of Occupational Injuries and Illnesses (SOII)

The Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses (SOII) provides information on the number and rate of injuries and illnesses affecting the United States' private industry workforce, excluding self-employed, private households and small farms.

Limitations: There are two major data limitations. Injuries and illnesses are underreported, and it is difficult to determine causation of most diseases and relatedness to occupational conditions.[2]

Centers for Disease Control (CDC)

National statistics for hospitalization and mortality data were obtained from the CDC's National Center for Health Statistics, National Hospital Discharge Survey, and Work-Related Lung Disease Surveillance System (eWORLD).

National Center for Health Statistics (NCHS)

NCHS is the principal health statistics agency for the U.S., providing data to assist in identifying and addressing health issues and guiding public policy decisions. Health and healthcare disparities are identified; health indicators, e.g. chronic disease, hospitalization, mortality, are provided using birth and death certificates, patient medical records, household surveys, physical examinations, lab tests and hospital & clinic information.

Limitations: Most data produced are for national-level trends. State data are available only if the sample size is deemed to be sufficiently large. Biases potentially associated with self-reported survey data may be applicable, although NCHS uses multiple data sources for verification purposes.

National Healthcare Safety Network (NHSN)

NHSN is the most widely used system to track healthcare-associated infections (HAI), serving more than 17,000 medical facilities that track HAI. Participants primarily include hospitals (acute and long-term care, psychiatric and rehabilitation) and outpatient dialysis centers. It provides real-time state- and national-level data to help patients and researchers determine areas of concern and measure prevention efforts, particularly regarding influenza vaccination coverage among healthcare personnel and infection control adherence rates.

Limitations: Only a small subset of the medical facilities in the U.S. are reporting HAI data to NHSN, and these are primarily hospitals. HAI that may be seen in patients at clinics through the country are not currently being reported. Biases associated with self-reported survey data may also be applicable with this data system.

National Hospital Discharge Survey (NHDS)

NHDS was a national probability survey conducted by the CDC annually from 1965-2010; the goal of the survey was to characterize inpatients discharged from nonfederal, short-stay hospitals in the U.S. From 2011 to present, data are collected by the National Hospital Ambulatory Medical Care Survey (NHAMCS) in a combined survey called the National Hospital Care Survey (NHCS).

Limitations: Approximately 45% of the respondent hospitals provide data for the NHCS annually through an automated system; the remaining 55% of the data are manually entered by hospital or U.S. Census Bureau staff into a database, which may entail some operator coding issues. Additionally, hospital determination of admission diagnosis, ICD-9 coding and completeness of demographic information may vary.

Louisiana Hospital Inpatient Discharge Database

The Louisiana Hospital Inpatient Discharge Database, or LAHIDD, serves as the state registry containing inpatient discharge data from Louisiana hospitals. LAHIDD contains detailed information on all hospital admissions: patient demographics, age, admission and discharge date, diagnosis (ICD-9 codes), cost of hospitalization, and payer information. The designation of workers' compensation payment as primary payer on hospital discharge records is a good proxy for the work-relatedness of hospitalized injuries.[3]
Limitations: Hospital discharge records are only available for non-federal, acute care hospitals. Selecting work-related hospitalizations based on payer source is not a complete measure of work-related illness as the majority of individuals with work-related illnesses and many others with injuries do not file for workers' compensation. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, and railroad, longshore and maritime workers are not covered by state workers' compensation systems. Louisiana residents who were hospitalized out-of-state are not factored in the numbers reported. The data represent the number of hospitalizations and not the number of residents hospitalized, due to the potential for multiple hospitalizations in a year for an individual.

Louisiana Tumor Registry

The Louisiana Tumor Registry, operated by the Louisiana State University Health Sciences Center, is a population-based Surveillance, Epidemiology, and End Results (SEER) cancer registry covering the entire state of Louisiana. The registry has been in operation in the New Orleans metropolitan area since 1974, in South Louisiana since 1983 and in the rest of the state since 1988. By law, every health care provider is required to report newly diagnosed cancers to the Tumor Registry. The Tumor Registry database contains information about cancer cases including patient demographics, primary site of cancer, histology codes, and location at date of diagnosis.

Louisiana Vital Records

The Louisiana Department of Health and Hospitals' Center for Records and Statistics maintains the Vital Records Registry (VRR) and the State Center for Health Statistics (SCHS). The Board of Health for Orleans Parish was initially established to provide annual reports on local health in 1847, in response to the Yellow Fever outbreak. Files are maintained for Louisiana births, deaths, fetal deaths and Orleans Parish marriages, copies of which are vital for conducting daily business, e.g. showing proof of citizenship or receiving government benefits. Reporting of vital records data allows researchers to conduct public health surveillance and tailor outreach and public policy decisions to at-risk populations.
Limitations: Mortality data for Louisiana are obtained from death certificate data maintained by the LDH/Center of State Registrar & Vital Records. U.S. mortality data are retained by the National Center for Health Statistics. Records included in the indicator data have the specific condition as either the underlying or contributing cause of death. Deaths related to particular chronic diseases, e.g., pneumoconioses, are undercounted on death certificates; due to the long time between exposure and the appearance of symptoms, physicians may not recognize the cause as pneumoconiosis.

National Academy of Social Insurance (NASI)

NASI is a not-for-profit, nonpartisan social insurance agency that increases public awareness of social insurance and its' contribution to economic stability. Social insurance includes other systems designed to help workers avoid income loss due to death, disability, or retirement and ensure access to health care.

Occupational Safety & Health Administration (OSHA): Office of Statistics

The Occupational Safety and Health Administration (OSHA), which is part of the U.S. Department of Labor, is a federal regulatory agency that sets and enforces standards and regulations to protect worker safety and health. The agency ensures that employers in private industry create and maintain a workplace that is safe from recognized hazards that may cause injury or death to the workforce. Worksites may be inspected and citations may be issued if an OSHA Compliance Officer finds violations at the workplace. There are 10 regional OSHA offices and 90 local area offices, with about 2,200 inspectors for more than 8 million worksites.

Toxic Exposure Surveillance System

Poison Control Centers (PCC) are an important data source for case reports of exposure to toxic substances, including pesticides. PCCs receive calls from health care providers and the general public. The majority of calls involve an acute exposure to a toxic substance and the PCCs' primary function is to provide the caller with toxicological and treatment information**.** Information collected by the PCC includes demographic, circumstance and site of exposure (e.g., workplace), route of exposure, medical care received, substance(s), severity, number of individuals involved, clinical effects, and medical outcome. If medical care is received, health care facility information is also collected. Every 5 minutes, information on all calls made to a PCC are uploaded to a central repository at the American Association of Poison Control Centers (AAPCC). The AAPCC uses this data to produce an aggregated dataset, which is called the *Toxic Exposure Surveillance System (TESS).* The Bureau of Labor Statistics does not provide data for pesticide poisonings on a national level; therefore, U.S. data for annual pesticide poisonings are obtained from the AAPCC. Reports of acute pesticide poisoning are captured from calls made to the Louisiana Poison Center.

Limitations: PCC cases only represent reported cases. To report a case, the exposed individual or healthcare provider must know about the PCC and how to contact them. Also, healthcare providers with more experience in diagnosing and treating pesticide cases are less likely to contact the PCC for assistance. Because of these factors, PCC data likely underestimate the true extent of work-related pesticide exposure. PCC data are estimated to reflect only 10% of all work-related pesticide poisoning cases in the United States.[4]

Background

Almost two million individuals work in Louisiana. Every year, thousands of these workers are injured on the job or become ill as a result of exposure to health and safety hazards at work. These work-related health conditions have high human and economic costs not only for workers and employers but also for society at large.[5] Workers' compensation claims alone in Louisiana cost more than $755 million in 2015.[6] Work-related injuries and illnesses can be prevented. Successful approaches to making the workplace safer begin with having the data necessary to understand the problems.[7]

The Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology and Toxicology's Occupational Health & Injury Surveillance Program (OPH/SEET) conducts ***surveillance of injuries, illnesses, deaths, and hazards among Louisiana workers***. This project began in 2006 through funding from the Center for Disease Control and Prevention/National Institute of Occupational Safety and Health (CDC/NIOSH). A set of occupational health indicators was developed by a State-Federal Workgroup composed of representatives from state occupational health programs, the Council of State and Territorial Epidemiologists (CSTE), and CDC/NIOSH to help state health departments with their surveillance activities. An ***occupational health indicator*** is a specific measure of a work-related disease or injury, or a factor associated with occupational health, such as workplace exposures, hazards, or interventions, in a specified population. Indicators allow a state to compare its health or risk status to that of other states, to evaluate trends over time within the state, and to guide priorities for prevention and intervention efforts. These indicators are collected and compiled annually.

This document briefly summarizes some of Louisiana's occupational indicator data. When available, national data are presented for comparison purposes. The reporting period may vary by indicator due to differences in the number of years of data available from the various data sources. Because no single data source adequately characterizes the occupational health issues for Louisiana, multiple data sources were used. Technical notes and a description of the data sources are included at the beginning of the document. Please note that Louisiana data are not currently available for two indicators: 1) State workers' compensation claims for amputations with lost work-time and 2) State workers' compensation claims for carpal tunnel syndrome with lost work-time.

Civilian Employment Demographics

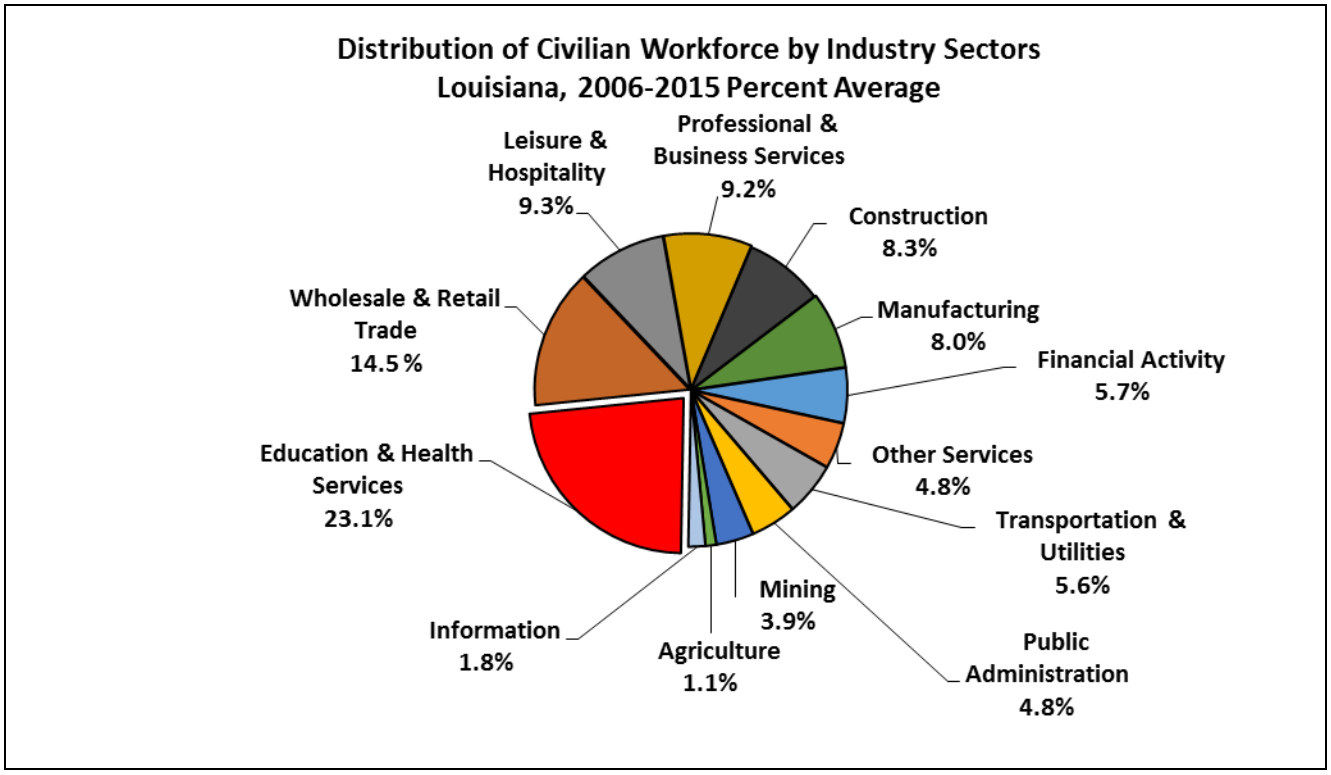
From 2006 through 2015, Louisiana's average annual workforce included 1,945,000 individuals. About 53% of the workforce was male, and 47% female. The percent of workers aged 16-17 years decreased by 49%, the percent of workers aged 18-64 years increased by 0.4%, and the percent of workers aged 65 years and older increased by 10%. On average, 70% percent of the workforce in Louisiana was white, and 27% was black; compared to 82% white and 11% black for the United States. About 4% of the Louisiana workforce was of Hispanic ethnicity, compared to 14% of the United States workforce. About 24% of Louisianans worked more than 40 hours per week.

Average Annual Count and Percent: 2006-2015	
Number Employed	1,945,000
	%
Male	52.7
Female	47.3
Age (in years)	
16 - 17	1.0
18 - 64	94.0
>/= 65	5.0
Race/ethnicity	
White	70.0
Black	27.0
Other	3.0
Hispanic*	4.0
Unemployed	6.0
Self-employed	6.0
Employed part-time**	16.0
Work hours/ week	
<40 hrs	31.0
40 hrs	45.0
>40 hrs	24.0

Note: Percentages may not add up to 100 due to rounding.
**Persons identified as Hispanic may be of any race.*
***"Employed part-time" are individuals who work 1 to 34 hours per week*
Data Sources: Bureau of Labor Statistics' Geographic Profile of Employment and Unemployment and Current Population Survey (age distribution only).

Workforce by Industry

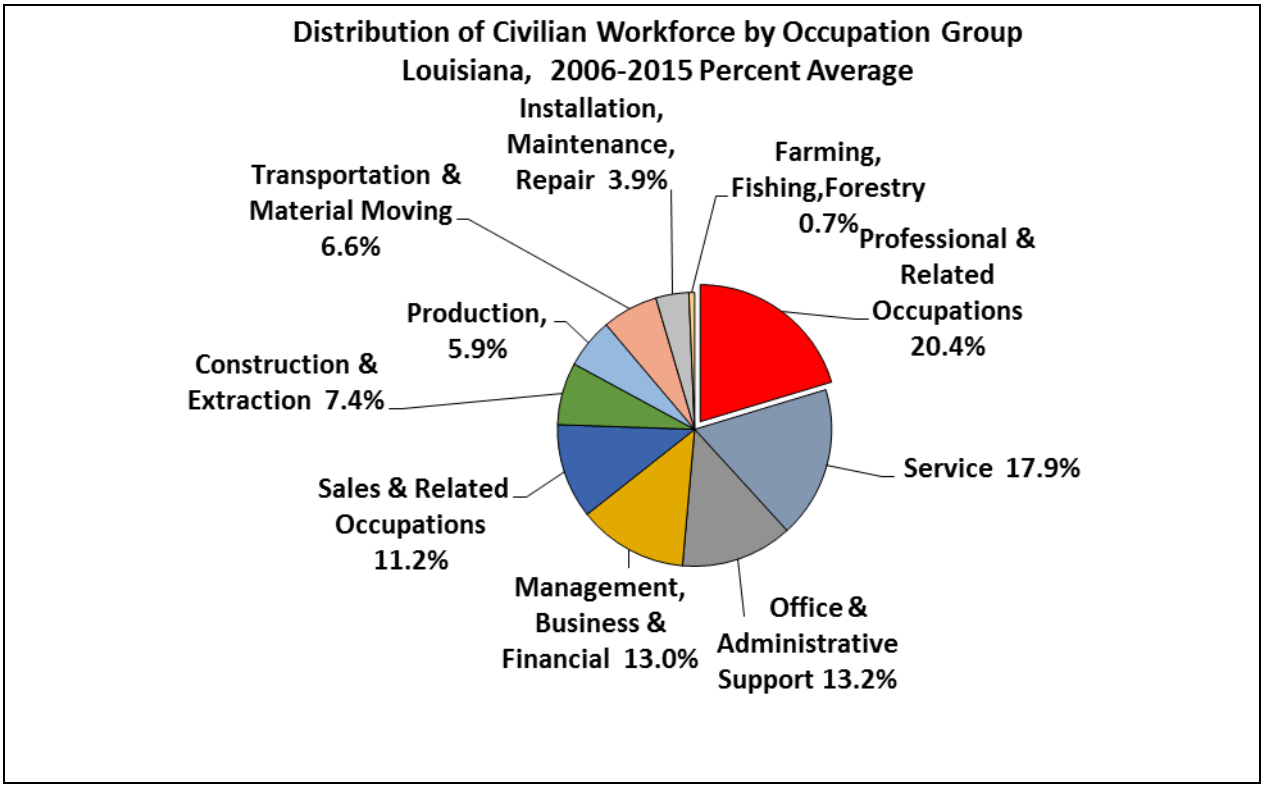
The industries in which Louisianans worked from 2006 through 2015 were evaluated using Census Industry Codes. Education and Health Services was the largest industry sector (23.1%), followed by wholesale and retail trade (14.5%) and leisure and hospitality (9.3%).



Data Source: Bureau of Labor Statistics' Geographic Profile of Employment and Unemployment
Note: Percentages may not add up to 100 due to rounding.

Workforce by Occupation

Workers' occupational group was evaluated using Census Occupation codes. The largest occupational groups were Professional and Related Occupations (20.4%), followed by Service (17.9%), and Office and Administrative Support (13.2%).



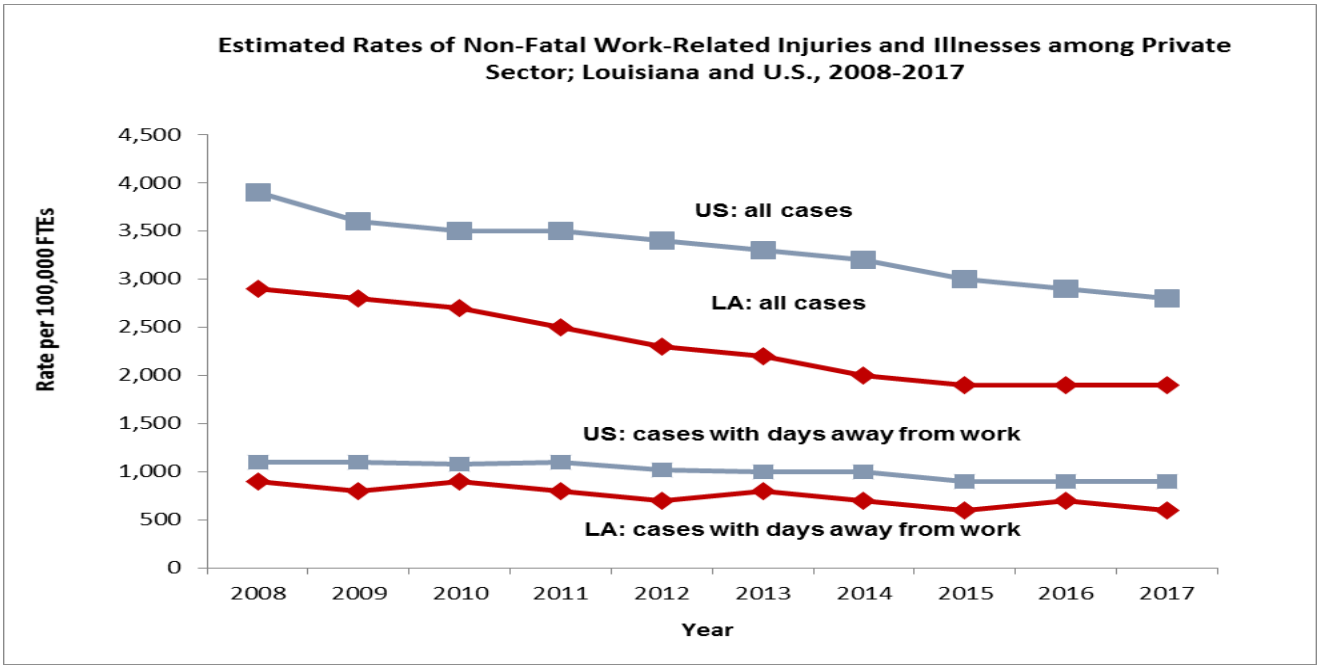
Data Source: Bureau of Labor Statistics' Geographic Profile of Employment and Unemployment
Note: Percentages may not add up to 100 due to rounding.

Indicator 1: Non-fatal work-related injuries and illnesses reported by Louisiana employers

The average annual work-related injury and illness incidence rate per 100,000 full-time workers from 2008 to 2017 was estimated at 2,310 for Louisiana and 3,310 for the U.S. The average annual incidence rate for cases involving days away from work per 100,000 full-time workers was estimated at 750 for Louisiana and 1,010 for the U.S.

Estimated Number of Non-Fatal Work-Related Injuries and Illnesses Reported by Private Industry Employers, Louisiana and U.S., 2008-2017

Year	All Cases		Cases with Days Away from Work		Cases with >10 Days Away from Work	
	LA	US	LA	US	LA	US
2008	38,300	3,696,000	12,900	1,100,000	5,620	479,260
2009	37,700	3,277,000	11,300	964,000	5,360	429,820
2010	34,800	3,063,400	11,400	933,200	5,550	420,840
2011	32,500	2,986,500	11,000	908,300	5,770	414,800
2012	30,600	3,027,600	10,000	918,700	5,170	421,960
2013	30,000	3,007,300	11,000	917,090	5,050	420,410
2014	28,500	2,953,500	9,300	916,400	4,470	426,430
2015	26,100	2,905,900	8,800	902,200	4,920	412,720
2016	25,700	2,857,400	9,600	892,300	4,750	407,310
2017	25,400	2,811,500	8,900	882,700	4,130	404,730



*Full-time work is calculated as the total number of hours worked, divided by the maximum number of compensable hours (e.g., where the work week equals 40 hours, two workers at 20 hours per week are equal to one FTE).
Data Source: Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses

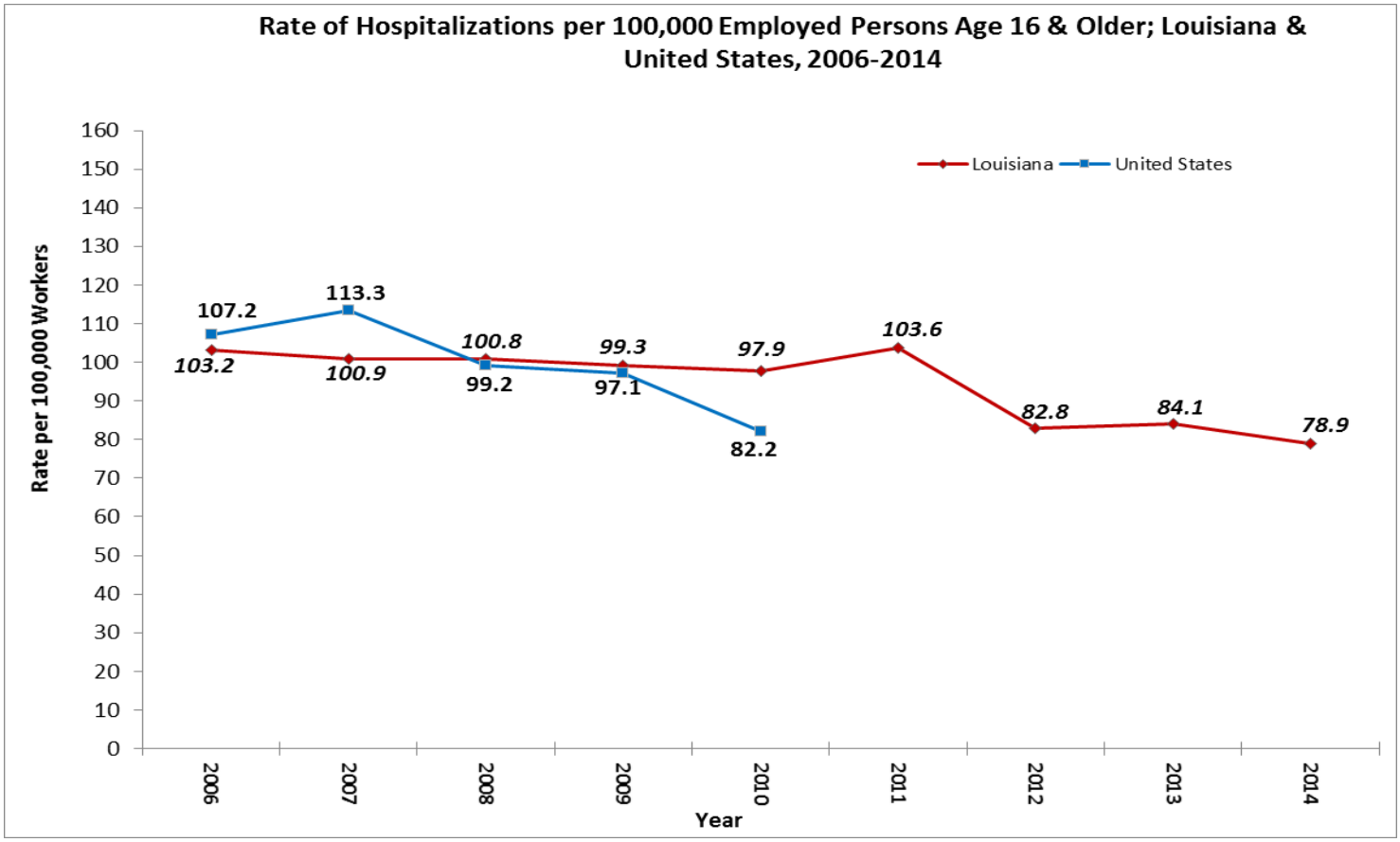
Note: Differences in industry concentration and sample size prohibit state-level data from being directly compared to other states or with national estimates.

Indicator 2: Work-related hospitalizations

From 2006 to 2015, there was an annual average of 1,796 hospitalizations in Louisiana for which workers' compensation was the primary payer. The number of work-related hospitalizations in Louisiana ranged from 1,502 to 1,997 during the ten-year period. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes.

Annual Number of Work-Related Hospitalizations for Persons Age 16 and Older; Louisiana & United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana	1,930	1,936	1,997	1,915	1,887	1,961	1,598	1,640	1,595	1,502
United States	154,877	165,441	144,184	135,825	114,242	N/A	N/A	N/A	N/A	N/A



Data Source: Louisiana Hospital Inpatient Discharge Database; U.S. data: National Hospital Discharge Survey; rates calculated using Bureau of Labor Statistics' Current Population Survey

Note: U.S. data for hospitalizations based on workers' compensation as a payment source were no longer available after 2010. *Workers' compensation eligibility criteria and availability of data from workers' compensation programs varies among states, prohibiting state-level data from being directly compared to other states or with national estimates.*

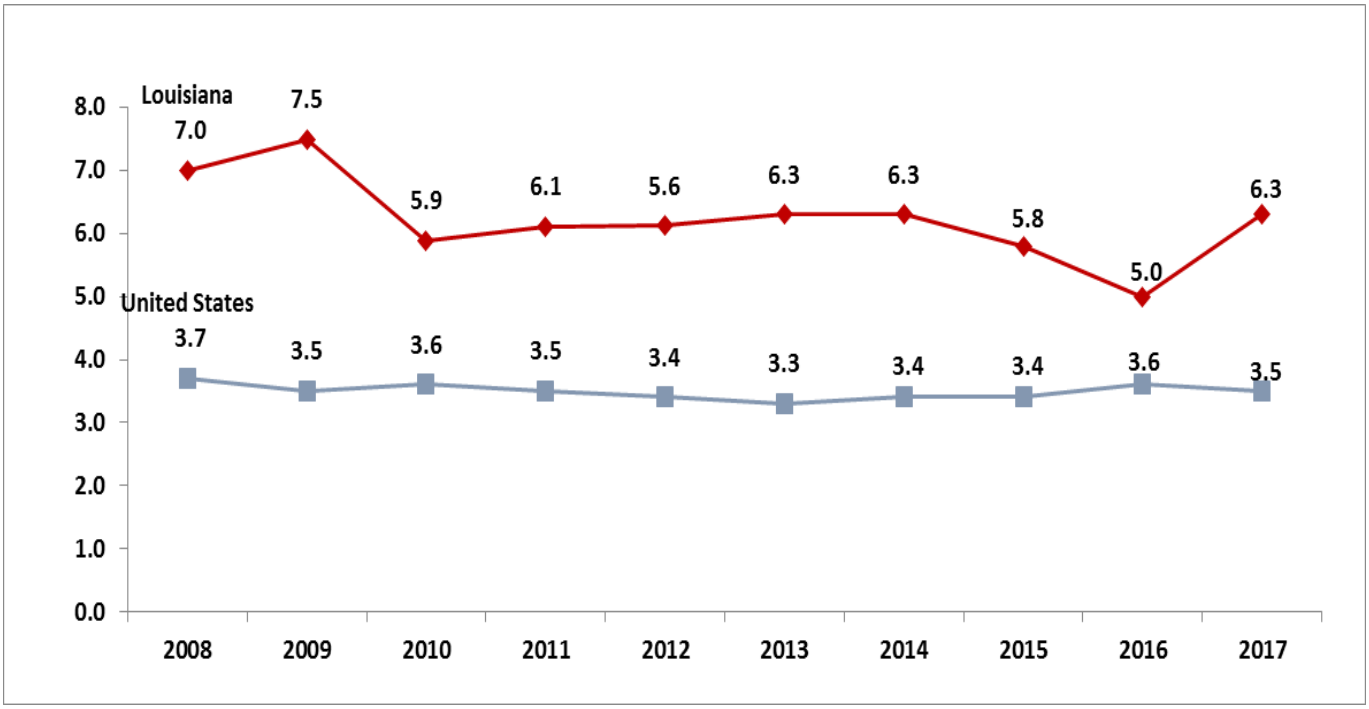
Indicator 3: Fatal work-related injuries

A fatal work-related injury is an injury occurring at work that results in death. This includes fatalities from non-intentional injuries such as falls, electrocutions, and acute poisonings as well as fatal injuries from motor vehicle crashes that occurred during travel for work. Intentional injuries (i.e., homicides and suicides) that occurred at work are also included. There was an average annual count of 117 fatal work-related injuries in Louisiana and 4,836 in the U.S. from 2008 through 2017. The number of work-related fatalities in Louisiana ranged from 95 to 140 during the 10-year period.

Number of work-related fatalities in Louisiana and United States, 2008-2017

Year of Fatal Event

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Louisiana	135	140	111	111	116	114	120	112	95	117
United States	5,214	4,551	4,690	4,693	4,628	4,585	4,821	4,836	5,190	5,147



Data Sources: Bureau of Labor Statistics' Census of Fatal Occupational Injuries and Geographic Profile of Employment and Unemployment; rates calculated using Bureau of Labor Statistics' Current Population Survey

Note: Data from 2008 forward were calculated using hours-based rates per 100,000 full-time equivalent workers, and these data are not comparable to prior years' rates.

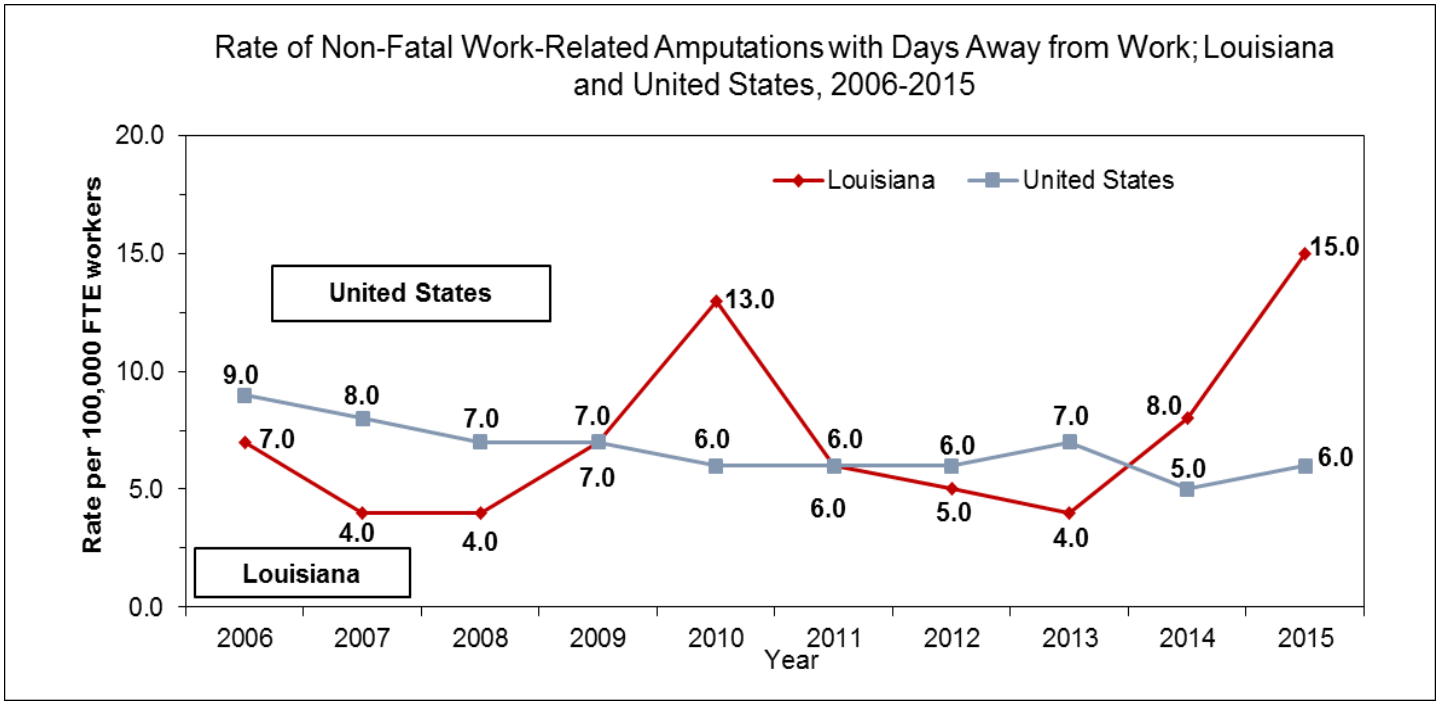
Indicator 4: Work-related amputations with days away from work reported by employers

An amputation is the partial or full removal of an exterior body part, e.g. a finger, toe, arm, hand, or leg. Amputations may reduce a worker's quality of life or prohibit the worker from adequately performing some previous job duties.

The average number of amputations each year from 2006 to 2015 was 100 in Louisiana and 5,860 in the United States, respectively. The number of non-fatal work-related amputations with days away from work in Louisiana ranged from 50 to 210.

Number of non-fatal work-related Amputations with days away from work: Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
LA	100	60	50	90	170	80	70	50	120	210
US	7,990	7,320	6,230	5,930	5,260	5,000	5,100	6,160	4,250	5,360



Data Source: Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses

Note: Differences in industry concentration and sample size prohibit state-level data from being directly compared to other states or with national estimates.

Indicator 5: Workers' compensation claims for amputations with lost work-time

Data for this indicator are currently not available.

Indicator 6: Hospitalizations for work-related burns

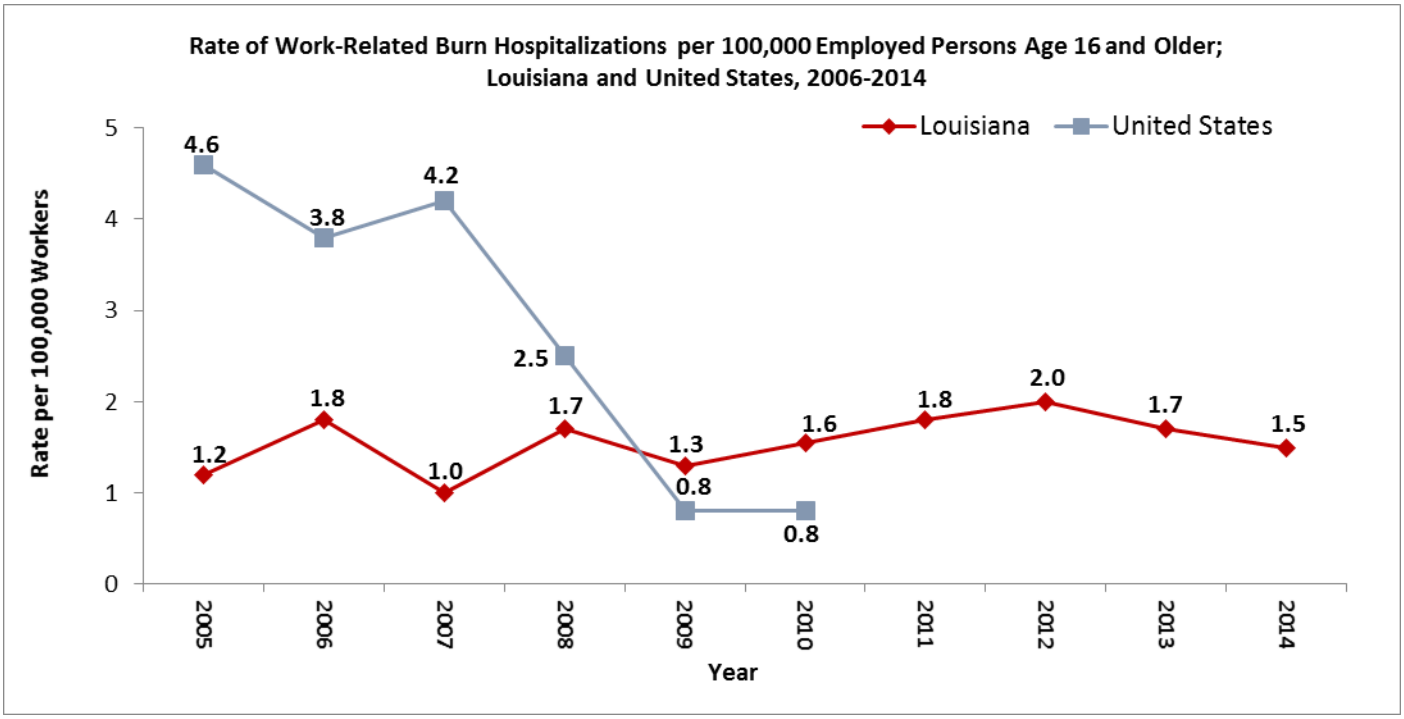
Burns are injuries to skin or other tissues caused by contact with a heat source, e.g. dry heat (fire), moist heat (steam), chemicals, electricity, friction, or radiation. Burn injuries are very expensive to treat and may result in partial or permanent disability, along with a potentially impaired quality of life. The most common types of burns are either thermal or chemical in nature. Burns are the most common cause of injury among young workers and workers employed in the food service industry. Nationally, an estimated 150,000 people with work-related burns are treated in emergency rooms annually, and approximately 30% to 40% of hospitalizations for burns among adults are work-related.[7]

The average annual count of work-related burn hospitalizations in Louisiana from 2005-2014 was 30 and 4,008 in the United States from 2005-2010. From 2005-2014, the number of work-related burn hospitalizations in Louisiana for persons age 16 and older ranged from 20 to 38 a year. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes.

Annual Number of Work-Related Burn Hospitalizations for Persons Age 16 and Older; Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana	33	20	33	25	30	34	38	34	30	45
United States	5,483	6,158	3,657	1,111	1,176	N/A	N/A	N/A	N/A	N/A

Note: U.S. burn hospitalization data are not available after 2010.



Data Sources: Louisiana Hospital Inpatient Discharge Database; U.S. data: National Hospital Discharge Survey; rates calculated using Bureau of Labor Statistics' Current Population Survey

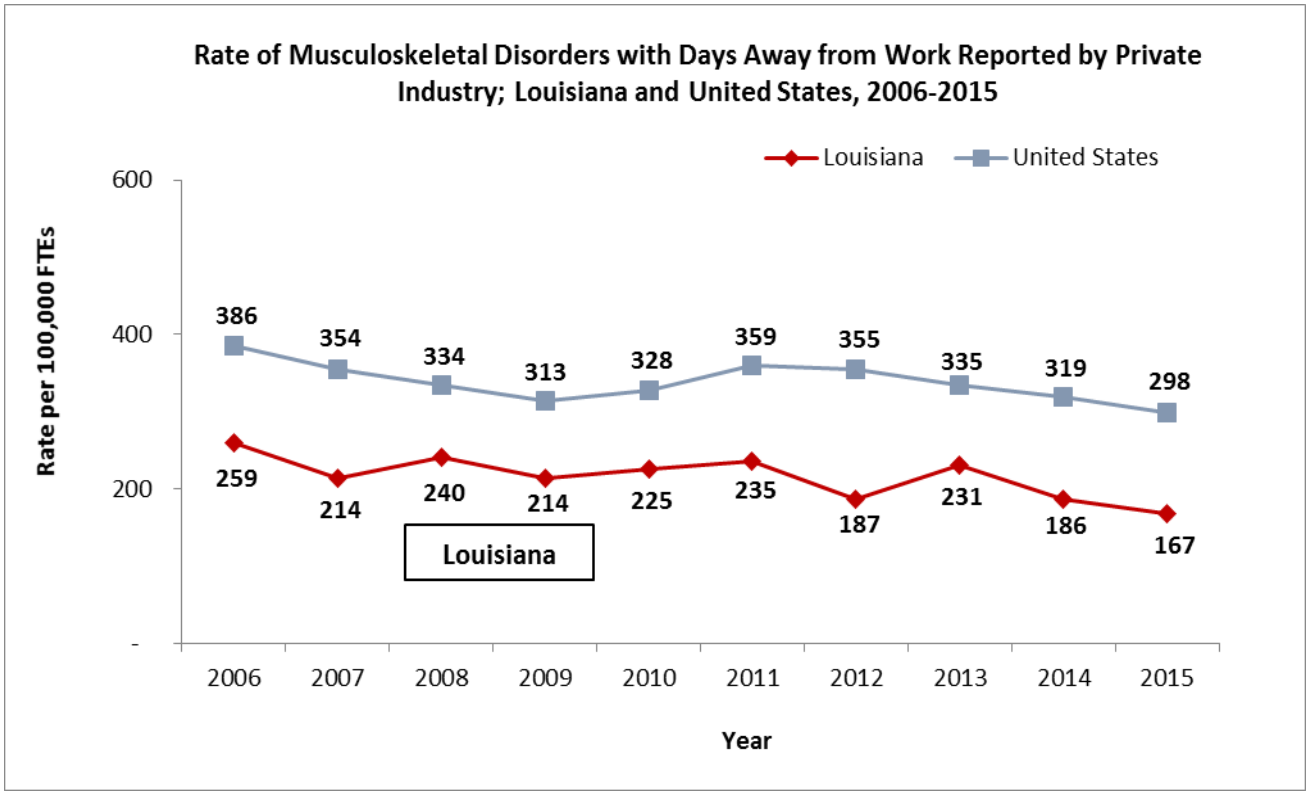
Note: Workers' compensation eligibility criteria and availability of data from workers' compensation programs varies among states, prohibiting state-level data from being directly compared to other states or with national estimates.

Indicator 7: Work-related musculoskeletal disorders reported by employers

Musculoskeletal disorders (MSDs) are among the most common and expensive work-related health issues. Occupational MSDs are caused by repetitively performing work-related tasks that engage the same muscles constantly without adequate rest, and they include injuries to the joints, muscles, tendons, ligaments, nerves or spine. Other causes of MSDs may include maintaining awkward postures that strain the body, using vibratory equipment, or lifting heavy/bulky loads. These disorders can greatly impact job performance and quality of life. BLS SOII data includes sprains, strains, pain, backaches, carpal tunnel syndrome, and hernias that develop over time from repetitive motion tasks or overexertion. The data excludes slips, falls, motor vehicle accidents, and any other single event that caused the MSD. The number of MSDs with days away from work in Louisiana ranged from 2,350 to 3,320.

Number of Musculoskeletal Disorders with Days Away from Work Reported by Private Industry, Louisiana and United States, 2006-2015

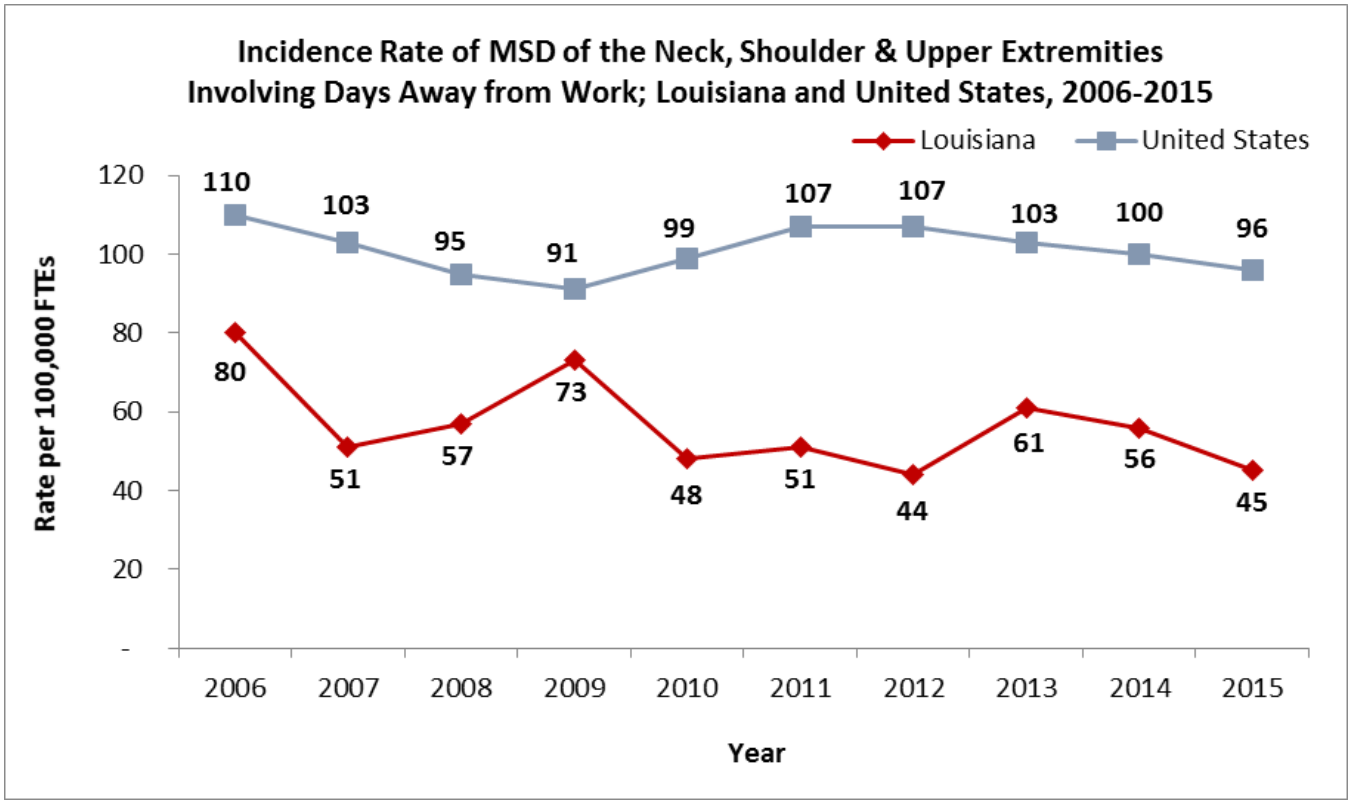
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana	3,320	2,870	3,320	2,870	2,910	3,100	2,530	3,100	2,640	2,350
United States	357,160	335,390	317,440	283,800	284,340	309,940	314,470	307,640	298,460	286,350

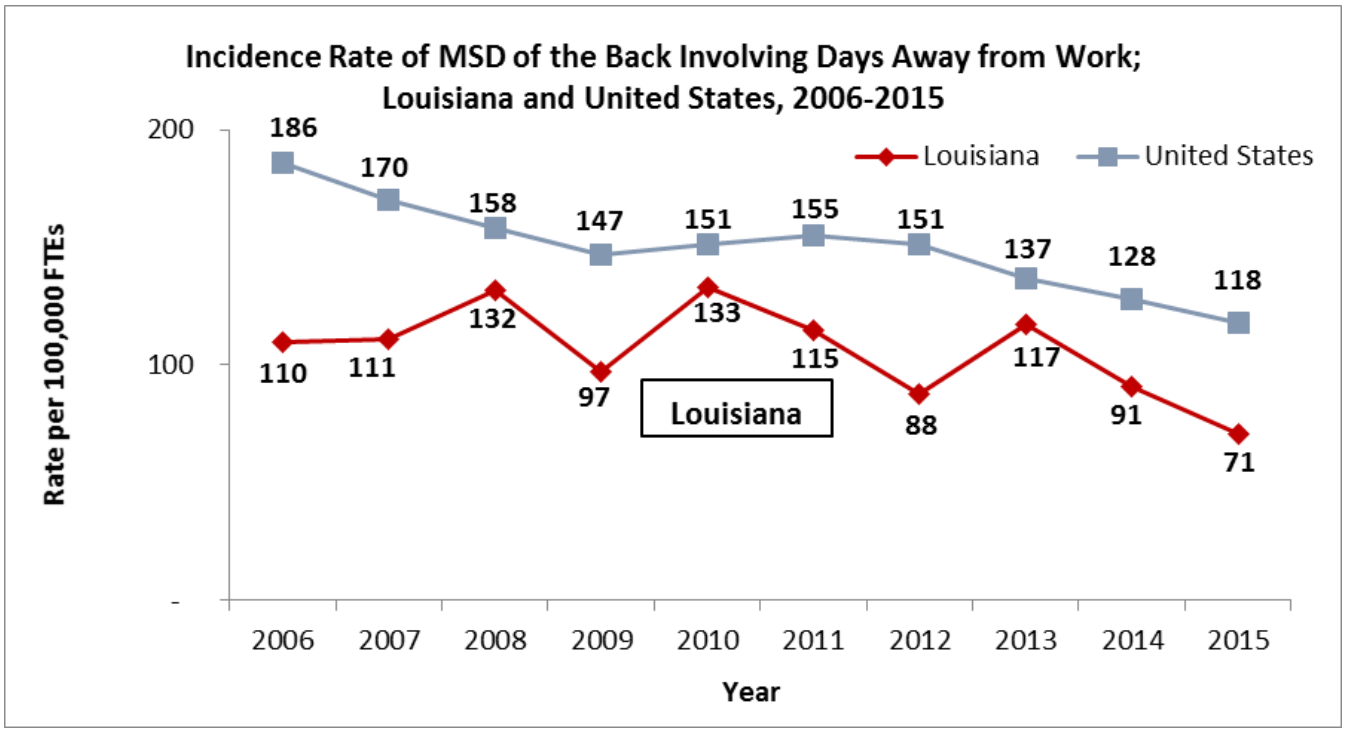


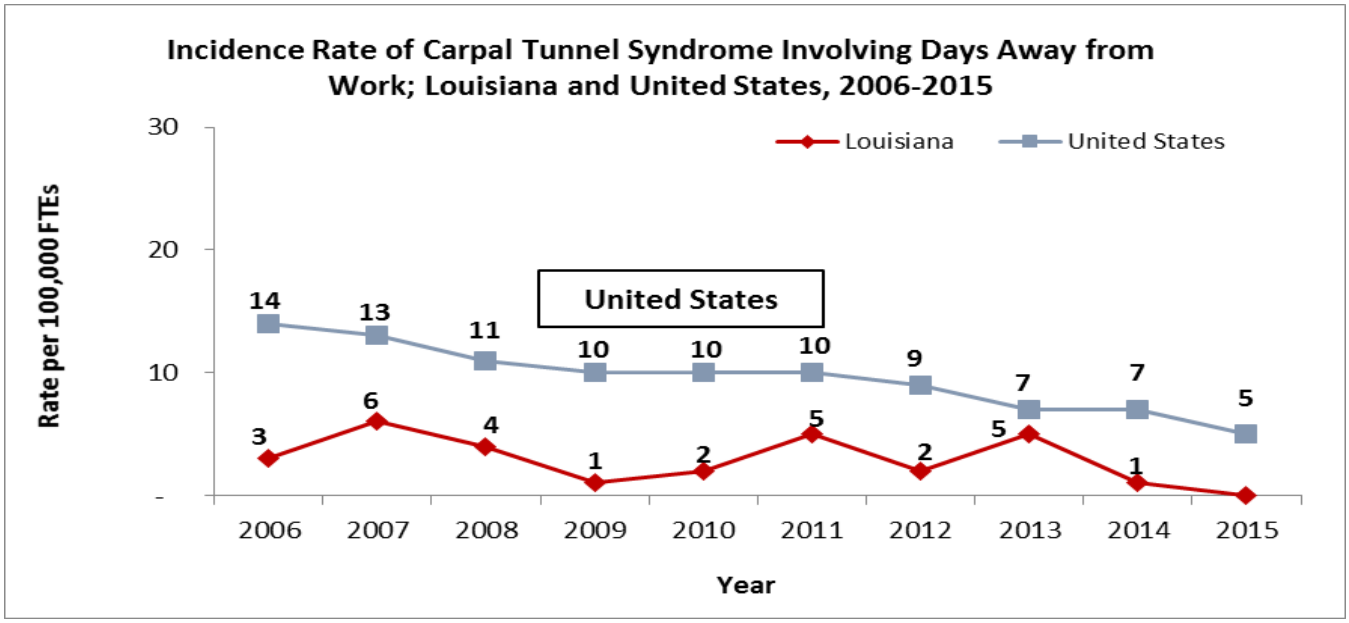
*Rates are per 100,000 FTE. A Full-Time Equivalent (FTE) is calculated as the total number of hours worked, divided by the maximum number of compensable hours (e.g., where the work week equals 40 hours, two workers at 20 hours per week are equal to one FTE).

Number of Musculoskeletal Disorders (MSDs) by Nature or Body Part with Days Away from Work Reported by Private Industry, Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana MSDs										
Neck, Shoulder & Upper Extremities	1,020	690	780	970	620	680	590	820	780	620
Back	1,410	1,490	1,820	1,300	1,720	1,520	1,180	1580	1280	1010
Carpal Tunnel Syndrome	40	80	60	20	30	70	30	70	20	N/A
United States MSDs										
Neck, Shoulder & Upper Extremities	102,150	97,690	90,600	82,640	85,790	92,120	94,380	94,620	93,410	92,380
Back	172,400	160,880	150,310	133,470	130,730	133,670	133,230	126,070	119,780	113,450
Carpal Tunnel Syndrome	12,990	11,920	10,060	9,140	8,490	8,290	7,540	6,440	6,800	4,920







Data Source: Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses

Note: Differences in industry concentration and sample size prohibit state-level data from being directly compared to other states or with national estimates.

Indicator 8: Workers' compensation claims for carpal tunnel syndrome with lost work-time

Data for this indicator are currently not available.

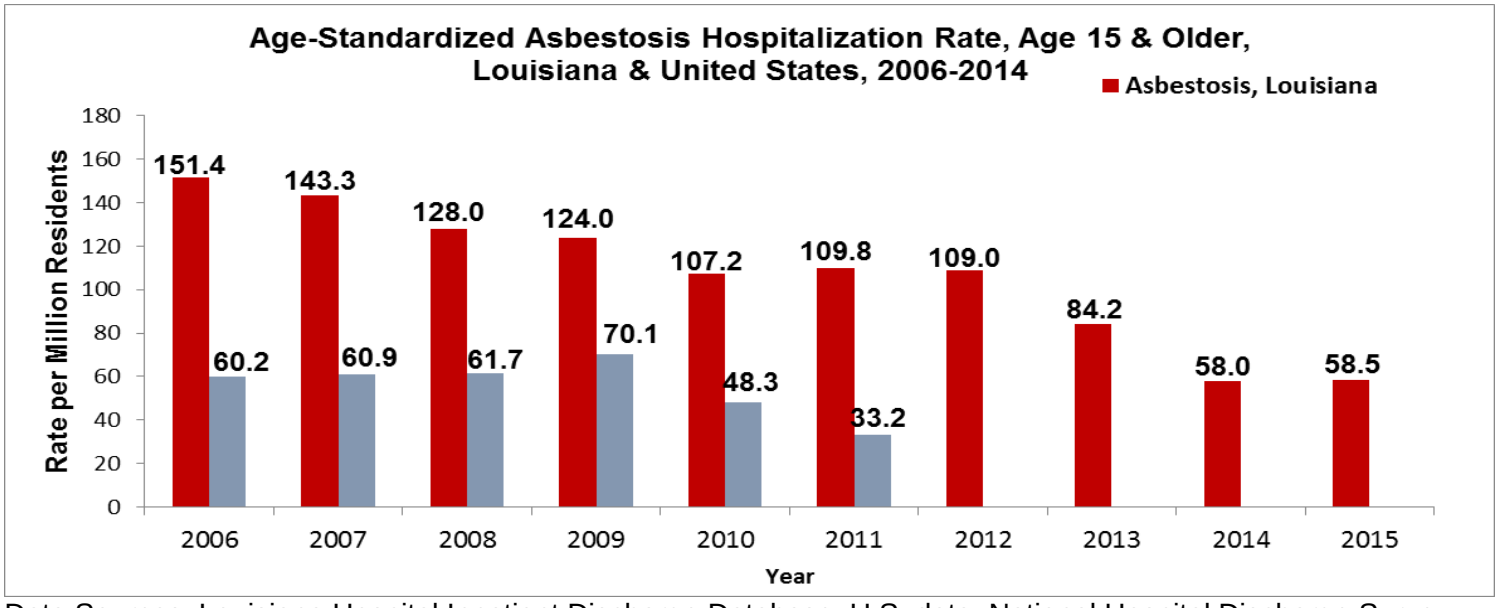
Indicator 9: Pneumoconiosis hospitalizations

Pneumoconiosis is a term for lung diseases caused by the inhalation of mineral dust, primarily in work-related settings. Cases of pneumoconiosis usually develop after many years of continuous exposure, which results in diagnoses occurring in older individuals often long past the initial exposure. This group of diseases is incurable and typically leads to death. Smoking may exacerbate the condition by weakening the lungs, and access to health care may influence the management of symptoms. Types of pneumoconiosis includes silicosis, asbestosis, coal workers' pneumoconiosis (CWP), and less frequently, pneumoconiosis from other mineral dusts, e.g. talc, aluminum, bauxite, and graphite.
Most hospitalizations in Louisiana for pneumoconiosis involve individuals at least 45 years old. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes. U.S. data are not available for 2010 forward.

Annual Number of Pneumoconiosis and Asbestosis Hospitalizations for Persons Age 15 and Older; Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Pneumoconiosis, Louisiana	538	528	471	477	410	431	426	353	248	261
Asbestosis, Louisiana	501	491	440	440	373	396	396	316	221	230
Total Pneumoconiosis, United States	20,799	19,037	19,097	16,481	10,262	N/A	N/A	N/A	N/A	N/A
Asbestosis, United States	14,416	14,841	16,876	11,810	8,123	N/A	N/A	N/A	N/A	N/A

On average, 91% of pneumoconiosis hospitalizations in Louisiana from 2006 to 2015 were for asbestosis-related complications. The number of asbestosis-related hospitalizations in Louisiana ranged from 221 to 501.



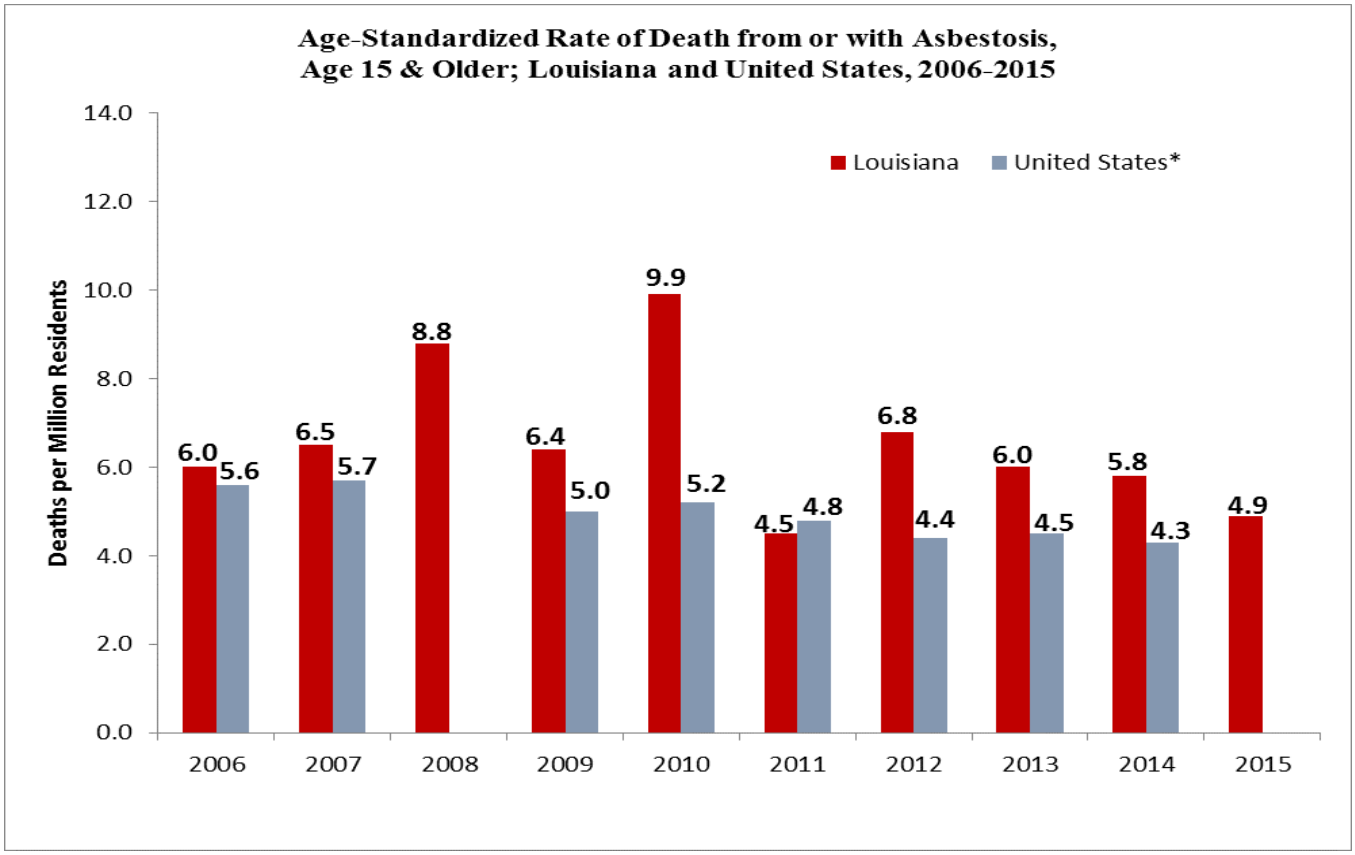
Data Sources: Louisiana Hospital Inpatient Discharge Database; U.S. data: National Hospital Discharge Survey; rates calculated using U.S. Census Bureau

Indicator 10: Pneumoconiosis mortality

Pneumoconiosis is a term for lung diseases caused by the inhalation of mineral dust, primarily in work-related settings. Cases of pneumoconiosis usually develop after many years of continuous exposure, which results in diagnoses occurring in older individuals often long past the initial exposure. This group of diseases is incurable and typically leads to death. Types of pneumoconiosis includes silicosis, asbestosis, coal workers' pneumoconiosis (CWP), and less frequently, pneumoconiosis from other mineral dusts, e.g. talc, aluminum, bauxite, and graphite. Most deaths in Louisiana due to pneumoconiosis involve individuals at least 65 years old. The number of deaths due to pneumoconioses for persons age 15 and older in Louisiana range from 18 to 38. U.S. pneumoconiosis data were not available for 2008 and are not yet available for 2015.

Annual Number of Pneumoconiosis Deaths for Persons Age 15 and Older; Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Pneumoconiosis, Louisiana	23	28	35	28	38	18	24	24	24	20
Asbestosis, Louisiana	19	22	31	22	33	16	24	22	21	19
Total Pneumoconiosis, United States*	2,312	2,194	N/A	1,998	2,037	1,890	1,850	1,859	1,790	N/A
Asbestosis, United States	1,344	1,401	N/A	1,262	1,318	1,243	1,208	1,229	1,218	N/A



Data Sources: LDH/Center of State Registrar & Vital Records; U.S. data: National Center for Health Statistics

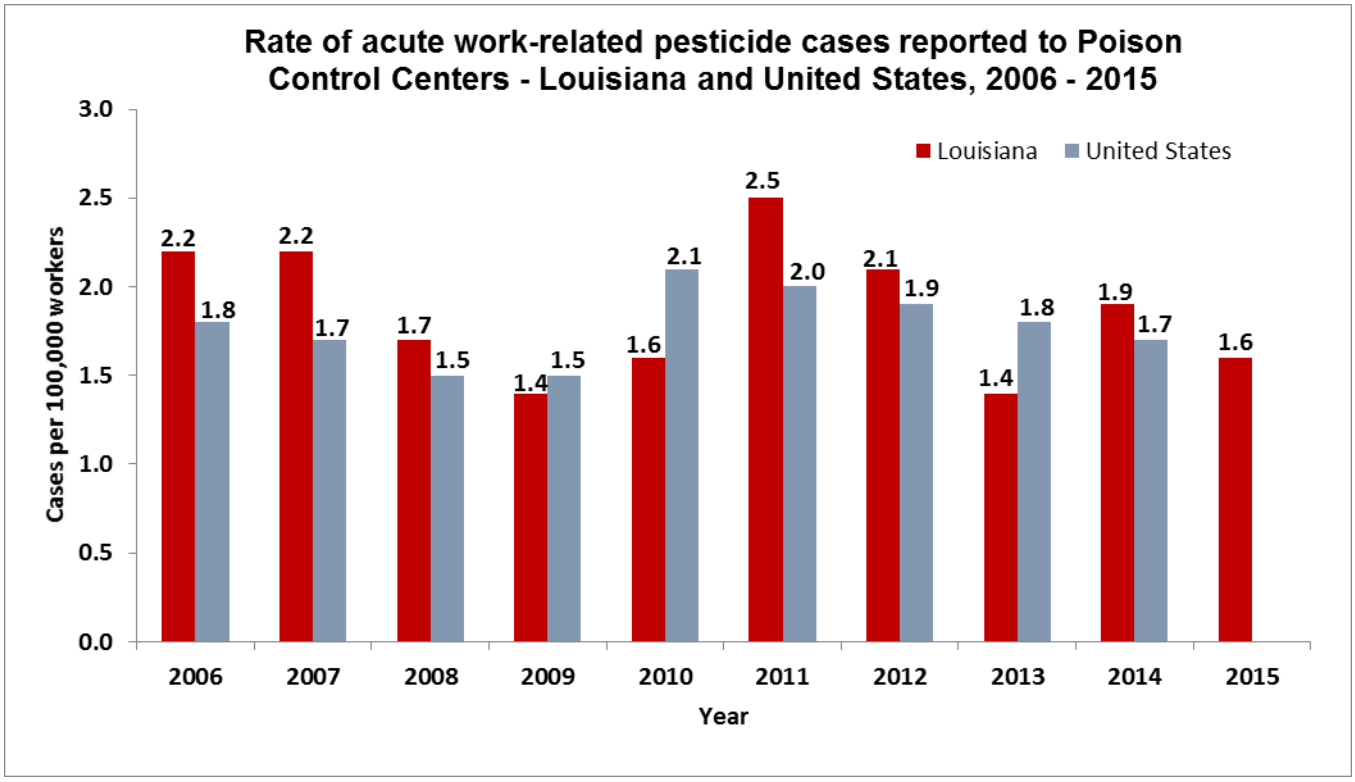
Indicator 11: Acute work-related pesticide poisonings reported to poison control center

A pesticide is a chemical that is used to get rid of nuisance plants, animals, insects, or fungi. In the U.S., approximately one billion pounds of pesticides, contained in more than 160,000 products, are used annually.[4] There are 20,000 to 40,000 work-related poisonings each year, according to the U.S. Environmental Protection Agency (EPA). Adverse health effects from exposure vary depending on the amount, the route of exposure, and the type of chemical used. The most at-risk occupations for severe pesticide poisonings are agricultural workers and pesticide applicators.

From 2006-2015, there was an average of 36 work-related pesticide poisonings reported per year in Louisiana and 2,530 pesticide poisonings reported per year in the United States. The number of reported work-related pesticide poisoning cases in Louisiana ranged from 27 to 45.

Annual Number of Reported Work-Related Pesticide Poisoning Cases; Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana	43	43	34	27	30	45	40	27	39	32
United States	2,560	2,458	2,171	2,040	2,871	2,857	2,696	2,631	2,484	N/A



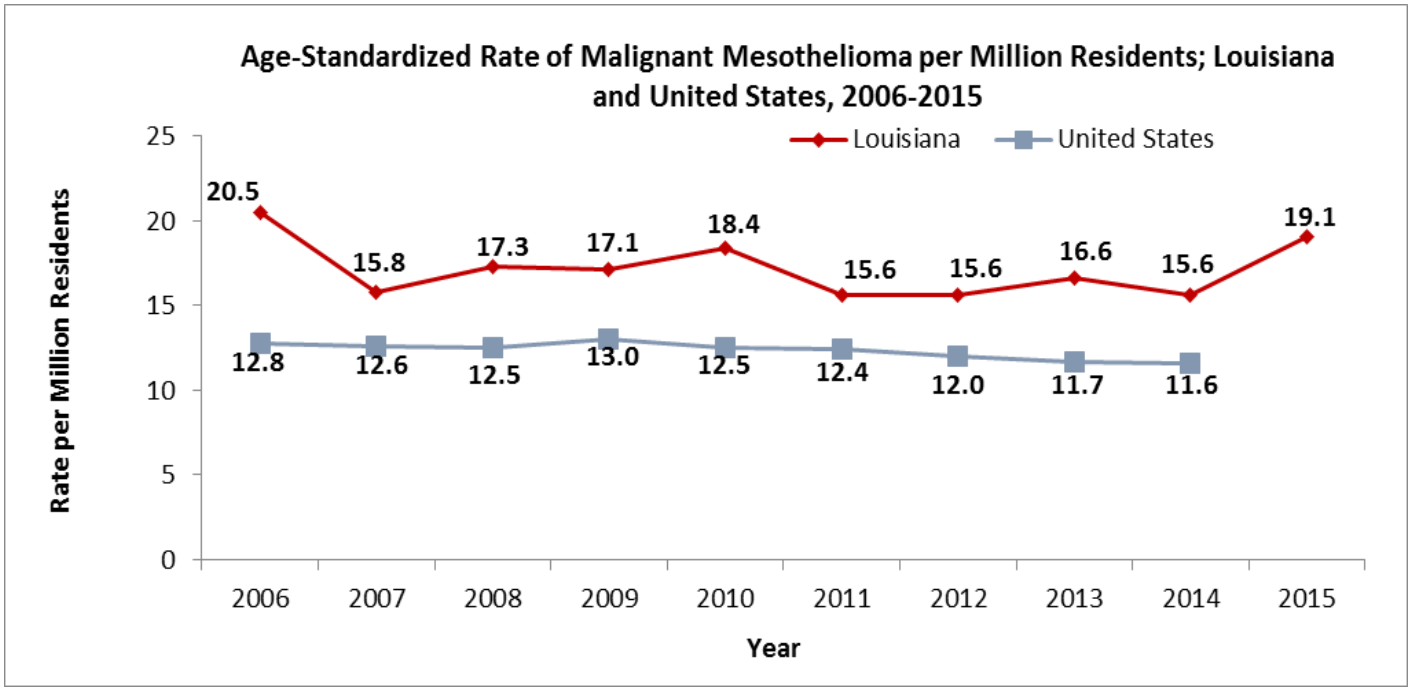
Data Sources: Louisiana Poison Control Center; U.S. data: American Association of Poison Control Centers (PCC); rates calculated using Bureau of Labor Statistics' Current Population Survey

Indicator 12: Incidence of malignant mesothelioma

Malignant mesothelioma is a rare but highly fatal cancer that usually occurs in the thin membranes surrounding the chest cavity or abdominal cavity. The only well-established risk factor for mesothelioma is exposure to asbestos fibers; 62 to 85% of all malignant mesothelioma cases reported having prior exposure to asbestos.[3] Mesothelioma is a disease of long latency, typically with 20-60 years between exposure and onset of disease.[8] Data are for persons 15 years and older who have been newly diagnosed with malignant mesothelioma. There are approximately 64 newly diagnosed malignant mesothelioma cases per year in Louisiana and 2,971 in the United States. The number of malignant mesothelioma cases in person age 15 and older in Louisiana ranged from 55 to 78.

Annual Number of Malignant Mesothelioma Cases, Age 15 years and older; Louisiana and United States, 2006-2015

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana	70	55	61	62	66	59	62	65	65	78
United States	2,637	2,872	3,003	2,921	2,850	3,108	3,109	3,114	3,127	N/A



Data Sources: Louisiana State University (LSU)'s Louisiana Tumor Registry; U.S. data: the North American Association of Central Cancer Registries (NAACCR); rates are calculated using 2010 U.S. Census Bureau data

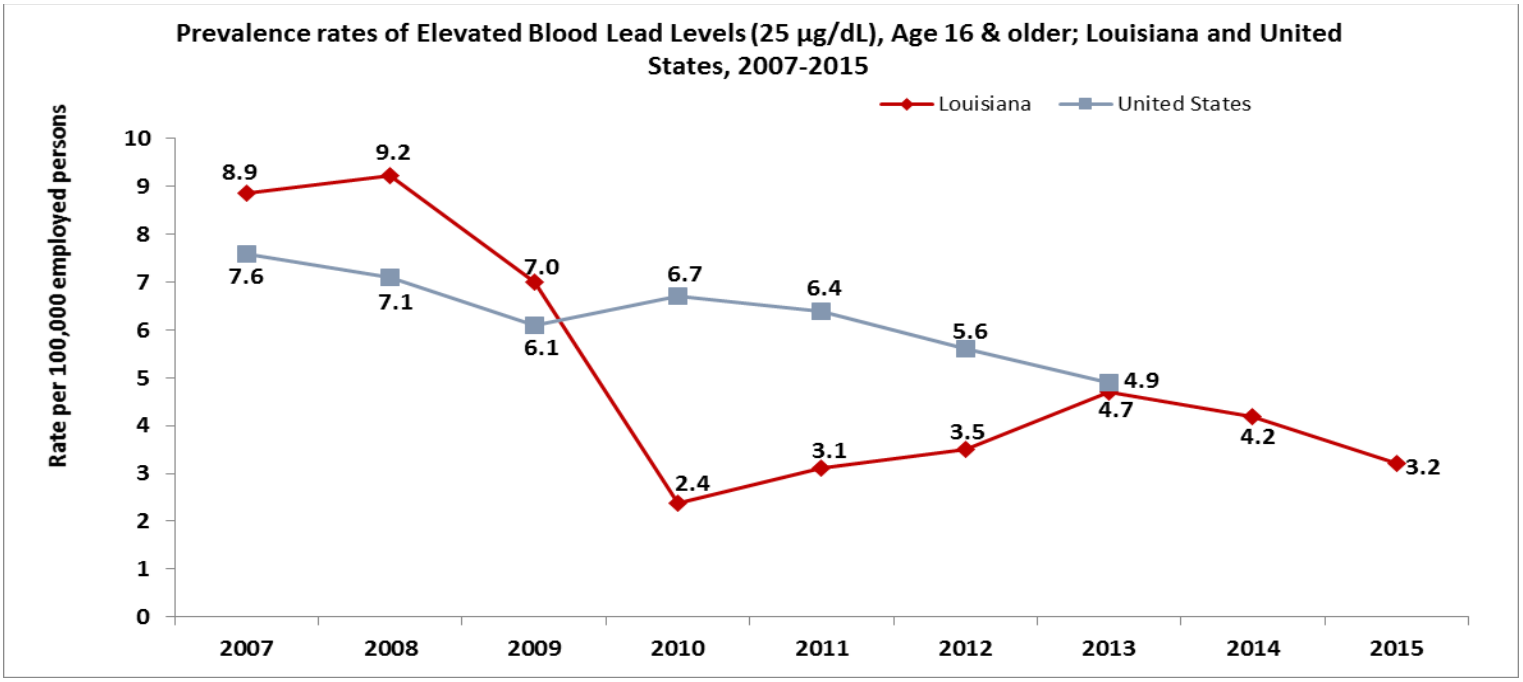
Indicator 13: Elevated blood lead levels among adults

Blood lead level (BLL) is a measure of recent exposure to lead. Over 90% of adults with elevated blood lead levels are exposed in the workplace and the majority of these occur through inhalation of lead-containing dust and fumes. Occupations at greatest risk of exposure include battery manufacturing, soldering (electrical components and automobile radiators), refinery workers, lead smelters, sandblasters, and bridge and construction workers.[9] Lead dust can be taken home on the worker's clothing, shoes, and personal protective equipment, which may pose significant health risks to young children and pregnant or nursing women in the home.

Louisiana law requires healthcare providers, laboratories, and physicians to report the results of all blood lead tests, regardless of level, to the Louisiana Department of Health. Cases with blood lead levels (BLLs) ≥ 25 µg/dL for males or ≥10 µg/dL for females are investigated to determine the source of exposure. More than 80% of all elevated adult BLLs received by SEET are males and more than 85% of the BLLs 25 µg/dL or greater are work-related exposures. In 2010, at least two battery manufacturers/recyclers which significantly contributed to the number of reported lead tests closed; this resulted in a sharp decline in the number of elevated lead tests between 2009 and 2010. However, an increase in the number of construction projects and subsequent blood lead testing may account for the uptick in lead reports from 2011 and beyond. The number of reported adult residents in Louisiana with elevated BLL (≥10 µg/dL) ranged from 287 to 425.

Number of Reported Adult Residents with Elevated BLL, Louisiana, 2007-2015

	2007	2008	2009	2010	2011	2012	2013	2014	2015
10 µg/dL	398	425	381	287	309	382	380	328	308
25 µg/dL	170	153	135	46	59	67	92	84	65
40 µg/dL	45	55	21	9	16	10	16	17	15



Data Sources: Louisiana Occupational Health & Injury Surveillance (LOHIS) Program; U.S. data: Adult Blood Lead Epidemiology & Surveillance System (ABLES); rates are calculated using Bureau of Labor Statistics' Current Population Survey

Indicator 14: Workers employed in industries at high risk for occupational morbidity

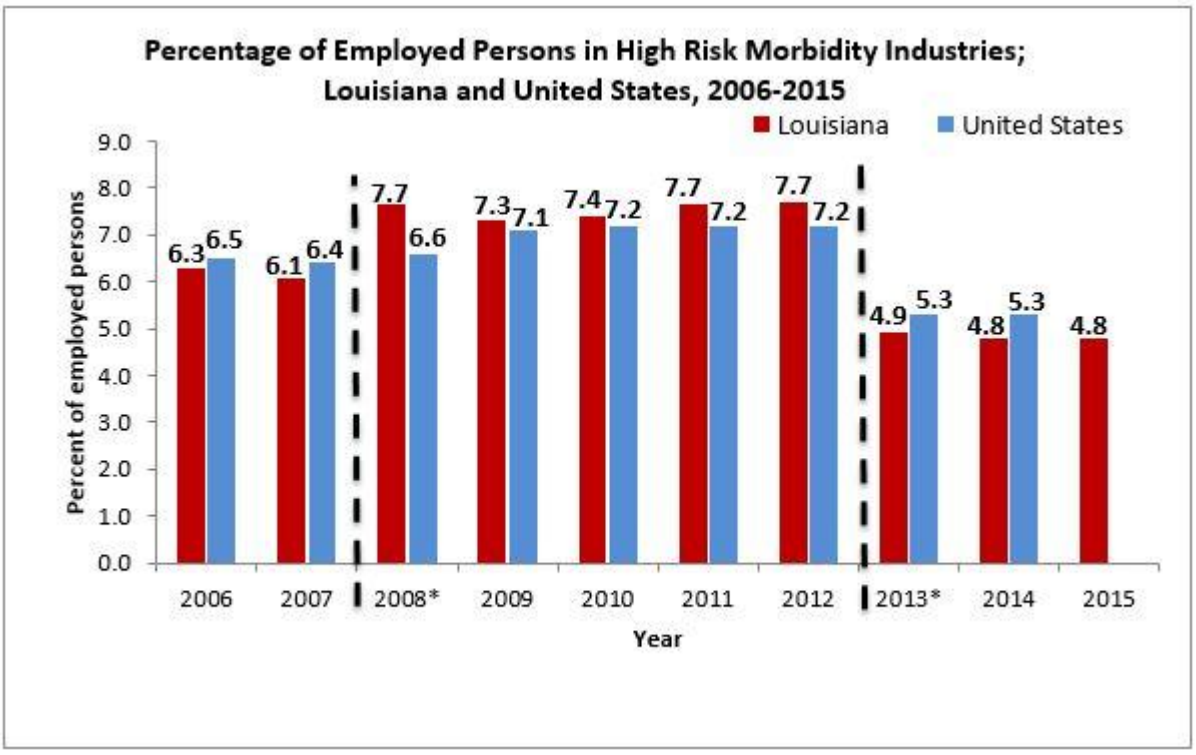
Workers in certain industries sustain non-fatal injuries and illnesses at much higher rates than those of the overall workforce. The proportion of the workforce that is employed in these high-risk industries varies by state. This variation can help explain differences in injury and illness rates among states.

In 2015, the Bureau of Labor Statistics (BLS) estimated that nationally there were almost 3 million injury and illness cases reported by employers within the private sector, which was equivalent to 3.0 cases per 100 full-time workers.[10] There were 48,000 fewer nonfatal injuries and illnesses reported in 2015 than in 2014.

Average Percentage of Employed Persons in High Risk Morbidity Industries; Louisiana and United States, 2006-2015

Combined Years	**Louisiana**	**United States**
(2006-2007)	6.2	6.5
(2008-2012)	7.5	7.1
(2013-2015)	4.8	5.3*

*U.S. data are for 2013 and 2014 only.



*The composition of industries that make up 'high-risk' industries in this indicator changed in 2008 and again in 2013.

Data Sources: U.S. Census Bureau County Business Patterns

Indicator 15: Workers employed in occupations at high risk for occupational morbidity

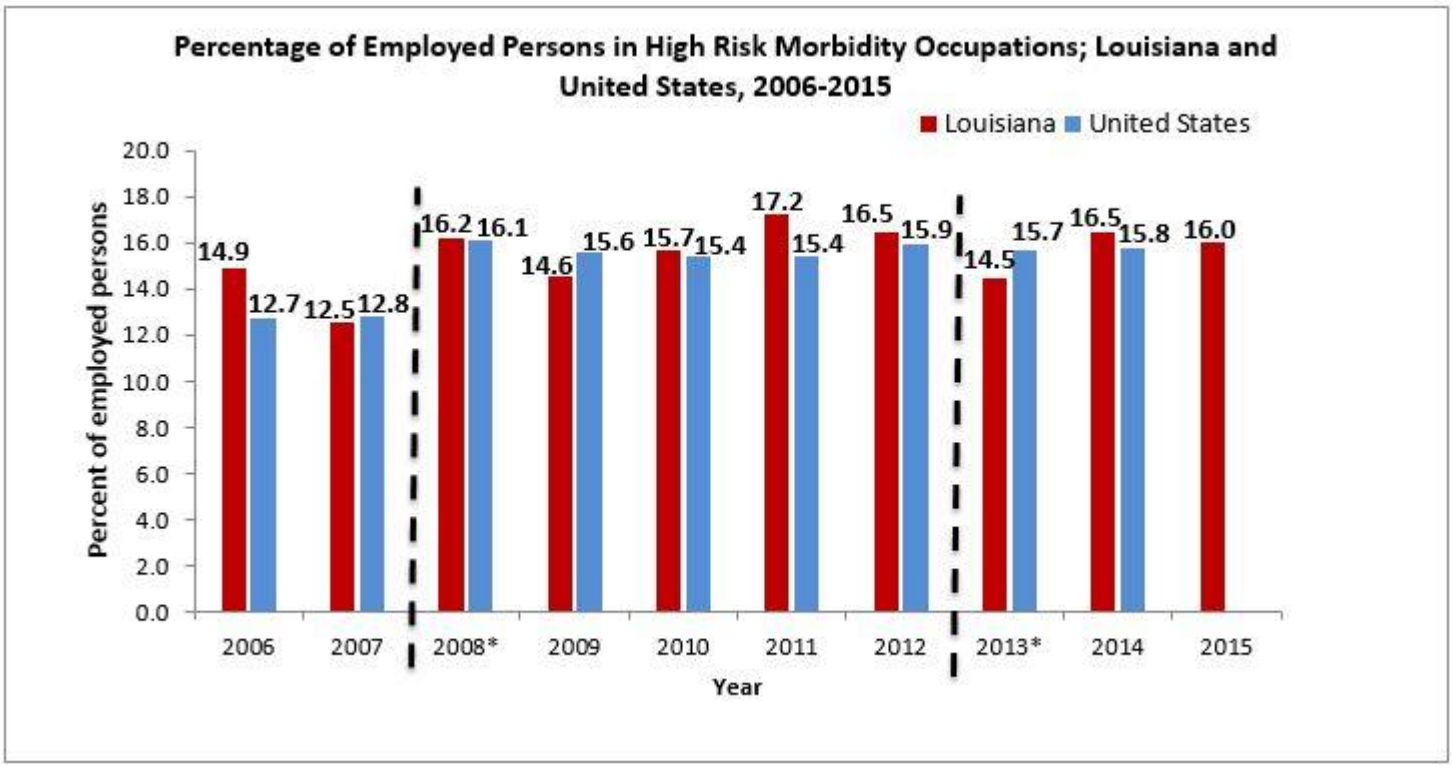
Workers in certain occupations sustain non-fatal injuries and illnesses at much higher rates than those of the overall workforce. The proportion of the workforce that is employed in these high-risk occupations varies by state. This variation can help explain differences in injury and illness rates among states.

In 2015, the Bureau of Labor Statistics (BLS) estimated that nationally there were almost 3 million injury and illness cases reported by employers within the private sector, which was equivalent to 3.0 cases per 100 full-time workers.[11] There were 48,000 fewer nonfatal injuries and illnesses reported in 2015 than in 2014.

Average Percentage of Employed Persons in High Risk Morbidity Occupations; Louisiana and United States, 2006-2015

Combined Years	**Louisiana**	**United States**
(2005-2007)	13.7	12.8
(2008-2012)	16.0	15.7
(2013-2014)	15.7	15.8*

*U.S. data are for 2013 and 2014 only.



*The composition of occupations that make up 'high-risk' occupations in this indicator changed in 2008 and again in 2013.

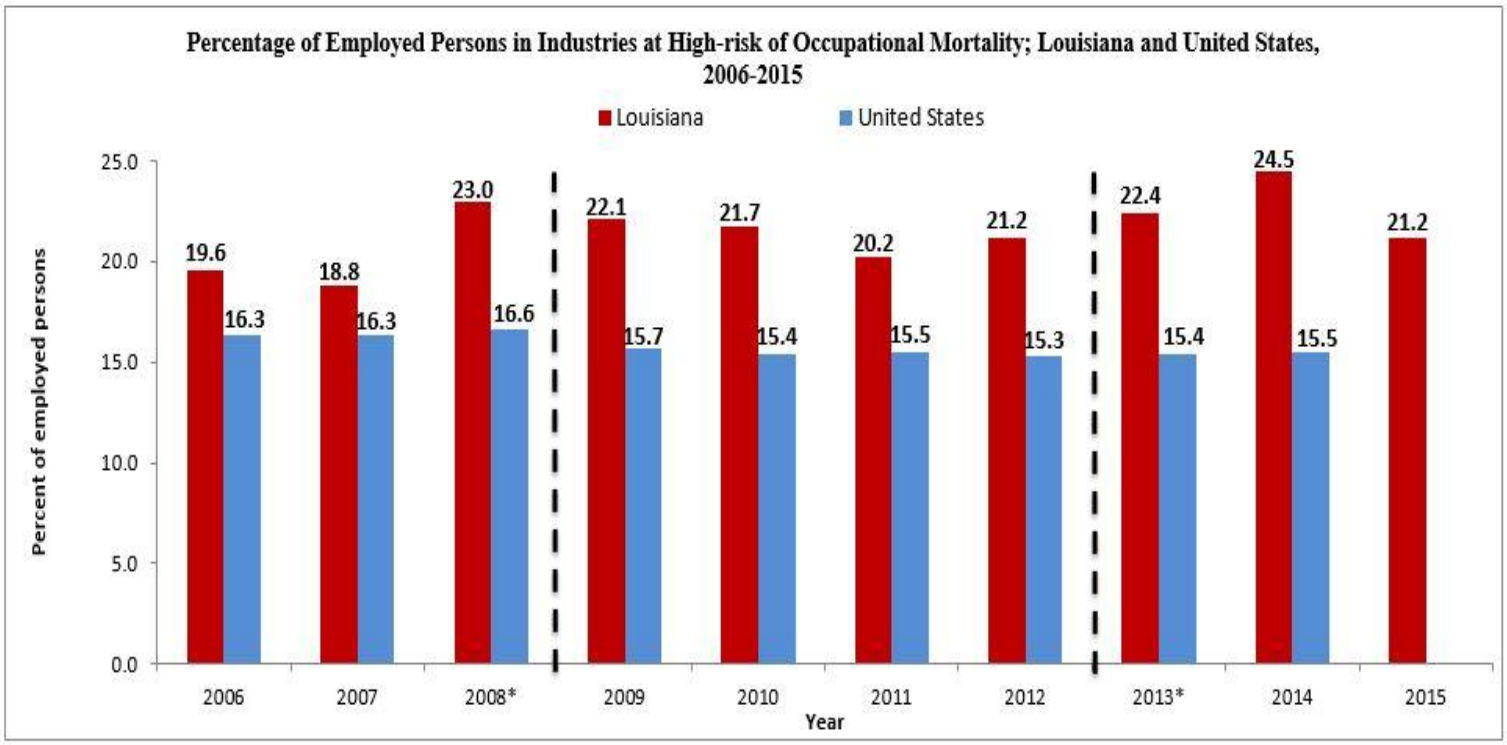
Data Sources: U.S. Census Bureau County Business Patterns

Indicator 16: Industries & occupations at high risk of occupational mortality

Workers in certain industries and occupations sustain fatal injuries at much higher rates than those of the overall workforce. The proportion of the workforce that is employed in these high-risk industries and occupations varies by state. This variation can help explain differences in injury mortality rates among states. In 2015, there were 4,836 work-related injury deaths in the United States, according to the Census of Fatal Occupational Injuries (CFOI), which is administered by the Bureau of Labor Statistics (BLS).[10] This was an increase of 0.3% and was equivalent to 3.4 deaths per 100,000 workers. Approximately 13 workers in the United States die each day due to work-related injuries.

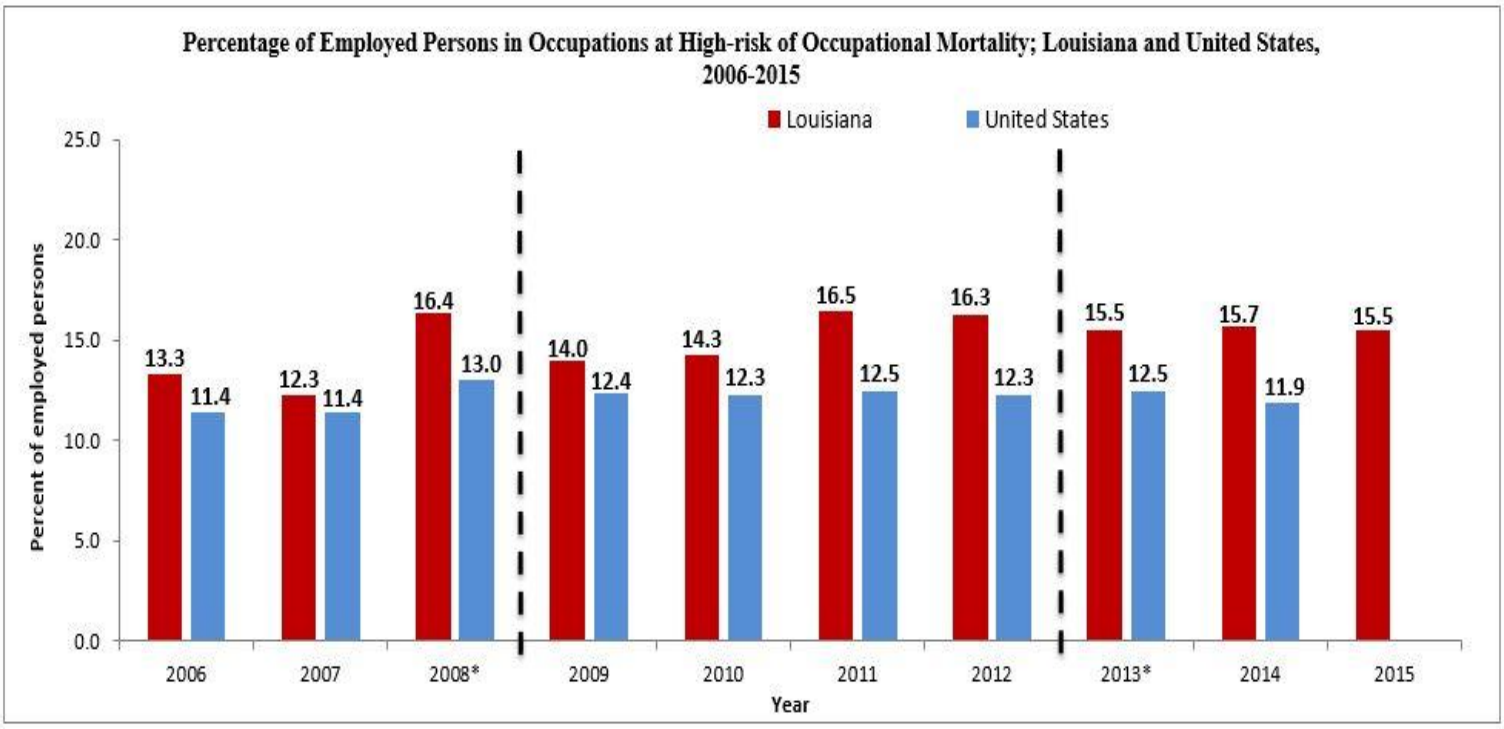
Average Percentage of Employed Persons in Industries and Occupations of High Risk Mortality Occupations; Louisiana and United States, 2006-2015				
Combined Years	Industries		Occupations	
	Louisiana	**United States**	**Louisiana**	**United States**
(2006-2007)	19.2	16.3	12.8	11.4
(2008-2012)	21.6	15.7	15.5	12.5
(2013-2015)	22.7	15.5	15.6	12.2*

*U.S. data are for 2013 and 2014 only.



*The composition of 'high-risk' industries and occupations in this indicator changed in 2008 and again in 2013.

Data Source: Bureau of Labor's Current Population Survey

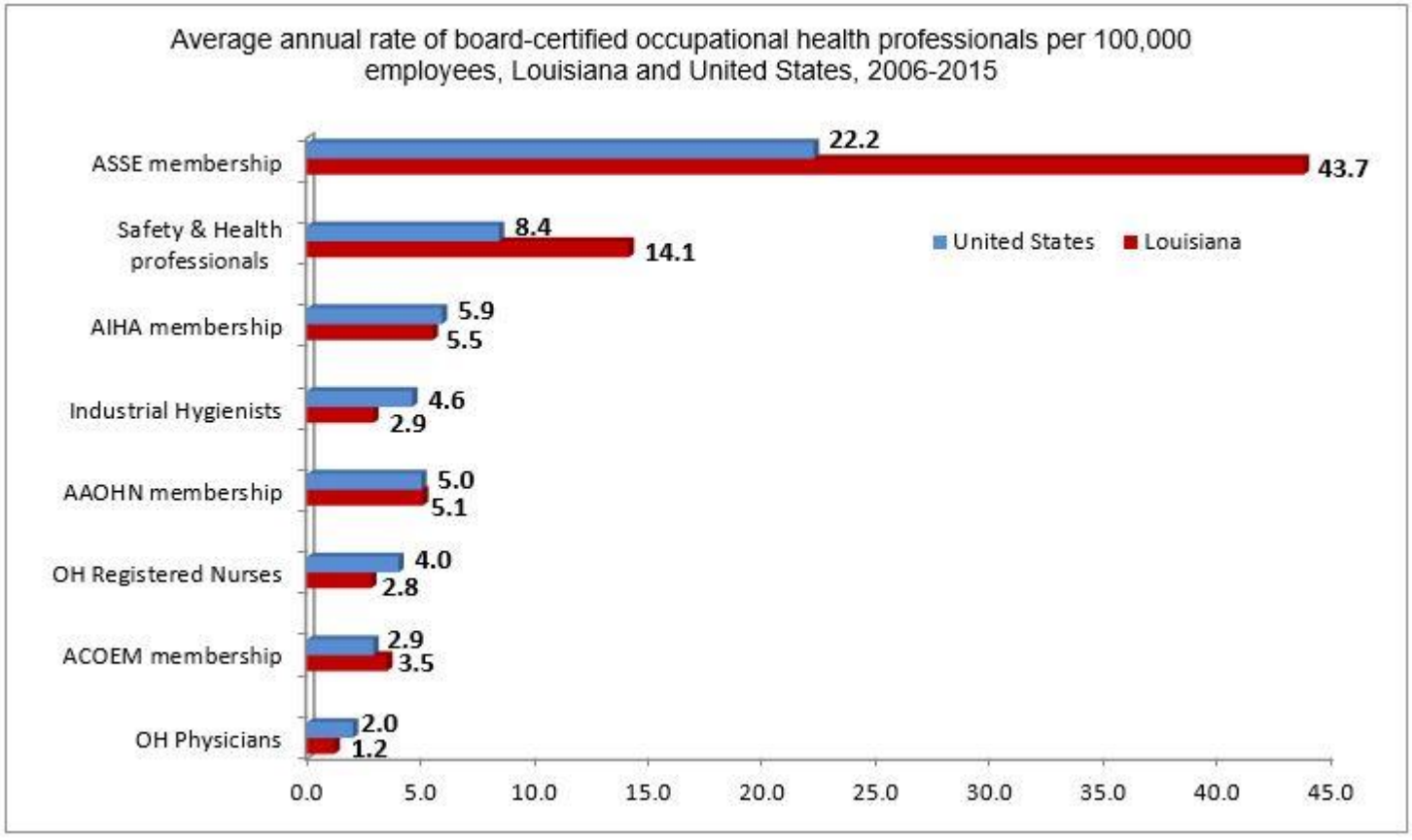


*The composition of 'high-risk' industries and occupations in this indicator changed in 2008 and again in 2013.

Data Source: Bureau of Labor's Current Population Survey

Indicator 17: Occupational safety and health professionals

Occupational safety and health professionals share the common goal of identifying workplace hazards and preventing or reducing workers' risks to these hazardous conditions or processes. According to the Institute of Medicine, an estimated 75,000 to 125,000 occupational safety and health professionals actively participate or are eligible to participate in professional societies, e.g., industrial hygiene, occupational safety, occupational health nursing, occupational medicine.[12] This indicator includes numbers and rates of occupational safety and health professionals who are board-certified occupational medicine physicians, members of the American College of Occupational and Environmental Medicine (ACOEM), board-certified occupational health nurses, members of the American Association of Occupational Health Nurses (AAOHN), board-certified industrial hygienists, members of the American Industrial Hygiene Association (AIHA), board-certified safety professionals, and members of the American Society of Safety Engineers (ASSE). The following specialties are not included in this indicator: fire prevention, occupational health psychologists, health physicists, employee-assistance professionals, ergonomists, and health educators.



*Louisiana and United States data are not available for 2011. AAOHN membership data are not available for 2010 or 2013 through 2015.

Data Sources: Current member rosters of listed health and safety professional memberships; rates are calculated using Bureau of Labor Statistics' Current Population Survey

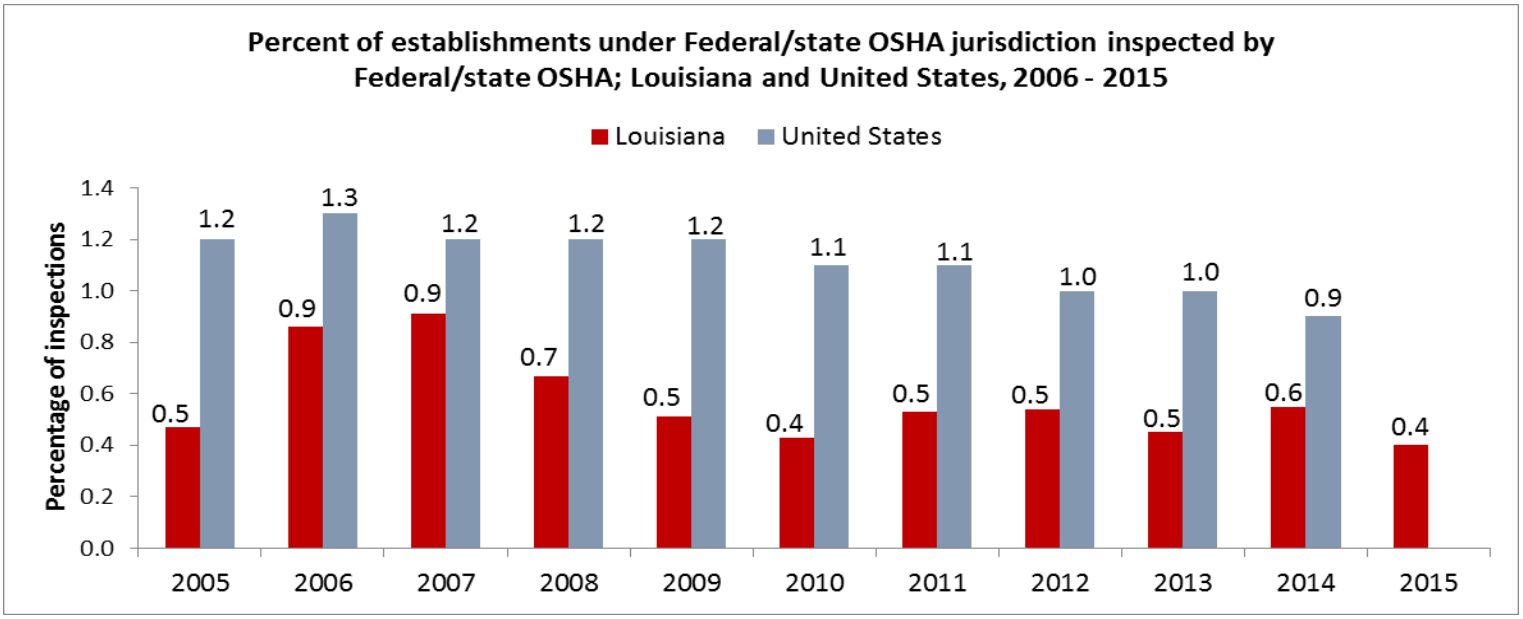
Indicator 18: Occupational Safety and Health Administration (OSHA) enforcement activities

The Occupational Safety and Health Administration (OSHA), which is part of the U.S. Department of Labor, is a federal regulatory agency that sets and enforces standards to protect worker safety and health. Employers are required to provide a workplace that is safe from recognized hazards, according to the OSH Act.[13] OSHA's federal and state plan jurisdictions includes private sector employers and excludes the mining industry, self-employed, and farm and government workers, with some exceptions. Almost eight million worksites fall under OSHA jurisdiction nationwide. Worksite inspections can occur without prior notification to employers, either on-site or by telephone/fax; inspections may be triggered by worker complaints, sites involving imminent danger, other agency referrals, high injury/illness reports, a worker fatality, or observation of hazardous work conditions by an OSHA Compliance Officer.

Annual OSHA worksite inspections in Louisiana are conducted by the OSHA-Baton Rouge Area Office. The average annual percentage of OSHA-covered establishments eligible for inspection that were inspected by Federal/State OSHA from 2006-2015 was 1% (699) out of an average of 119,476 eligible establishments for Louisiana. The 2015 data for the United States are not available yet.

Annual number of establishments eligible for and inspected by Federal/state OSHA; Louisiana and United States, 2006 - 2015

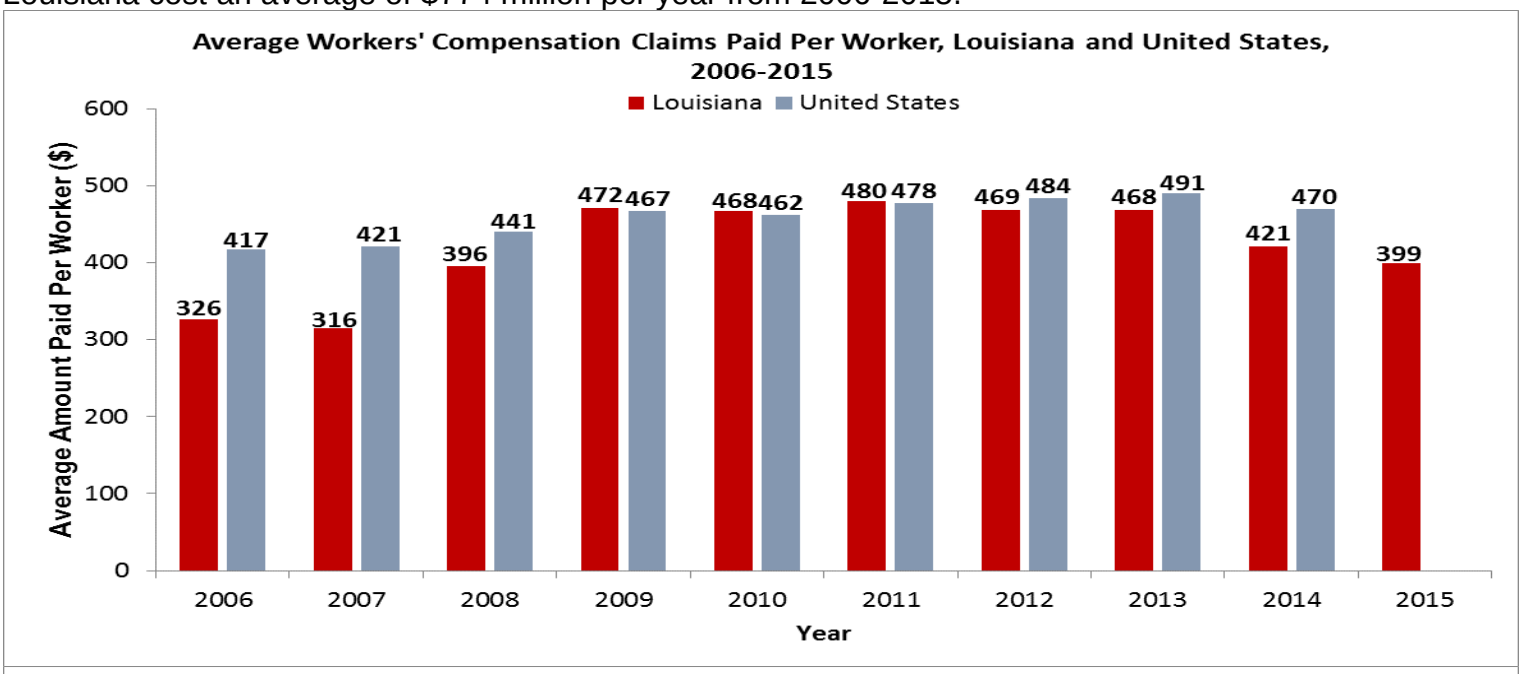
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Louisiana										
Total Number of establishments eligible for OSHA inspection	115,100	113,708	117,453	118,475	122,088	123,043	124,119	124,726	117,616	118,431
Annual number of establishments inspected	989	1,033	797	601	521	649	674	564	644	521
United States										
Total Number of establishments eligible for OSHA inspection	8,421,089	8,595,768	8,702,901	8,621,891	8,607,674	8,686,344	8,734,543	8,818,558	8,970,995	DNR
Annual number of establishments inspected	107,610	104,010	100,548	100,245	98,788	93,231	91,550	88,239	83,701	DNR

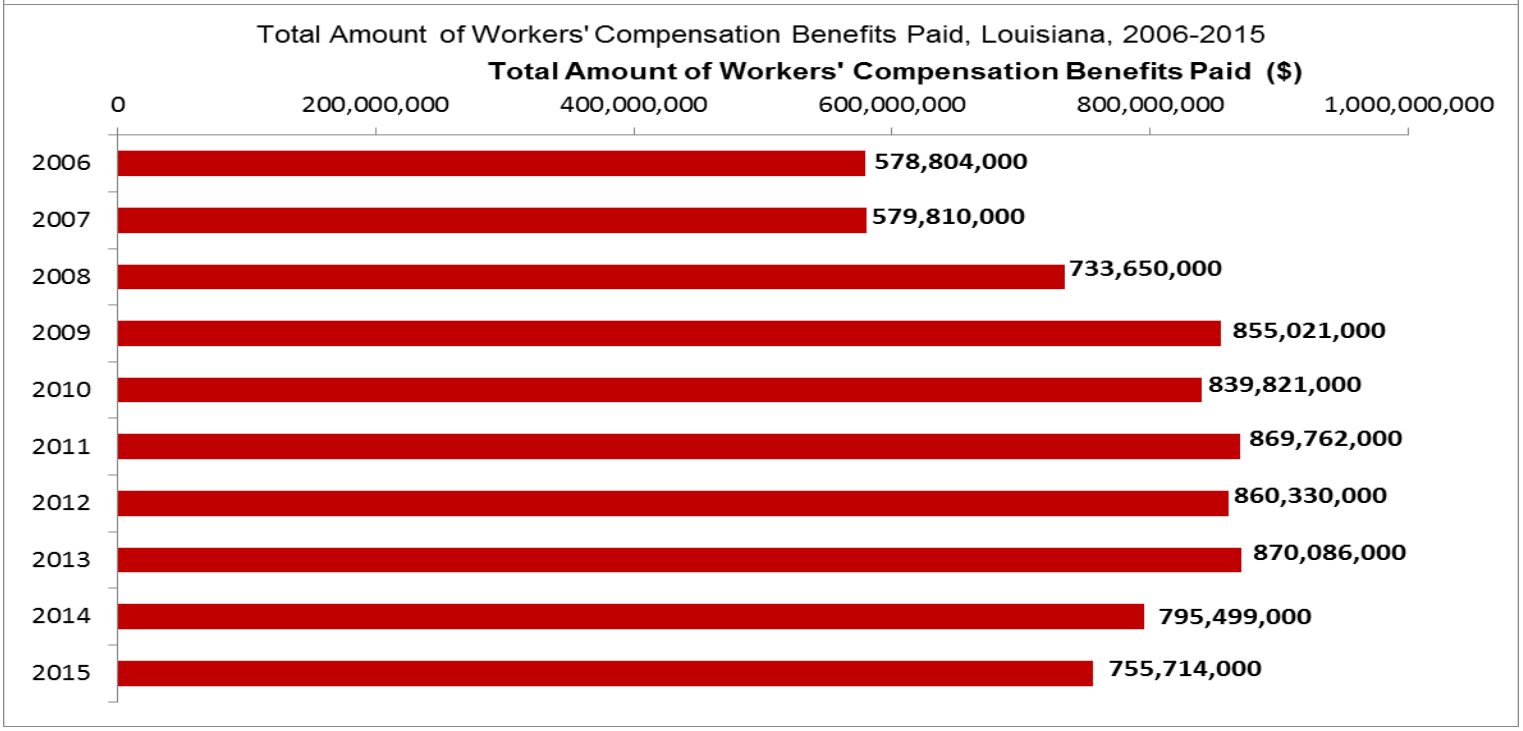


Data Sources: OSHA's Office of Statistics; Bureau of Labor Statistics' Covered Employers and Wages (ES 202)

Indicator 19: Workers' compensation awards

Workers' compensation, introduced in the U.S. in 1911, is a state-based social insurance program that guarantees financial compensation for workers who become injured or ill on the job and limits employers' liability.[6] The amount of benefits paid is directly related to the financial costs of work-related injuries and illnesses, yet it does not reflect the true burden. Indirect costs, both to the employer and employee, are not factored into the compensation, and some workers who are otherwise eligible for workers' compensation benefits do not file claims. Additionally, some workers are excluded from workers' compensation including maritime, railroad, federal, agricultural, and self-employed workers. Workers' compensation claims in Louisiana cost an average of $774 million per year from 2006-2015.





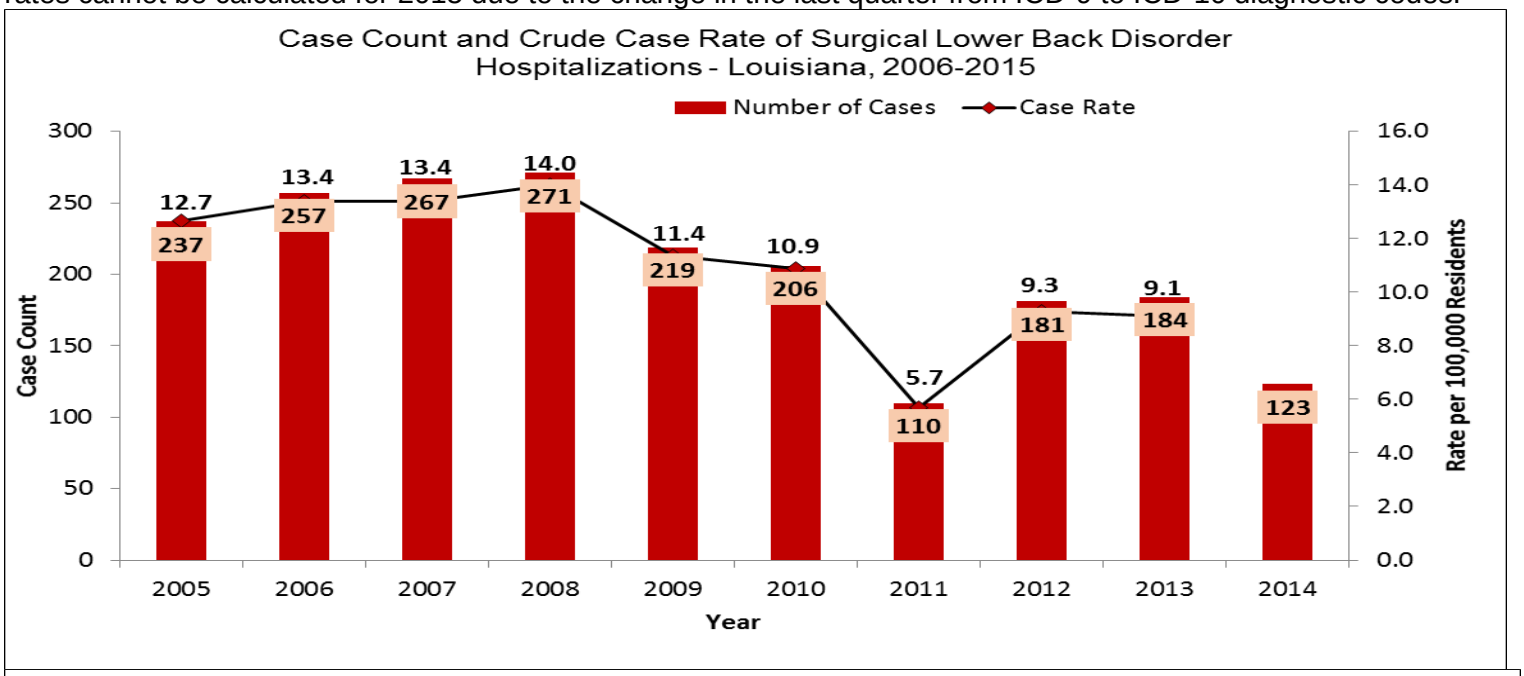
Data Sources: National Academy of Social Insurance (NASI)

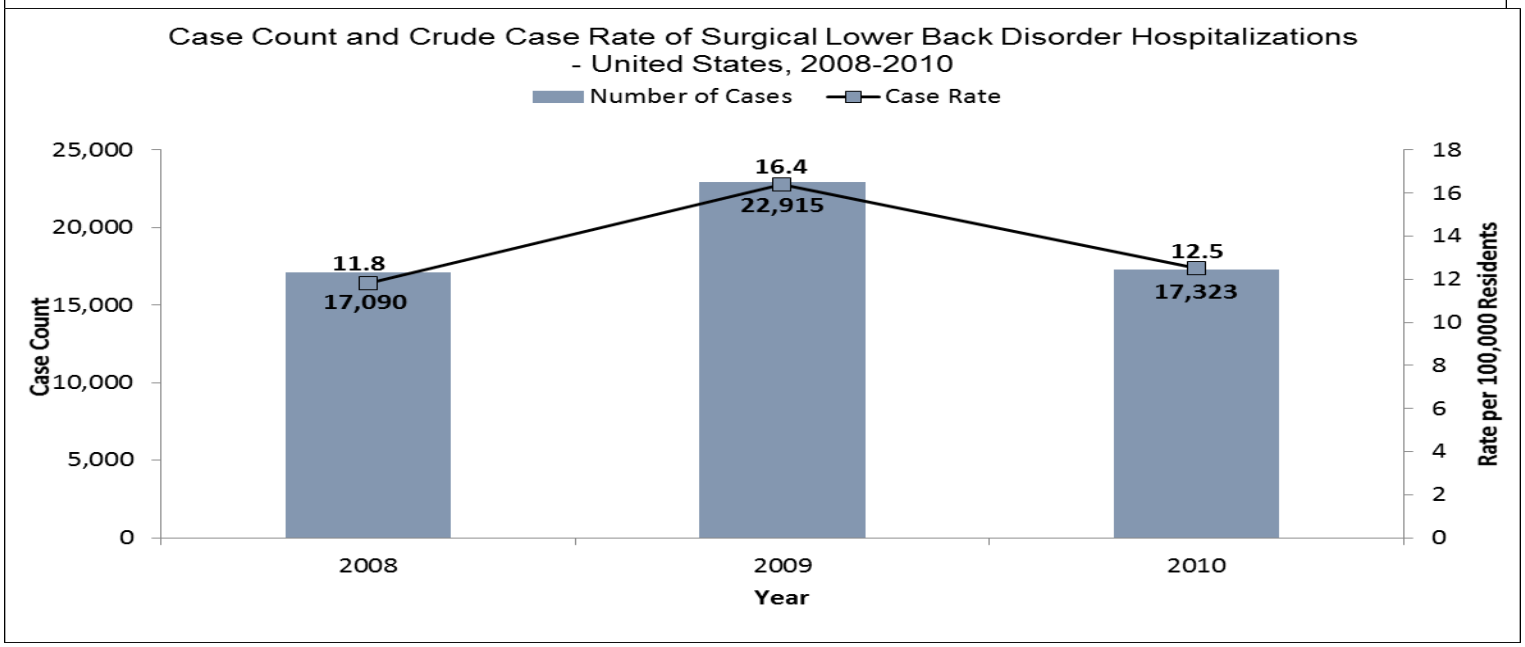
Note: Workers' compensation eligibility criteria and availability of data from workers' compensation programs varies among states, prohibiting state-level data from being directly compared to other states or with national estimates.

Indicator 20: Work-related low back disorder hospitalizations

Low back pain is reported by 15%-20% of Americans annually, resulting in more than 100 million lost workdays and more than 10 million physician visits.[14] Almost two-thirds of all low back pain cases may be attributed to work-related factors, according to National Health Interview survey data. Back pain accounts for roughly 20% of all workers' compensation claims, but comprises about 40% of workers' compensation costs. A study in 2009 found that about $66 billion that was spent on low back pain in the United States was due to lost wages and lost productivity.[15] Hospitalizations due to back pain are costly in terms of reduced job performance and productivity, expensive medical treatment payments, physical impairment and disability and time spent away from work. Some moderate-to-severe cases of lower back pain may require surgery in order to correct the underlying issues.

Data shown include hospitalizations for surgical lower back disorders for adults age 16 years and older. U.S. surgical low back pain disorder hospitalization data prior to 2008 and from 2011 forward are not available. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes.



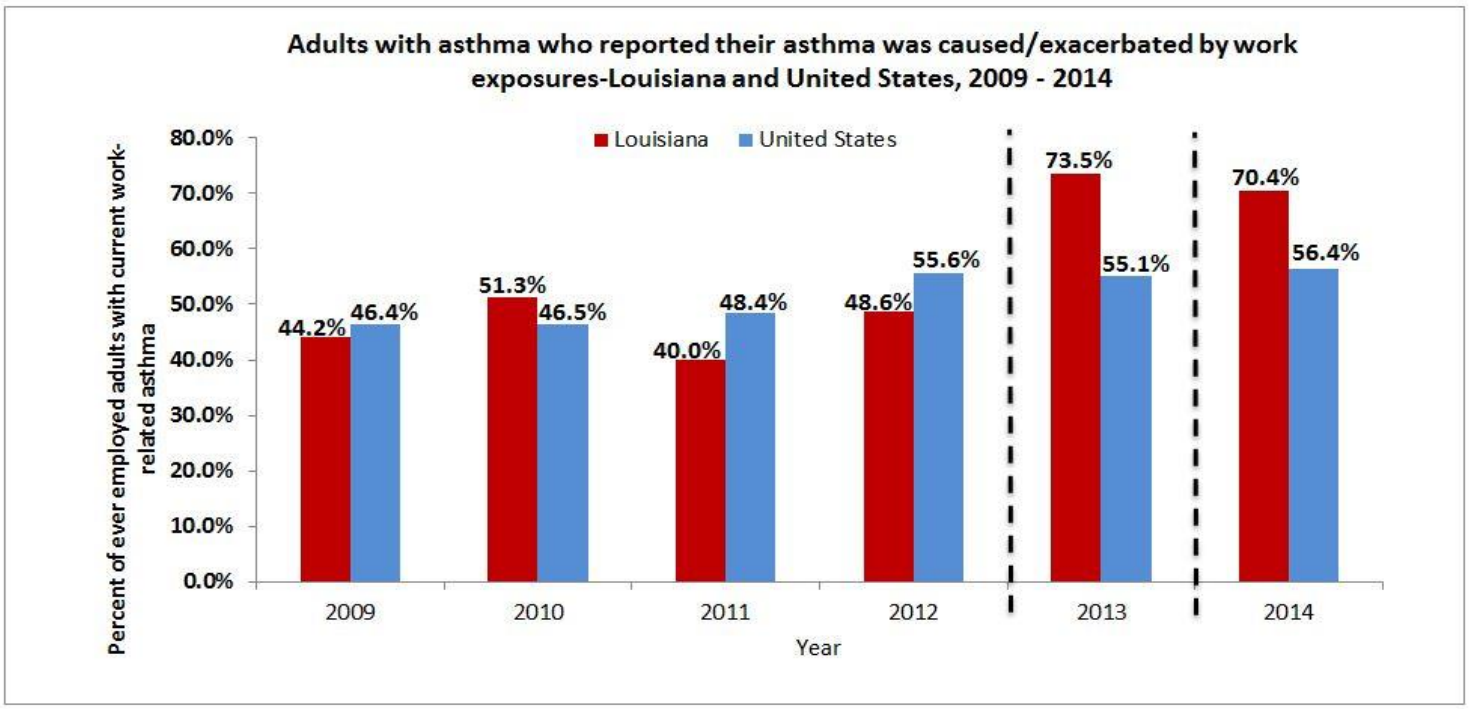


Data Sources: Louisiana Hospital Inpatient Discharge data; U.S. data: National Hospital Discharge Survey; rates were calculated using Bureau of Labor Statistics' Current Population Survey data

Indicator 21: Work-related asthma

Asthma is characterized by chronic inflammation of the lungs, wheezing, shortness of breath, chest tightness, and persistent coughing. More than 18 million U.S. adults have asthma, and one in ten adults in Louisiana suffers from asthma in his or her lifetime.[1,16] Work-related asthma (WRA) is diagnosed when asthma symptoms may be aggravated or caused by the work environment and temporal association is probable. If detected early and further exposures are reduced, work-related asthma may be reversible. Approximately 36-58% of adult asthma cases in the U.S. may be work-related; however, work-related asthma continues to be underdiagnosed. Common asthma triggers are mold, cockroach parts, animal dander, pollen, grass, dust mites, environmental tobacco smoke, fires, cleaning products, exercise, respiratory infections, and occupational exposures (e.g., isocyanates).

Louisiana's Centers for Disease Control's (CDC) Behavioral Risk Factor Surveillance System (BRFSS) Asthma Callback Survey (ACBS) results show, on average from 2009 to 2012, 61,134 (46% of respondents) ever-employed adults with current asthma in Louisiana reported that their asthma was caused or exacerbated by work exposures. Louisiana's data for 2013 and U.S. data for 2011 forward are not comparable to older data due to changes in weighting methods. Louisiana's data for 2014 are also not comparable to previous years because only five states were included in the landline only weighting method. Louisiana no longer collected ACBS data after 2014 so this indicator will not be updated.

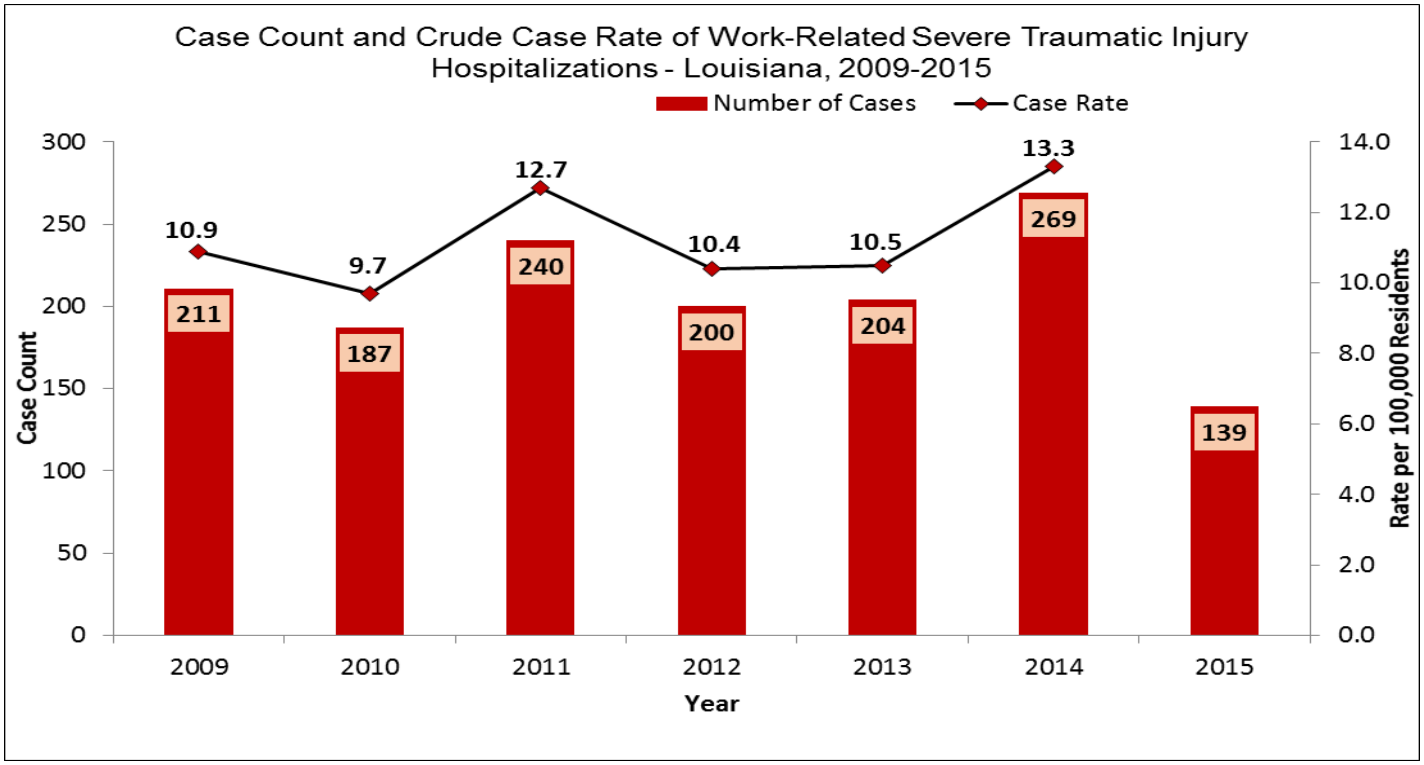


*U.S. data uses the median annual percentage of ever-employed adults with current asthma caused or exacerbated by work for the following number of states: 36 in 2009, 39 in 2010, 40 in 2011, 42 in 2012 and 5 in 2014.

Data Source: Louisiana's Behavioral Risk Factor Surveillance Survey's (BRFSS) Asthma Call-back survey (ACBS); U.S. data: CDC's BRFSS/ACBS

Indicator 22: Work-related severe traumatic injury hospitalizations

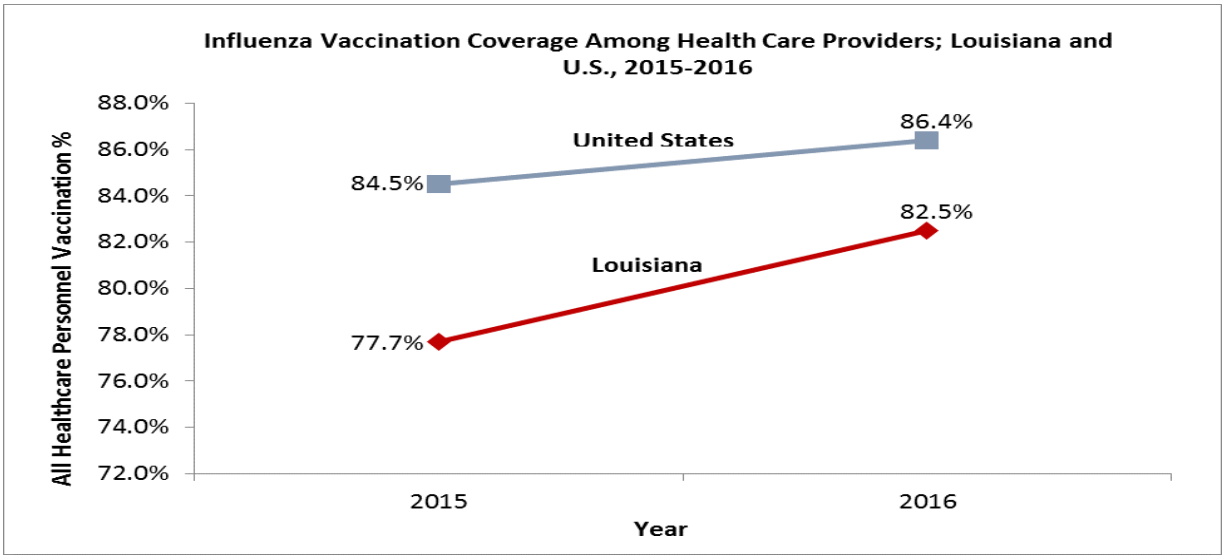
Work-related injuries are costly to employers, employees, and society.[17] As many injured workers are employed in physically demanding occupations such as construction, a severe injury can negatively impact and, at times, completely impair an injured worker's future ability to work. In addition to these high human costs, economists estimate that the United States' economy loses $192 billion annually as a result of injuries in the work place, including direct payments for medical workers' compensation (WC) and other insurance costs as well as indirect costs, such as lost wages and productivity. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes.



Data Source: Louisiana Hospital Inpatient Discharge Database; rates calculated using Bureau of Labor Statistics' Current Population Survey

Indicator 23: Influenza vaccination coverage among healthcare personnel

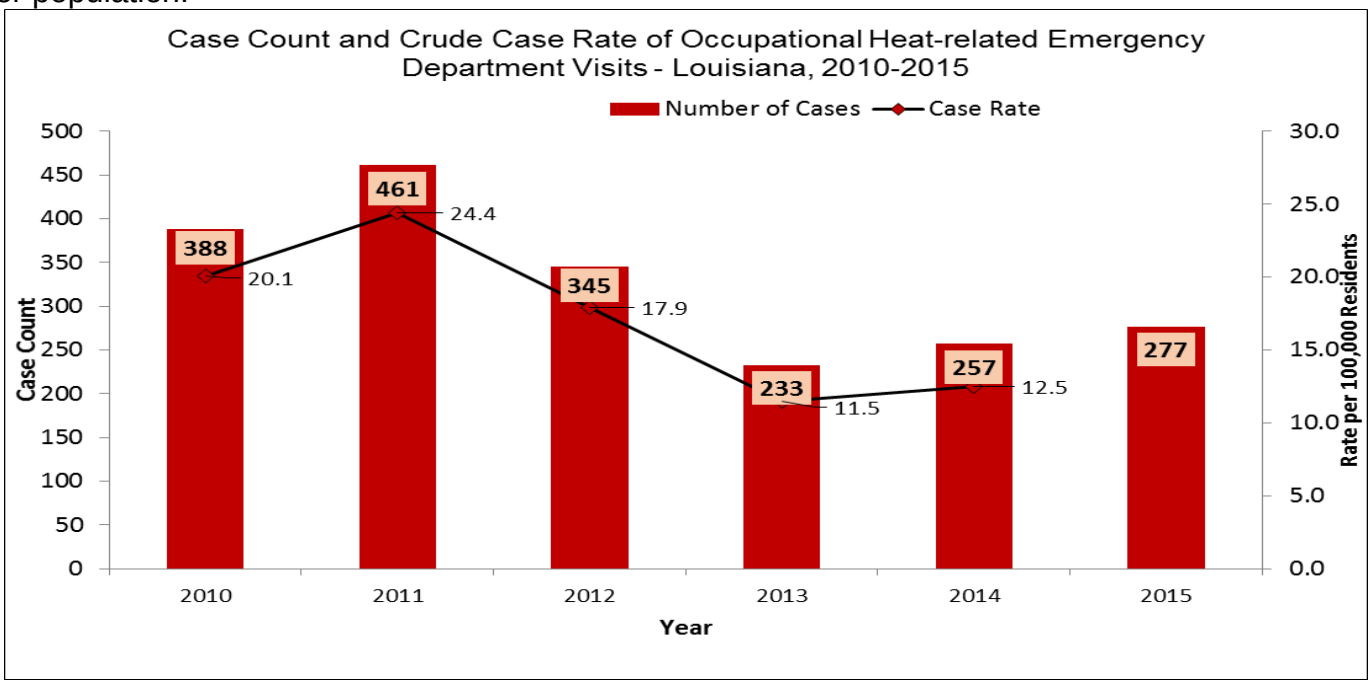
Influenza, especially among vulnerable populations, is a significant cause of morbidity and mortality. Influenza virus infections caused, on average, 23,607 deaths directly related to influenza complications from 1976 to 2007; approximately 90% of the deaths were among persons aged 65 years and older.[14] Healthcare personnel may have an important role in influenza transmission, since they are at high risk of getting influenza through contact with patients and potentially spreading the virus to patients when they go to work while ill. On average, Louisiana's vaccination coverage among healthcare personnel was 7% lower than the national rate in 2015 and 2016.



Data source: National Healthcare Safety Network (NHSN)

Indicator 24: Occupational heat-related ED visits

Heat exposure is a recognized workplace hazard that can lead to medical issues ranging from heat cramps to the more severe heat stroke. The heat and humidity in Louisiana especially leaves workers vulnerable to the negative effects of too much exposure. From 2010 to 2015, the average estimated number of nonfatal injury cases (which includes heat-related illness) involving days away from work in the United States' private sector was 10,250, and the rate from 2010 to 2014 was 750 per 100,000 full-time workers. The average annual case number in Louisiana was 327, with an average annual case rate of 17.3. Hospitalization rates cannot be calculated for 2015 due to the change in the last quarter from ICD-9 to ICD-10 diagnostic codes. A 2015 study of occupational heat-related illness in nine states in the southeastern U.S. found that males, younger workers, and blacks had significantly higher ED rates than the rest of the worker population.[18]



Data source: Louisiana Emergency Department database; rates calculated using Bureau of Labor Statistics' Geographic Profile of Employment and Unemployment

Acknowledgements

This report was prepared by the Louisiana Department of Health/Office of Public Health/Section of Environmental Epidemiology & Toxicology/ Occupational Health & Injury Surveillance Program with funding from the National Institute for Occupational Safety and Health Cooperative Agreement #U60 OH008470.

References

[1] Centers for Disease Control (CDC). Behavioral Risk Factor Surveillance System. Asthma Call-back Survey. 17 Feb 2017. Available at http://www.cdc.gov/Brfss/acbs/index.htm. Accessed on 15 May 2018.

[2]Wuellner SE, Bonauto DK. Exploring the relationship between employer recordkeeping and underreporting in the BLS Survey of Occupational Injuries and Illnesses. Am J Ind Med. 2014; 57(10): 1133-1143.

[3] Albin, M, Magnani, C, Krstev, S, Rapiti, E, and Shefer, I. Asbestos and cancer: An overview of current trends in Europe. Environ Health Perspect. 1999; 107(2): 289-298.

[4] Calvert GM, Plate DK, Das R, Rosales R, Shafey O, Thomsen C, Males D, Beckman J, Arvizu, E, Lackovic M. Acute occupational pesticide-related illness in the US, 1998-1999: Surveillance findings from the SENSOR-pesticides program. Am J Ind Med. 2004; 45:114-23.

[5] Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ. Occupational Injury and Illness in the United States: Estimates of Costs, Morbidity and Mortality. Arch of Intern Med. 1997; 157:1557-1568.

[6] National Academy of Social Insurance. Report: Workers' Compensation: Benefits, Coverage and Cost, 2015. Available at http://www.nasi.org. Accessed on 18 Jun 2018.

[7] Baggs J, Curwick C, Silverstein B. Work-related burns in Washington State, 1994-1998. J Occup Environ Med. 2002; 44:692-9.

[8]Thompson J, Westbom C, Shukla A. Malignant Mesothelioma: Development to Therapy. J Cell Biochem. 2014; 115(1):1-7.

[9] ATSDR. Toxicological profile for lead. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. Agency for Toxic Substances and Disease Registry. Atlanta, GA. Jan 2015. Available at http://www.atsdr.cdc.gov/toxprofiles/tp.asp?id=96&tid=22. Accessed on 15 May 2018.

[10] Bureau of Labor Statistics. U.S. Department of Labor. Employer-Reported Workplace Injuries and Illnesses. 2014. Available at http://www.bls.gov. Accessed on 18 Jun 2018.

[11] Bureau of Labor Statistics. U.S. Department of Labor. Employer-Reported Workplace Injuries and Illnesses. 2014. Available at http://www.bls.gov. Accessed on 18 Jun 2018.

[12] Institute of Medicine. A Framework for Educating Health Professionals to Address the Social Determinants of Health. 2016. Available at http://www.nationalacademies.org/hmd/Reports/2016/Framework-for-Educating-Health-Professionals-to-Address-the-Social-Determinants-of-Health.aspx. Accessed on 18 Jun 2018.

[13] Occupational Safety & Health Administration (OSHA). OSH Act of 1970. 2014. Available at http://www.osha.gov. Accessed on 25 May 2018.

[14] Council of State and Territorial Epidemiologists (CSTE). Occupational Health Indicators. Available at http://cste.org. Accessed on 18 Jun 2018.

[15] Crow W, Willis D. Estimating Cost of Care for Patients with Acute Low Back Pain: A Retrospective Review of Patient Records. Journal of American Osteopathy Association. 2009; 109: 229-233. Accessed on 6 Dec 2018.

[16] Centers for Disease Control and Prevention. National Center for Health Statistics. National Health Interview Survey. Current Asthma Prevalence Percents by Age, Sex, and Race/Ethnicity, United States, 2014. Available at http://www.cdc.gov/asthma/asthmadata.htm. Accessed on 19 Jun 2018.

[17] Reilly A, Sears J, Lackovic M, Lewis, J. Traumatic Injury Hospitalizations Among Louisiana Workers, 2006-2014: Results of a Severity Threshold Analysis. Louisiana Morbidity Report. 2016; 27(1): 2-3. Available at http://new.dhh.louisiana.gov/assets/oph/Center-PHCH/Center-CH/infectious-epi/LMR/2011-2020/2016/janfeb16.pdf

[18] Harduar-Morano L, Bunn TL, Lackovic M et al. Occupational Heat-Related Illness Emergency Department Visits and Inpatient Hospitalizations in the Southeast Region, 2007-2011. American Journal of Industrial Medicine. 2015; 58(10): 1114-25. doi: 10.1002/ajim.22504.