Council of State and Territorial Epidemiologists

OCCUPATIONAL HEALTH INDICATORS:
A Guide for Tracking Occupational Health Conditions and Their Determinants

Updated April 2018

Changes made to this document as part of the 2018 update are highlighted in yellow

Council of State and Territorial Epidemiologists

In Collaboration with the National Institute for Occupational Safety and Health
Centers for Disease Control and Prevention

Authors' Notes

This document is intended to provide guidance to states for generating Occupational Health Indicators for the years 2003 – 2015. In some instances, these "how-to" guides will be applicable for generating data prior to 2003. If you are trying to generate Occupational Health Indicator (OHI) data prior to 2003 and are experiencing difficulty, please contact Song Xue sxue@cste.org at CSTE for technical assistance.

Questions about data collection and analysis for any specific OHI may be directed to the state and national lead representatives of the indicator in question (Appendix D). Questions about the OHI Work Group, which collectively manages OHI updates and additions for this document, may be directed to the Work Group Co-chairs (Appendix D).

Indicators which are NOT conducive to state-to-state or state-national comparisons using Workers' Compensation or Hospital Discharge Data:

- Indicator # 2 Work-related hospitalizations
- Indicator # 5 Amputations identified in state workers' compensation systems
- Indicator # 6 Hospitalizations for work-related burns
- Indicator # 8 Carpal tunnel syndrome cases identified in state workers' compensation systems
- Indicator # 9 Pneumoconiosis hospitalizations
- Indicator # 19 Workers' compensation awards
- Indicator # 20 Hospitalizations for low-back disorders
- Indicator # 22 Work-related severe traumatic injury hospitalizations

Please include the following note with presentation of these data: *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.*

Indicators which are NOT conducive to state-to-state or state-national comparisons using Survey of Occupational Injuries and Illnesses data:

- Indicator #1: Non-fatal work-related injuries and illnesses reported by employers
- Indicator #4: Work-related amputations with days away from work reported by employers
- Indicator #7: Work-related musculoskeletal disorders with days away from work reported by employers

Please include the following note with presentation of these data: *Difference in industry concentration and sample size prohibit state-level data from being directly compared to other states or with national estimates.*

This document is intended to provide guidance to states regarding the minimal level of occupational health surveillance activity. The CSTE recommends that every state should have the ability to collect and use data from this minimal list of indicators on a regular basis.

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INTRODUCTION

This document describes the current recommended set of indicators for occupational health surveillance by the Council of State and Territorial Epidemiologists (CSTE), in association with the National Institute for Occupational Safety and Health (NIOSH) Work Group. The developed occupational health indicators represent the consensus view of State and NIOSH representatives, and are intended as advisory to the states. They are a subset of the larger number of conditions that were recommended for surveillance in 2001. The indicators represent a core set of data that, if calculated at the state level, can assist in the development of programs to prevent workplace injuries and illnesses. The indicators are intended to be used in conjunction with other guidelines for the state-based surveillance of occupational injuries and illnesses (NIOSH 1995, CSTE 2001), and to be used as a complement to overall state and national goals to improve the health of the population (CDC 2000). Members of the current Work Group are listed in Appendix C.

BACKGROUND

State health agencies, which are vested with the legal authority to require disease reporting and collect health data, play a central role in public health surveillance. Whereas public health surveillance was once focused primarily on infectious diseases, it has expanded in recent years to include surveillance of a wide range of health outcomes and their determinants, including chronic diseases, injuries and health behaviors (Halperin 1998). National statistics on occupational injuries and illnesses have been collected largely outside of the public health infrastructure and rely almost entirely on data reported by employers. State health agencies that have access to a wide variety of public health data systems have an important role in the surveillance of occupational diseases, injuries and hazards. State health agencies are in a unique position to conduct a number of activities:

- Provide critical data on occupational diseases. State health agencies can augment and complement employer-based systems to fill the information gap using a variety of existing health data sources (e.g., death certificates, hospital discharge data, and physician reports).
- Generate information necessary to evaluate the conventional occupational injury data sources. Both the annual Survey of Occupational Injuries and Illnesses and the Occupational Safety and Health Administration (OSHA) Data Initiative are based on employer reports of occupational injuries and illnesses. There has been longstanding concern about the accuracy of records maintained by employers (NRC 1987). State surveillance systems – derived from multiple data sources – can be used to supplement the Bureau of Labor Statistics (BLS) data sources to better understand the true economic and human burden of occupational diseases and injury.
- Link surveillance findings with intervention efforts at the State and local levels. State agencies are in a critical position to work with employers, labor unions, health and safety professionals, and community-based organizations to develop and disseminate interventions that can prevent targeted workplace illnesses, injuries and fatalities.
- Integrate occupational health into mainstream public health. Building surveillance programs at the state level that are actively linked to intervention efforts provides an opportunity to integrate occupational health into mainstream public health. Collaborations with partners outside the occupational health infrastructure such as school-based programs or community health clinics may yield benefits in disseminating strategies to prevent occupational injuries and illnesses.

In a nationwide surveillance system, all states should have core capacity to conduct a minimum level of surveillance of occupational injuries and illnesses (CSTE 2008). At a minimum, this capacity should include personnel and resources to conduct surveillance of basic occupational indicators using existing data systems, and the ability to develop working relationships with federal, state and local partners in both the public and private sectors. States and their partners may also conduct more in-depth surveillance, follow-up, and intervention for specific diseases, injuries, and hazards.

Background of Occupational Health Indicator Development

In 1998, the Council of State and Territorial Epidemiologists (CSTE), in association with the National Institute for Occupational Safety and Health (NIOSH), convened the NIOSH-States Occupational Health Surveillance Work Group to make recommendations to NIOSH concerning State-based surveillance activities for the coming decade. The original Work Group members (see Appendix A) agreed that the surveillance planning process should be outcome driven; e.g., begin with the identification of occupational injuries, illnesses and hazards to be placed under surveillance. The Work Group also identified a number of surveillance issues that cut across specific conditions and made several recommendations to NIOSH for the implementation of comprehensive State-based occupational health surveillance systems (CSTE 2001). A draft of the Work Group report contributed to the NIOSH Surveillance Strategic Plan (NIOSH 2001).

The Work Group report described draft "profiles" for priority conditions to be placed under surveillance as part of State-based surveillance systems. Since the publication of the Work Group report, public health surveillance "indicators" have been developed in several areas, including chronic disease, injury control and environmental health (CSTE 1999, STIPDA 1999, CDC 2001, CSTE 2002). These indicators are a construct of public health surveillance that defines a specific measure of health or risk status (i.e., the occurrence of a health event or of factors associated with that event) among a specified population. Surveillance indicators allow a state to compare its health or risk status with that of other states and evaluate trends over time within the state, and guide priorities for prevention and intervention efforts. **Occupational health indicators** can provide information about a population's health status with respect to workplace injuries and illnesses or to factors that can influence health. These indicators can either be measures of health (work-related disease or injury) or factors associated with health, such as workplace exposures, hazards or interventions.

From 2001 through 2003, the Work Group members developed an approach for indicator selection, and subsequently drafted and finalized the set of occupational health indicators. The following criteria were considered in selecting the indicators:

- *Availability of easily obtainable state-wide data*. Access to existing data was considered a critical element in the development of the indicator set. The Work Group recognized that some states might have access to other sources of data for occupational health surveillance, and that additional indicators may be developed, as these data will allow. However, this document sets out a "core" or minimum set of occupational health indicators that relies on data that should be available to most states.
- *Public health importance of the occupational health effect or exposure to be measured*. This criterion was used in identifying health effect and exposure indicators. Factors considered in determining public health importance included the magnitude or extent of the effect or exposure, severity of the health effect, economic impact, emergent status of the condition, and degree of public concern.

- *Potential for workplace intervention activities.* The indicator should inform program and policy development at the state level to protect worker safety and health.

The Work Group reviewed a number of sources to guide the selection of the final indicator set. This included CSTE recommendations for the surveillance of occupational injuries and illnesses, surveillance case definitions from the published literature, and indicators developed in other public health domains (CSTE 1999, STIPDA 1999, CDC 2001, CSTE 2002).

A total of 19 indicators was originally selected by Work Group consensus. The list has been expanded since that time to include 24 indicators:

- 16 **Health effect** indicators (measures of injury or illness that indicate adverse effects from exposure to known or suspected occupational hazards),
- 1 **Exposure** indicator (measures of markers in human tissue or fluid that identify the presence of a potentially harmful substance resulting from exposure in the workplace),
- 4 **Hazard** indicators (measures of potential for worker exposure to health and safety hazards in the workplace),
- 2 **Intervention** indicators (measures of intervention activities or intervention capacity to reduce workplace health and safety hazards), and
- 1 **Socioeconomic impact** indicator (measure of the economic impact of work-related injuries and illnesses).

In addition, the Work Group recommended that states develop a profile of employment demographics.

The Indicator Pilot Project and Development of "How-to" Guides

The Work Group recognized the need to pilot the indicators to assess the feasibility of widespread implementation and to develop specific guidance on how to compute the proposed measures. In summer 2002, the five "Core" states with NIOSH Cooperative Agreements to conduct "Core Occupational Health Surveillance" (California, Massachusetts, Michigan, New York, and Washington) (see Appendix B) agreed to pilot test the indicators and to create user-friendly "how-to" guides so that other states could calculate the indicators. This pilot project met one of the goals of the NIOSH Core Surveillance program: "to develop models for other states that can be used to establish a comprehensive, nationwide system of state-based occupational injury and illness surveillance."

An implementation plan was agreed upon, and the states worked on the indicators independently, communicating primarily through conference calls and e-mail. Each of the five pilot states tested all indicators; however, individual states took the lead on the various indicators, becoming the primary authors of the "how to" guides for their respective indicators. These guides and the indicator data were shared among the states. Monthly conference calls were held to discuss data issues including, for example, clarification of numerators and denominators, and inconsistencies in the data sources between states.

Based on the pilot results, the Core States and Work Group revised the indicators and finalized the "how to" documents. For example, Indicator 8 ("Carpal Tunnel Syndrome Cases Filed with the State Workers' Compensation System") was modified from the original indicator of "Musculoskeletal Disorders Filed with the State Workers' Compensation System" because of difficulties in defining and obtaining

information on all musculoskeletal disorders. Because of differences among states with regard to their data systems, particularly Workers' Compensation data, more general "how-to" guides were developed for indicators 5 and 8 ("Amputations and Carpal Tunnel Syndrome Cases Filed with the State Workers' Compensation System").

After the initial pilot testing by the five Core states, eight additional states (Connecticut, Maine, Nebraska, New Jersey, New Mexico, North Carolina, Oregon and Wisconsin) pilot tested the "how to" guides. Feedback from these additional states was incorporated into the development of final "how to" guides in November 2004. Using these guides, thirteen states generated indicator data for 2000 and the results were published in September 2005 ("Putting Data to Work: Occupational Health Indicators from Thirteen Pilot States for 2000").

Procedures to review, approve, and implement new indicators were developed by the Work Group. Since the publication of the original indicator list, several additional indicators have been developed, pilot tested, and approved by the Work Group:

- 2007: Work-related low back disorder hospitalizations
- 2013: Asthma among Adults Caused or Made Worse by Work
- 2014: Influenza vaccination rates among health care providers (reporting for this indicator has been delayed due to limited availability of data)
- 2014: Work-Related Severe Traumatic Injury Hospitalizations
- 2015: Occupational heat-related emergency department visits
- 2017: Hospitalizations for work-related eye injuries

Occupational Health Indicators limitations and considerations for use

The Work Group acknowledges significant limitations in the design of these indicators, both intrinsic to the nature of the indicators as well as to the data sources upon which they rely. While the indicators should be implemented in all states, some states will not have all of the data resources available to them.

Due to changes (e.g., website addresses, coding schemes) inherent in the data sources used to generate the indicators, the "how to" guides have been updated. Each year, states review the instructions to ensure they are current.

These indicators and the "how-to" guides are meant to assist states in building capacity for occupational health surveillance. Results from the pilot project showed that the process of generating the indicators is as useful as the data itself. All states will not be able to complete all indicators, nor will the indicators alone provide all of the information necessary for a state occupational health program. However, the process of generating the indicators will help raise awareness and build capacity for using available data, and also open dialogues among occupational health partners within the state. The indicator data will be most useful when multiple years of data have been compiled and potential problems with rate instability can be minimized and trends across multiple years can be observed within each state. Due to significant differences in data sources, comparing data among states is not recommended for certain indicators. These limitations are discussed in the individual section for each indicator. The design and implementation of any public health surveillance system should be evaluated according to established criteria (MMWR 2001). Several factors should be considered in the design and evaluation of any occupational health surveillance system:

- Underreporting of occupational injuries and illnesses by employees and health care providers;
- Inadequate recognition of occupational injuries and illnesses by health care providers;
- Failure by employers and/or health care providers to report cases according to applicable state laws;
- 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);
- Variations in coding the causes of injury, illness or death;
- Differences in underlying populations at risk ("denominators")

The Work Group remains committed to ensuring the ongoing viability of this project and assisting all 50 States to address the important public health issue of work-related injury and illness.

Council of State and Territorial Epidemiologists

The Council of State and Territorial Epidemiologists enhances the ability of state and other health agencies to detect, prevent, and control diseases and risks of public health significance. CSTE does this by building effective relationships among state and other health agencies. As a professional organization, CSTE represents public health epidemiologists working in state and territorial health agencies. CSTE has over 1,000 members with surveillance and epidemiologic expertise in a broad range of areas including chronic disease, communicable disease, immunization, environmental health, occupational health, and injury. The organization frequently provides technical advice and assistance to federal agencies, including the Centers for Disease Control and Prevention (CDC), on matters of state-based epidemiology. CSTE is an affiliate organization of the Association of State and Territorial Health Officials (ASTHO), the professional organization of chief public health executives in each state and territory.

TOPIC: DEMOGRAPHICS EMPLOYMENT DEMOGRAPHICS PROFILE	
Demographic Group:	Employed persons
Numerator:	Employed persons 16 years or older by specific demographic characteristics
Denominator:	Employed population 16 years or older for the same calendar year
Measures of Frequency:	1. Percentage of civilian workforce unemployed. 2. Percentage of civilian employment self-employed. 3. Percentage of civilian employment employed part-time. 4. Percentage of civilian employment by number of hours worked (<40, 40, 41+) per week. 5. Percentage of civilian employment by sex. 6. Percentage of civilian employment by age group (16-17, 18-64, 65+ years of age). 7. Percentage of civilian employment by race (White, Black, Other). 8. Percentage of civilian employment by Hispanic origin. 9. Percentage of civilian employment by industry. 10. Percentage of civilian employment by occupation.
Time Period:	Calendar year
Significance and Background:	In 2015, there were 149 million civil, non-institutionalized workers in the United States of which 47% were female, 21% were of a racial minority, 16% were of Hispanic origin, and 93% were aged 18-64 years (Current Population Survey). The makeup of the workforce differs among states and may be important in understanding the occupational health status differences among states and within a given state.
Rationale:	Work-related injuries and illnesses are preventable, and control of occupational hazards is the most effective means of prevention. Research has shown relationships between demographic characteristics of workers and the risk of occupational injury or illness. Understanding the basic characteristics of a state's workforce will help state health departments assess possible occupational health risks for their state.
Limitations of Indicator:	The BLS Geographic Profile of Employment and Unemployment estimates are derived primarily from the Current Population Survey (CPS), which is a monthly household cluster survey. As such, the estimates are subject to sampling error, meaning there is potential for over– or under-sampling the number of workers in each of the demographic categories listed.
Data Resources:	BLS Geographic Profiles of Employment and Unemployment (https://www.bls.gov/gps/home.htm) (numerator for all measures of frequency, except age, sex, race, and Hispanic origin). BLS Geographic Profiles of Employment and Unemployment (denominator, except age). NIOSH Employed Labor Force query system (for percentage of civilian employment by sex, age, race, and Hispanic origin) (https://wwwn.cdc.gov/wisards/cps/)

Limitations of Data Resources:	The Geographic Profiles data are based on the Current Population Survey (CPS), which is a monthly probability sample of households across the United States. Geographic Profiles excludes workers less than 16 years of age, active-duty members of the military, and people living in institutions (i.e., prisoners, living institutions for the elderly). These data may underestimate the percentage of certain racial or ethnic worker populations that do not have permanent residences, or are migratory in nature. More information is available at https://www.bls.gov/gps/home.htm. Additionally, because data from the Geographic Profiles of Employment & Unemployment were not publicly available for 2015 as of April 2018, employment data by sex, age, race, and Hispanic origin are taken from CDC's Employed Labor Force (ELF) query system. The ELF system uses a subset of CPS data that uses slightly different methods to apply population controls from those used in GPS reports published by the Bureau of Labor Statistics. (See https://www.bls.gov/gps/notescps.htm for details.) As a result, demographic estimates obtained through ELF will tend to differ slightly from estimates provided in GPS reports, even though both sources derive from CPS data.
HP2020 Objectives[1]:	None
CSTE Positions:	None
Other Available Data:	Data are available to report cross-tabulations of many of these demographic indicators, including tabulations by major industry or occupation divisions on the Geographic Profiles website. Information on age distribution, education, unionization, and income are available from the CPS micro-data, which states may be able to utilize (https://wwwn.cdc.gov/wisards/cps/).
Recommendations:	States could report the available cross-tabulations of demographic indicators provided within the Geographic Profiles reports.

[1] Throughout this document, Healthy People 2020 objectives corresponding to OHI measures may be tracked using different data sources.

How-To Guide: Demographics

Profile of employment demographics

Note: The 2015 Geographic Profile of Employment and Unemployment data had not been posted to the Bureau of Labor Statistics website while updating the current how-to guide. Therefore, data was distributed to states along with the updated how-to guide. These data tables do not cover all the Employment demographics, therefore the NIOSH Employed Labor Force (ELF) query system will be used where needed. Contact Marija Borjan (Marija.Borjan@doh.nj.gov) or Tristan Victoroff (uwm3@cdc.gov) with questions regarding data needs for this indicator.

P1. Percentage of civilian workforce unemployed

To obtain the percentage:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- Within the row for your state, find the value for "Unemployed, Total." The total number employed is in the first data column.
- Divide the total number of unemployed by the sum of full-time and part-time workers, which is found in the first data column.
- Multiply the result by 100 to obtain the **"Percentage of civilian workforce unemployed"**

P2. Percentage of civilian employment self-employed

a) To obtain the number of self-employed workers:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-cw15".
- Find the row corresponding to your state.
- Add the data in the column titled "Agricultural industries Self-employed" and the data in the column titled "Nonagricultural industries Self-employed" to obtain the total number of self-employed workers, in thousands
- Multiply the result by 1,000.

b) To obtain the total employed civilians 16 years or older:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-cw15" described in P2a, find the value listed under Total for your state (first data column). This is the total number of full-time and part-time workers, in thousands.
- Multiply the listed number by 1,000.

c) To calculate the percentage:

- Divide the value for self-employed persons (P2a) by the value for Total employed persons (P2b).
- Multiply the result by 100 to get the **"Percentage of civilian employment self-employed"**.

P3. Percentage of civilian employment in part-time jobs

a) To obtain the number of workers in part-time jobs:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.

- Find the column headed "Total" under "Part-time workers." Multiply the listed number by 1,000.

b) To obtain the total employed civilians 16 years or older:
- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15," find the value listed under Total for your state (the first data column). This is the total number of employed civilians 16 or older, in thousands.

c) To calculate the percentage:
- Divide the number of part-time workers (P3a) by the total number employed (P3b).
- Multiply the result by 100 to get the **"Percentage of civilian employment in part-time jobs"**.

P4. Percentage of civilian employment by number of hours worked

a) To obtain the number of employed persons by hours worked:
- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-hrswrk15".
- Find the row corresponding to your state.
- 0 to 39 hours worked:
    - 0 hours worked. These are individuals who worked 0 hours during the week of the survey (e.g., due to vacation, sick leave). To obtain the number of employees working 0 hours, find the number listed under "Total at work," then subtract this from the value for total employed civilians 16 years or older (P3b). Multiply the result by 1,000.
    - 1-14 hours worked. Multiply the number listed in the column "1 to 14 hours" by 1,000.
    - 15-29 hours worked. Multiply the number listed in the column "15 to 29 hours" by 1,000.
    - 30-34 hours worked. Multiply the number listed in the column "30 to 34 hours" by 1,000.
    - 35-39 hours worked. Multiply the number listed in the column "35 to 39 hours" by 1,000.
    - Sum the above together to obtain the number of employees who worked 0-39 hours.

ii) 40 hours worked:
- Multiply the number listed in the column "40 hours" by 1,000.

iii) 41+ hours worked:
- 41-48 hours worked. Multiply the number listed in the column "41 to 48 hours" by 1,000.
- 49 hours and over worked. Multiply the number listed in the column "49 hours and over" by 1,000.
- Sum the above together to obtain the number of employees who worked over 40 hours

b) To obtain the total employed civilians 16 years or older:
- Use the number obtained from P2b.

c) To calculate the percentages:
- Divide each of the subcategories by the "Total number of workers" from P4b.

- Multiply the result by 100 to get the **"Percentage of civilian employment by number of hours worked."**

P5. Percentage of civilian employment by sex

a) To obtain the number of employed males and females:

- Go to the NIOSH Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/.
- Click on "ELF" Estimates from the left-hand menu.
- In Step 1, select 'Number of Workers.'
- In Step 2, under Time Period, select the year of interest.
- In Step 2, under Location, click on Expand Options, then select your state.
- In Step 3, for Column Variable (1-Major Group), select State.
- In Step 3, for Row Variable (2-Major Group), select Sex.
- In Step 3, under Advanced Options, leave Weight as 'Composite Weight.'
- In Step 4, click on 'Submit Query.'
- In a short time, you will see your query results. Check the Query Parameters to ensure that they are all correct. These are the numbers of employed males and females.

b) To obtain the total employed civilians 16 years or older:

- Sum the total number of employed males and females from P5a.

c) To calculate the percentages:

- Males. Divide the number of males employed (P5a) by the total number employed (P5b). Multiply the result by 100.
- Females. Divide the number of females employed (P5a) by the total number employed (P5b). Multiply the result by 100.

P6. Percentage of civilian employment by age group (16-17, 18-64, 65+ years of age)

To obtain the number of employed persons by age group:

- Go to the NIOSH Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/.
- Click on "ELF" Estimates from the left-hand menu.
- In Step 1, select 'Number of Workers.'
- In Step 2, under Time Period, select the year of interest.
- In Step 2, under Location, select your state (if necessary, click on Expand Options).
- In Step 3, for Column Variable, select 'State.'
- In Step 3, for Row Variable, select 'Age Group (Five Years).'
- In Step 3, leave Weight as 'Composite Weight.'
- In Step 4, click on 'Submit Query.'
- In a short time, you will see your Query Results. Check the Query Parameters to ensure that they are all correct.
- Export to an Excel file.

i) 16 to 17 year olds

- The ELF query system will automatically generate a value for the number of workers age 16-17 years.

ii) 18 to 64 year olds

- In the Excel file, sum the number of workers in each relevant age category (e.g., age group 18-19 through age group 60-64). This will give you the **Total number of workers age 18 to 64 years** in your state.

NOTE: *if you simply highlight the values associated with the 18-64 group, Excel should illustrate the sum at the bottom of the screen.*

iii) 65+ year olds

- Follow the process above (ii) for ages 65 to 75+ (equivalent to 65 and older). (Again, summation can be done by Excel by simply highlighting the appropriate values.)

b) To obtain the total employed civilians 16 years or older:

- The ELF query system will automatically generate a value for the total number of workers age 16 years or older, based on a sum of the individual age categories.

c) To calculate the percentage:

- 16 to 17 year olds. Divide the number of 16 to 17 year olds (P6i) by the total employment (P6b). Multiply the result by 100.
- 18 to 64 year olds. Divide the number of 18 to 64 year olds (P6ii) by the total employment (P6b). Multiply the result by 100.
- 65+ year olds. Divide the number of 65+ year olds (P6iii) by the total employment (P6b). Multiply the result by 100.

P7. Percentage of civilian employment by race

a) To obtain the number of employed by race:

- Go to the NIOSH Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/.
- Click on "ELF" Estimates from the left-hand menu.
- In Step 1, select 'Number of Workers.'
- In Step 2, under Time Period, select the year of interest.
- In Step 2, under Location, click on Expand Options, then select your state.
- In Step 3, for Column Variable, select 'State'.
- In Step 3, for Row Variable, select 'Race(2003+)'.
- In Step 3, under Advanced Options, leave Weight as 'Composite Weight.'
- In Step 4, click on 'Submit Query.'
- In a short time, you will see your query results. Check the Query Parameters to ensure that they are all correct.
- For White, use "White Only."
- For Black, use "Black Only."
- For Other, sum White and Black, and subtract this from Total.

b) To calculate the percentage:

- White. Divide the number of Whites employed (P7a) by the total number employed (P7a, as listed in the ELF results). Multiply the result by 100.
- Black. Divide the number of Blacks employed (P7a) by the total number employed (P7a, as listed in the ELF results). Multiply the result by 100.
- Other. Divide the number of Other races employed (P7a) by the total number employed (P7a, as listed in the ELF results). Multiply the result by 100.

P8. Percentage of civilian employment by Hispanic origin

a) To obtain the number of Hispanic origin employed:

- Go to the NIOSH Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/.
- Click on "ELF" Estimates from the left-hand menu.
- In Step 1, select 'Number of Workers.'
- In Step 2, under Time Period, select the year of interest.
- In Step 2, under Location, click on Expand Options, then select your state.
- In Step 3, for Column Variable, select State.
- In Step 3, for Row Variable, select 'Hispanic'.
- In Step 3, under Advanced Options, leave Weight as 'Composite Weight.'
- In Step 4, click on 'Submit Query.'
- In a short time, you will see your query results. Check the Query Parameters to ensure that they are all correct.

b) To calculate the percentage:

- Divide the number of Hispanic origin employed (P8a) by the total number employed (P8a, as listed in the ELF results). Multiply the result by 100.

P9. Percentage of civilian employment by industry

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-empind15_%distribution".
- Find the row corresponding to your state.
- Find the percent of the total employed in the various industries.

Prior to 2003, these categories were:

- Construction
- Manufacturing – Durable goods
- Manufacturing – Non-durable goods
- Transportation/communications/public utilities
- Trade
- Finance/insurance/real estate
- Services
- Government
- Agriculture

Starting in 2003, the categories are:

- Mining and logging
- Construction

- Manufacturing – Durable goods
- Manufacturing – Non-durable goods
- Wholesale and retail trade
- Transportation and utilities
- Information
- Financial activities
- Professional and business services
- Education and health services
- Leisure and hospitality
- Other services
- Public administration
- Agriculture and related industries

P10. Percentage of civilian employment by occupation

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-empocc15_%distribution".
- Find the row corresponding to your state.
- Find the percent of the total employed in the various occupations.

Prior to 2003, these categories were:

- Executive/administrative/managerial
- Professional specialty
- Technicians and related support
- Sales
- Administrative support including clerical
- Service
- Precision production/craft/repair
- Machine operators/assemblers/inspectors
- Transportation/material moving
- Handlers/equipment cleaners/helpers/laborers
- Farming/forestry/fishing

Starting in 2003, the categories are:

- Management, business and financial operations
- Professional and related
- Service
- Sales and related
- Office and administrative support
- Farming, fishing, and forestry
- Construction and extraction
- Installation, maintenance, and repair
- Production
- Transportation and material moving

TOPIC: OCCUPATIONAL INJURIES AND ILLNESSES COMBINED INDICATOR # 1: Non-fatal work-related injuries and illnesses reported by employers	
Demographic Group:	Employed persons in the private sector
Numerator:	Estimated cases of work-related injuries and illnesses Estimated cases of injuries and illnesses involving days away from work Estimated cases of injuries and illnesses involving more than 10 days away from work
Denominator:	Estimated total full-time equivalents (FTEs) worked for the same calendar year
Measures of Frequency:	Estimated annual total number of work-related injuries and illnesses (numerator) Estimated annual total work-related injury and illness incidence rate per 100,000 FTEs Estimated annual total number of cases involving days away from work (numerator) Estimated annual total incidence rate for cases involving days away from work per 100,000 FTEs Estimated annual total number of cases involving more than 10 days away from work (numerator)
Time Period:	Calendar year
Significance and Background:	There were approximately 2.9 million nonfatal workplace injuries and illnesses reported by private industry employers in 2015, which occurred at a rate of 3.0 cases per 100 equivalent full-time workers. The 2015 rate continued a pattern of decline that, apart from 2012, occurred annually for the preceding 13 years. (https://www.bls.gov/news.release/archives/osh_10272016.pdf) The overall incidence rate of nonfatal occupational injury and illness cases requiring days away from work to recuperate was 104.0 cases per 10,000 full-time workers in 2015, down from 107.1 cases in 2014. In 2015, there were 1,153,490 days-away-from-work cases in private industry, state government, and local government—essentially unchanged from the number of cases reported in 2014. The median days away from work to recuperate—a key measure of severity of injuries and illnesses—was 8 days in 2015, 1 day fewer than reported in 2014. Source: https://www.bls.gov/news.release/pdf/osh2.pdf
Rationale:	Work-related injuries and illnesses are preventable, and control of occupational hazards is the most effective means of prevention. Estimating the burden and tracking these injuries can help target prevention programs and activities. Information on reported cases can be used to identify contributory factors and to develop improved or new prevention strategies or regulations to protect workers.
Limitations of Indicator:	Employers are required to record events that resulted in death, loss of consciousness, days away from work, restricted work activity or job transfer, or medical treatment beyond first aid, or a significant injury or illness diagnosed by a physician or other licensed health care professional. Additional reportable

	conditions information is listed at https://www.bls.gov/opub/hom/soii/concepts.htm. Limitations to this indicator include impacts from employer reporting compliance and the accuracy and completeness of the reports. Variations also occur regarding employer utilization of restricted or light duty for injured workers as a means of eliminating or decreasing the number of days an injured worker is away from work, which impacts reporting. Employers may not be aware of work-related conditions for which employees obtained medical care from their personal health care providers, or for conditions that have long latencies and are diagnosed after an employee leaves their employment. The industries for which data are available also vary among states, primarily due to the differences in industry concentration and sample size from one state to the next. As a result, it is not recommended to compare numbers or rates between state or national data. Because of regulation and reporting changes, time series comparisons may be subject to data breaks.
Data Resources:	Annual Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII) https://www.bls.gov/opub/hom/soii/home.htm. Additional information is available at the SOII home page including history, concepts, data sources, design, calculation, presentation, and more. SOII is an establishment-based survey used to estimate incidence rates and counts of workplace injuries and illnesses. It also provides more detailed case and demographic data for cases that involve one or more days away from work (DAFW) and for days of job transfer and restriction (DJTR) for select industries SOII estimates the number and frequency (incidence rates) of workplace injuries and illnesses based on recordkeeping logs kept by a sample of employers during a calendar year. SOII uses OSHA's recordkeeping guidelines and logs to facilitate convenient collection of data, but the survey is not administered by OSHA. Detailed guidance for OSHA's injury and illness recordkeeping rule can be found at https://www.osha.gov/recordkeeping/entryfaq.html. SOII covers private, state government, and local government wage and salary workers, but does not covers workers on small farms, the self-employed, family workers, and federal government workers. In addition, the scope of SOII encompasses industries not regulated by OSHA, such as railroad and mining.
Limitations of Data Resources:	The SOII is based on a probability sample of employer establishments, not on a census of all employers. As such, SOII estimates are subject to sampling error. The data are also subject to non-sampling errors such as mistakes in recording or coding the data that are not measured. SOII excludes approximately 14% of

	the workforce including the military, self-employed individuals, private household workers, workers on farms with 10 or fewer employees, and Federal agencies, because these workers fall outside the scope of the Occupational Health and Safety Act of 1970. Until 2008, SOII also excluded state and municipal workers. Although BLS has produced national estimates for state and local government since 2008, in many states, maintenance of logs of OSHA recordable injuries and illnesses by these agencies is voluntary. Therefore, generation of this indicator is limited to private sector workforce only. Some states do not participate in this Federal-State survey, and in some participating states, the sample sizes are insufficient to generate state-specific estimates. BLS does not publish rates less than .05 per 10,000 full-time equivalent workers in the case and demographics system. The SOII relies on employer reports of injuries and illnesses and is therefore subject to both willful and unintentional underreporting of cases or case details. Employers may place affected workers on restricted work activity, thereby avoiding the reporting of these cases as lost workday cases (which require reporting of additional details). In addition, the SOII only collects data for the incident year, and does not capture lost work-time that may carry over to a new calendar year. For example, a debilitating injury that occurs on the last day of the calendar year will have no lost work-time associated with it in the SOII. Changes to OSHA reporting regulations for employers went into effect as of January 1, 2015, impacting SOII data starting in 2015. BLS has long acknowledged that some conditions that are difficult for employers to relate to the workplace are not adequately recognized and reported during a calendar year (for example, long-term latent illnesses) and are believed to be understated in SOII illness measures (https://www.bls.gov/news.release/pdf/osh2.pdf). Following several studies in the mid-2000s questioning the completeness of SOII injury and illness counts, BLS began internal research in 2007 and, at the request of Congress, established an ongoing research program. Initial research conducted between 2009 and 2012 found that the SOII failed to capture some cases but could not determine the magnitude or leading cause of an undercount. Researchers determined that the ability to match injury and illness data across different data sources was impacted by various factors, such as establishment type, the time of case filing, and the type of injury. BLS initiated additional research from 2012 to 2014 that included interviews with employers in four states to learn more about their injury and illness recordkeeping practices. Following the four state study, BLS conducted a nationwide follow-back survey with SOII respondents in 2015 and 2016. Analysis of the results of this study will help BLS learn more about recordkeeping practices and timing issues that may negatively affect employer injury and illness reporting to the SOII. BLS also continues to conduct exploratory research on the collection of occupational injury and illness data directly from employees and will pilot test collection of these data beginning in 2017. For more information on undercount research, please see www.bls.gov/iif/undercount.htm.

HP2020 Objective:	None
CSTE Positions:	None
Other Available Data:	Industry, occupation, age, gender, race/ethnicity, nature of injury, body part, type of event and source of injury, length of service. Public sector should be looked at, if available. (Details are available only for injuries/illnesses involving days away from work.)
Recommendations:	SOII has many data elements that can be used to better define patterns of work-related injuries and illnesses in the state. These include, for example, industry-specific counts and rates, and, for cases involving days away from work, counts (not rates) of illnesses and injuries by occupation, length of service, age, gender, race/ethnicity and sources of injury.

How-To Guide: Indicator #1

Non-Fatal Work-Related Injuries and Illnesses Reported By Employers

1.1 Estimated Annual Total Number of Work-Related Injuries and Illnesses

- Go to the BLS Injuries, Illnesses, and Fatalities web page: http://www.bls.gov/iif/oshstate.htm.
- Select your state from the map.
- Select "Case counts' under SOII for the specific year needed.
- From resulting Table 2, read across 'Private Industry' row and down major column 'Total Recordable Cases.'

  NOTE: Data from this same table will be used in step 1.3.
- Multiply this cell's value by 1,000 to get the **'Estimated annual total number of work-related injuries and illnesses.'**

1.2 Estimated Annual Total Work-Related Injury and Illness Incidence Rate per 100,000 FTEs

- Go to the BLS web site: http://www.bls.gov/iif/oshstate.htm.
- Select your state from the map.
- Select 'Incidence Rates' under SOII for the specific year needed.
- From resulting Table 1, read across 'Private Industry' row and down major column 'Total Recordable Cases.' (Rate is provided per 100 FTEs).

  NOTE: Data from this same table will be used in step 1.4.
- Multiply the value of this cell by 1,000 to get the **'Estimated annual total work-related injury and illness incidence rate per 100,000 FTEs.'**

1.3 Estimated Annual Total Number of Cases Involving Days Away from Work

- Go to the BLS web site: http://www.bls.gov/iif/oshstate.htm
- Select your state from the map.
- Select "Case counts' under SOII for the specific year needed.
- From resulting Table 2, read across 'Private Industry' row and down the sub-column 'Cases with days away from work' under the major column header 'Cases with days away from work, job transfer, or restriction.'
- Multiply the value of this cell by 1,000 to get the **'Estimated annual total number of cases involving days away from work.'**

1.4 Estimated Annual Total Incidence Rate for Cases Involving Days Away from Work per 100,000 FTEs

- Go to the BLS web site: http://www.bls.gov/iif/oshstate.htm
- Select your state from the map.
- Select 'Incidence Rates' under SOII for the specific year needed.
- From resulting Table 1, read across 'Private Industry' row and down sub-column 'Cases with days away from work' under major column header 'Cases with days away from work, job transfer, or restriction' (rate is provided per 100 FTEs).
- Multiply the value of this cell by 1,000 to get the **'Estimated annual total incidence rate for cases involving days away from work per 100,000 FTEs.'**

1.5 Estimated Annual Total Number of Cases involving more than 10 Days Away from Work

- Go to: http://www.bls.gov/iif/home.htm.
  - From the left-hand column, click on 'IIF Databases.'
- Under Workplace Injury and Illness Databases, find the row with the database name 'Nonfatal cases involving days away from work: selected characteristics (2011 forward)' and click on the icon for 'multi-screen data search.'
  - You should be at a page called 'Create Customized Tables' with a description of 'Nonfatal cases involving days away from work: selected characteristics (2011 forward) – Area (Screen 1 of 7).' The next steps describe making selections using this data wizard.
  - Under 'Choose Area' scroll as needed to view your state name. Click on the state name to highlight it and then click 'Next form' button.
  - Under 'Choose Ownership' click on '1 Private industry' to highlight and then click 'Next form' button.
  - Under 'Choose Data Type' click on '6 Injury and Illness Cases' to highlight and then click 'Next form' button.
  - Under 'Choose Case Type' scroll to and click on '3 Selected characteristic by detailed industry' to highlight. Then click 'Next form' button.
  - Under 'Choose category' hold down the shift key (to allow for multiple selections) while scrolling down and click to highlight 'DEX DAFW (11-20 days), DFX DAFW (21-30 days), and DGX DAFW (31+ days).' Release shift key. Verify that all three choices are highlighted, then click 'Next form' button.
  - Under 'Choose Industry' click on '00000 All Industry' to highlight. Then click 'Next form' button.
  - You should be at the screen showing 'Nonfatal cases involving days away from work: selected characteristics (2011 forward) – Year (Screen 7 of 7).' The data box below should contain three data series IDs. Click on the 'Retrieve data' button below the data box.
  - The results page is titled 'Databases, Tables & Calculators by Subject.' The results of the query will show all three data series, the identifying information, and your total number in each of the three data series. Verify that the state name and data description is correct.
    - DATA REMINDER: You need the result data from all three data series files shown for the final calculation of OHI 1.5.

NOTE: *As additional years of data (2011 and later) are available, multiple years of data results may be shown, grouped by year. You can limit the data shown to one year if desired using the 'Change Output Options' function shown under the page title.*

- Options:
  - You can write down the year's result for each of the three data series – found under 'annual' for the next step in calculating OHI 1.5.
  - You can print the page shown below as a reference showing the results as a reference for the next step in calculating OHI 1.5
  - You can download each of the three files as a reference for the next step in calculating OHI 1.5

- Sum the annual result data from all three data sets (11-20 days, 21-30 days, and 31+ days) for the year of interest. This is the **'Estimated annual total number of cases involving more than 10 days away from work.'**

Data Tips: Regional BLS offices can provide revised/updated counts and rates for any year. Numbers and rates may not be available from the website if the estimate does not meet the publishable criteria of BLS. This is particularly true for small states and rare conditions.

TOPIC: OCCUPATIONAL INJURIES AND ILLNESSES COMBINED INDICATOR # 2: Work-related hospitalizations	
Demographic Group:	Employed persons
Numerator	Inpatient hospital discharges with primary payer coded as workers' compensation
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of inpatient hospitalizations for persons age 16 years or older (numerator) Annual crude rate of inpatient hospitalizations per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	In 2015, there were 2.9 million work-related injuries and illnesses reported by employers in the United States. Of those, 95.2% were recordable injuries and 4.8% were recordable illnesses. More than half of the 2.9 million injury and illness cases reported in 2015 were of a more serious nature that involved days away from work, job transfer, or restriction (DART cases). These cases occurred at a rate of 1.6 cases per 100 full-time workers (BLS, 2016). Workers' compensation costs in the United States total more than $100 billion per year (Sengupta et al., 2013).
Rationale:	Individuals hospitalized with work-related injuries and illnesses have some of the most serious and costly work-related adverse health outcomes. Tracking of these significant adverse health effects should be undertaken to document the burden of occupational injuries and illnesses, to design, target, and evaluate the impact of prevention efforts over time, and to identify previously recognized settings in which workers may continue to be at high risk.
Limitations of Indicator:	Inpatient hospital discharge records are only available for non-federal, acute care hospitals. Individuals hospitalized for work-related injuries and illnesses represent less than 10 percent of all workers who receive workers' compensation. 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, railroad or longshore and maritime workers are not covered by state workers' compensation systems. Attribution of payer in hospital discharge may not be accurate. Data between states may not be comparable due to the differences in states' workers' compensation programs.
Data Resources:	Inpatient hospital discharge data (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Practice patterns and payment mechanisms may affect decisions by health care providers to hospitalize patients, to correctly diagnose work-related conditions, and/or to list the condition as a discharge diagnosis. The number of diagnoses listed on discharge summaries may vary by regional practice patterns and by the person completing discharge summaries. Residents of one state may be hospitalized in another state and not be reflected in his/her state's hospitalization data. All admissions are counted, including multiple admissions

	for a single individual. Until hospital discharge data is available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity is not collected in some states and is incomplete and/or questionable validity in others. Hospital discharge records are only available for non-federal, acute care hospitals.
HP2020 Objectives:	OHS-2
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, diagnosis, residence zip code
Recommendations:	Age, gender, race/ethnicity, and zip code specific counts and rates can be used to better define the pattern of work-related hospitalizations.

How-To Guide: Indicator #2

Work-Related Hospitalizations

2.1 <u>Annual number of inpatient hospitalizations for persons age 16 years or older</u>

Obtain from the State Health Department the number of cases meeting the following criteria from the inpatient hospital discharge file:

- Primary payer = Workers' Compensation.
- Limit age to those 16 years or older (age at admission is preferred).
- Select for state of residence = *'your state'*.
- Exclude:
  - age unknown
  - out-of-state residents and unknown residence
  - out-of-state inpatient hospitalizations
- Use undeduplicated data (no exclusions for deaths, readmissions).
- Use discharge data during calendar year, not fiscal year.
- Use all cases reported on the discharge file, regardless of length of stay.
- This will yield **'Annual number of inpatient hospitalizations for persons age 16 years or older.'**

2.2 <u>Annual crude rate of inpatient hospitalization per 100,000 employed persons age 16 years or older</u>

a) <u>To obtain the denominator for the rate:</u>

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

b) <u>To calculate the rate:</u>

- Divide the numerator (2.1) by the denominator (2.2a).
- Multiply this result by 100,000 to get the **'Annual crude rate of inpatient hospitalizations per 100,000 employed persons age 16 years or older.'**

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 3: Fatal work-related injuries	
Demographic Group:	Employed persons
Numerator:	All fatal work-related injuries reported to the Census of Fatal Occupational Injuries (CFOI)
Denominator:	Total hours worked by all employees
Measures of Frequency:	Annual number of fatal work-related injuries (numerator) Annual crude fatality rate per 100,000 full-time equivalent workers (FTEs) age 16 years or older
Time Period:	Calendar year
Significance and Background:	In 2015, 4,836 fatal work injuries were reported to the Census of Fatal Occupational Injuries (CFOI) Program administered by the Bureau of Labor Statistics (BLS). The 2015 total was the highest annual total recorded since 2008. The overall fatal work injury rate for the U.S. in 2015 was 3.4 fatal injuries per 100,000 full-time equivalent workers, equivalent to the final rate reported for 2014. An average of 14 workers die each day as a result of these injuries sustained at work. Worker fatalities have decreased approximately 16% from a decade earlier (CFOI, 2016).
Rationale:	Multiple factors and risks contribute to work-related fatalities, including workplace/process design, work organization, worker characteristics, economics and other social factors. Surveillance of work-related fatalities can identify new hazards and case clusters, leading to the development of new interventions and development of new or revised regulations to protect workers.
Limitations of Indicator:	Fatalities of people younger than 16 may be included in the numerator but are not included in the denominator, since employment statistics are only available for those 16 years of age and older. Because the numbers of deaths among those less than 16 in any one state are small, these numbers are not broken out in the BLS tables and often do not meet the BLS publication criteria. Also, CFOI reports data on work-related fatalities by the state in which the fatal incident occurred, which is not necessarily the state of death or the state of residence. The denominator used for calculating rates is based on state of residence, thus rates may overestimate risk for a state if the fatal incidents involved victims who were out of state residents. Likewise, rates may be underestimated if fatal incidents occurred in other states. Deaths among military personnel and volunteers are included in the numerator but not the denominator. The BLS uses a different methodology to calculate fatal work-related injury rates from what CSTE presents here. As a result, rates calculated using this indicator methodology may differ from the BLS published rates. For more information regarding the BLS methodology please visit the BLS website at: http://www.bls.gov/iif/oshnotice10.htm
Data Resources:	Census of Fatal Occupational Injuries (numerator) BLS Current Population Survey Data (denominator)

Limitations of Data Resources:	CFOI program states are not permitted to release occupation or industry specific data when data are sparse. Such sparse data is categorized under 'others.' The CFOI program, although it has a data element for ICD codes, publishes findings according to the OIIC classification system rather than ICD. Therefore, data from CFOI may not be comparable to causes of death documented on death certificates.
HP2020 Objectives:	OSH-1 and OSH-5
CSTE Positions:	None
Other Available Data	Industry and occupation, age, gender, race/ethnicity, nature, source of injury and event

How-To Guide: Indicator #3

Fatal Work-Related Injuries

NOTE: *The denominator that the Bureau of Labor Statistics (BLS) uses to calculate fatality rates has changed over time from the number of workers employed to the quantity of hours worked. The new hours-based rates use the average number of employees at work and the average hours each employee works. To be consistent with the BLS, the denominator for fatal work-related injury rates for this indicator has changed from the number employed, as indicated in the Geographic Profiles, to the number of hours worked which is designated as Full-Time-Equivalent workers or FTEs. States may wish to calculate rates using either method to track trends over time.*

3.1 Annual number of fatal work-related injuries

- Go to the BLS web site: https://www.bls.gov/iif/oshstate.htm.
- Select your state from the map or scroll down to find your state in the table.
- Under 'Fatal occupational injuries (CFOI) data,' select 'Fatal injury counts (HTML)' for the appropriate year.
- From the resulting table, read across 'Total' row and down 'Total fatal injuries' column. This is the **'Annual number of work-related fatal injuries'** for your state.

3.2 Annual crude fatality rate per 100,000 Full-Time-Equivalent workers (FTEs) age 16 years or older.

a) Obtain the annual average number of Full-Time-Equivalent workers (FTEs) age 16 years or older based on the Current Population Survey (the denominator for the rate) using NIOSH's Employed Labor Force Query System.

NOTE: *NIOSH's Employed Labor Force (ELF) Query System will be used to calculate the number of FTEs age 16 years or older instead of DataFerrett, which has been used in the past. ELF is a simpler and faster method, and it uses a single screen with pull-down menus and checkboxes to select data analysis options.*

- Go to the NIOSH Employed Labor Force (ELF) Website at: https://wwwn.cdc.gov/wisards/cps/
- Link to the ELF estimates page by selecting "ELF Estimates" from the left-hand menu.
- For Step 1: Select *'type of labor force estimates':* Select '*FTE- primary job'* only.
- For Step 2: Select *'Query Parameters'*
  - For *Time Period:* Select '*2015'*
  - For *Location:* Expand the option to select your state.
- For the Total FTE, leave the remaining parameters as they are, *Skip step 3* and leave the weighting as 'composite weight.'
- For *Step 4:* select *'Submit the Query.'*
- A new screen will populate and the **Annual Average Number of FTEs** age 16 years or older will be displayed, you can also view the data as a Microsoft Word, Microsoft Excel, or PDF document.

b) Calculate the '**Annual Crude Fatality Rate per 100,000 FTEs age 16 years and older.'**

- Divide the 'Annual number of work-related fatal injuries' from 3.1 by the 'Annual average number of FTEs age 16 years or older' from 3.2a

- Multiply the result by 100,000 to get the '**Annual crude fatality rate per 100,000 FTEs age 16 years and older.'**

NOTE: *Because of data limitations, fatalities among persons less than 16 years of age may be included in the numerator (3.1) but are excluded from the denominator (3.2a).*

Data Tips

- Beginning with 2015 reference year, final data from CFOI will be released in December of each year (e.g. the final 2015 CFOI data were released in December 2016). Preliminary data, which formerly appeared nine months after the close of the calendar year, are no longer produced.
- State contact information is provided at https://www.bls.gov/iif/oshstate.htm.
- For data on fatal work-related injuries prior to 2003, go to: http://www.bls.gov/iif/oshwc/cfoi/cftb0186.pdf
- Numbers may not be available from the website if the estimate does not meet the publishable criteria of BLS. This is particularly true for small states.

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 4: Work-related amputations with days away from work reported by employers	
Demographic Group:	Employed persons in the private sector
Numerator:	Estimated cases of work-related amputation with days away from work (OIICS 2.01 nature of condition code 1311)
Denominator:	Estimated total full-time equivalents (FTEs) worked for the same calendar year
Measures of Frequency:	Estimated annual number of work-related amputation cases with days away from work (numerator) Estimated annual incidence rate of work-related amputation cases with days away from work per 100,000 FTEs
Time Period:	Calendar year
Significance and Background:	In 2015, approximately 5,360 private sector workers in the United States experienced a nonfatal work-related amputation that required days away from work. Ninety-one percent of these workers were male. About 96% involve amputations to the hand (wrist/hand/finger) (BLS 2015 IIF data). These injuries can greatly affect a worker's job skills and reduce earnings. Wrist/hand/finger amputation medical and work-lost combined costs averaged $58,424 for ED-treated and released adult cases in 2010, and $289,050 for cases requiring hospitalization (CDC National Center for Injury Prevention and Control WISQARS data).
Rationale:	Work-related amputations are a preventable serious injury, and control of occupational hazards is the most effective means of prevention. Estimating the burden and tracking these injuries can help target prevention programs and activities. Information on reported cases can be used to identify contributing factors and to develop improved or new prevention strategies or regulations to protect workers.
Limitations of Indicator:	Employers are required to record events that resulted in death, loss of consciousness, days away from work, restricted work activity or job transfer, or medical treatment beyond first aid, or a significant injury or illness diagnosed by a physician or other licensed health care professional. Additional reportable conditions information is listed at https://www.bls.gov/opub/hom/soii/concepts.htm. Limitations to this indicator include impacts from employer reporting compliance and the accuracy and completeness of the reports. Variations also occur regarding employer utilization of restricted or light duty for injured workers as a means of eliminating or decreasing the number of days an injured worker is away from work, which impacts reporting. The industries for which data are available also vary among states, primarily due to the differences in industry concentration and sample size from one state to the next. As a result, it is not recommended to compare numbers or rates between state or national data.

Data Resources:	Annual Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII) https://www.bls.gov/opub/hom/soii/home.htm. Additional information is available at the SOII home page including history, concepts, data sources, design, calculation, presentation, and more. SOII is an establishment-based survey used to estimate incidence rates and counts of workplace injuries and illnesses. It also provides more detailed case and demographic data for cases that involve one or more days away from work (DAFW) and for days of job transfer and restriction (DJTR) for select industries SOII estimates the number and frequency (incidence rates) of workplace injuries and illnesses based on recordkeeping logs kept by a sample of employers during a calendar year. SOII uses OSHA's recordkeeping guidelines and logs to facilitate convenient collection of data, but the survey is not administered by OSHA. Detailed guidance for OSHA's injury and illness recordkeeping rule can be found at https://www.osha.gov/recordkeeping/entryfaq.html. SOII covers private, state government, and local government wage and salary workers, but does not covers workers on small farms, the self-employed, family workers, and federal government workers. In addition, the scope of SOII encompasses industries not regulated by OSHA, such as railroad and mining.
Limitations of Data Resources:	The SOII is based on a probability sample of employer establishments, not on a census of all employers. As such, SOII estimates are subject to sampling error. The data are also subject to non-sampling errors such as mistakes in recording or coding the data that are not measured. SOII excludes approximately 14% of the workforce including the military, self-employed individuals, private household workers, workers on farms with 10 or fewer employees, and Federal agencies, because these workers fall outside the scope of the Occupational Health and Safety Act of 1970. Until 2008, SOII also excluded state and municipal workers. Although BLS has produced national estimates for state and local government since 2008, in many states, maintenance of logs of OSHA recordable injuries and illnesses by these agencies is voluntary. Therefore, generation of this indicator is limited to private sector workforce only. Some states do not participate in this Federal-State survey, and in some participating states, the sample sizes are insufficient to generate state-specific estimates. BLS does not publish rates less than .05 per 10,000 full-time equivalent workers in the case and demographics system. The SOII relies on employer reports of injuries and illnesses and is therefore subject to both willful and unintentional underreporting of cases or case details. Employers may place affected workers on restricted work activity, thereby avoiding the reporting of these cases as lost workday cases (which require reporting of

	additional details). In addition, the SOII only collects data for the incident year, and does not capture lost work-time that may carry over to a new calendar year. For example, a debilitating injury that occurs on the last day of the calendar year will have no lost work-time associated with it in the SOII. Changes to OSHA reporting regulations for employers went into effect as of January 1, 2015, impacting SOII data starting in 2015. BLS has long acknowledged that some conditions that are difficult for employers to relate to the workplace are not adequately recognized and reported during a calendar year (for example, long-term latent illnesses) and are believed to be understated in SOII illness measures (https://www.bls.gov/news.release/pdf/osh2.pdf). Following several studies in the mid-2000s questioning the completeness of SOII injury and illness counts, BLS began internal research in 2007 and, at the request of Congress, established an ongoing research program. Initial research conducted between 2009 and 2012 found that the SOII failed to capture some cases but could not determine the magnitude or leading cause of an undercount. Researchers determined that the ability to match injury and illness data across different data sources was impacted by various factors, such as establishment type, the time of case filing, and the type of injury. BLS initiated additional research from 2012 to 2014 that included interviews with employers in four states to learn more about their injury and illness recordkeeping practices. Following the four state study, BLS conducted a nationwide follow-back survey with SOII respondents in 2015 and 2016. Analysis of the results of this study will help BLS learn more about recordkeeping practices and timing issues that may negatively affect employer injury and illness reporting to the SOII. BLS also continues to conduct exploratory research on the collection of occupational injury and illness data directly from employees and will pilot test collection of these data beginning in 2017. For more information on undercount research, please see www.bls.gov/iif/undercount.htm.
HP2020 Objectives:	OSH-2
CSTE Positions:	None
Other Available Data:	Industry, occupation, age, gender, race/ethnicity, body part, type of event and source of injury. (Details are available only for injuries/illnesses involving days away from work).
Recommendations:	SOII has many data elements that can be used to better define patterns of work-related amputations in the state. These may include, for example, industry-specific counts and rates of injuries, and for cases involving days away from work, counts (not rates) by occupation, length of service, age, gender, race/ethnicity and sources of injury.

How-To Guide: Indicator #4

Work-Related Amputations with Days Away From Work Reported By Employers

NOTE: BLS SOII data changes beginning with 2011 data: *Starting with 2011 data, BLS began using a revised version of the Occupational Injuries and Illnesses Classification System (OIICS) manual to code case characteristics associated with work-related injuries, illnesses and fatalities. Information about the original OIICS coding structure as well as the new OIICS 2.01 coding structure is available here: http://www.bls.gov/iif/oshoiics.htm. A summary of these changes can be found on the following link and includes information about the changes made to the Nature codes involving amputations, avulsions, and enucleations: http://www.bls.gov/iif/oiics_changes_2010.pdf. For OHI 4, this change requires the use of 'Amputations code 1311XX' for data from 2011 and forward, while 'Amputations code 031XXX' was used for 2010 and previous calculations.*

Impact to trend analysis: *Due to the extensive revisions, BLS cautions users against directly comparing Event, Source, Secondary Source, Part, and Nature case characteristic codes from 1992-2010 to data from 2011 onward. You can examine the amputation definition in the original OIICS coding structure and the OIICS 2.01 coding structure prior to deciding to continue a trend analysis over time (again, BLS cautions against this and doesn't do it in-house as a matter of program policy). Some data users feel that the definitions of particular codes across the two systems are similar enough for their data needs. See pages 4 and 5 of the original coding structure (http://www.bls.gov/iif/oiics_manual_2007.pdf) compared to pages 17-18 of the OIICS 2.01 coding structure (http://www.bls.gov/iif/oiics_manual_2010.pdf).*

4.1 Estimated Annual Number of Work-Related Amputations Involving Days Away from Work

- Go to the BLS IIF Home page: http://www.bls.gov/iif/home.htm .
- From the left-hand column, click on 'IIF Databases.'
- Under Workplace Injury and Illness Databases, find the row with the database name 'Occupational Injuries and Illnesses and Fatal Injuries Profiles' and click on the icon for 'multi-screen data search.'
- You should be at a page called 'Occupational Injuries/Illnesses and Fatal Injuries Profiles.' The next steps describe making selections using this data wizard.
  - Select 'Case and Demographic Numbers' as the table type. Click on 'Continue.'
  - Select the year of interest. Click on 'Continue.'
  - Select the state of interest. Leave 'Beginning year:' as 'single year.' Click on 'Continue.'
  - Select 'Nature of condition' under 'Characteristic Type.' Leave 'Name or description' selected under 'Order.' Click on 'Continue.'
  - Select 'Amputations 1311XX' under 'Subcharacteristic.' Leave 'Private industry' selected under 'Ownership.' Click on 'Continue.'
  - Review your selections. Select the desired output format – HTML or Excel.
    - For Excel, select 'Open' from the pop-up box to view the file. You may get a second pop-up box saying the file is in a different format than specified by the extension, and that you should verify that the file is not corrupted and from a trusted source. Click 'Yes' to open as an Excel file. You will need to change the file type to save it as an Excel file.

- Read across 1st row 'Total' and down 3rd column 'Amputations (code 1311XX)' from the resulting table. This is the '**Estimated annual number of work-related amputations involving days away from work.**'

NOTE: *For some years, BLS lists the number of amputations in hundreds. BLS includes a parenthetical note - i.e., "(in hundreds)" in the table heading if this applies. If your data shows this notation, the listed figure must be multiplied by 100 to generate the total number of amputations.*

4.2 Estimated Annual Incidence Rate of Amputations Involving Days Away from Work per 100,000 FTEs

- Go to: http://www.bls.gov/iif/data.htm. (This is a direct link to the same database page used in step 4.1)
- Under Workplace Injury and Illness Databases, find the row with the database name 'Occupational Injuries and Illnesses and Fatal Injuries Profiles' and click on the icon for 'multi-screen data search.'
- You should be at a page called 'Occupational Injuries and Illnesses and Fatal Injuries Profiles.' The next steps describe making selections using this data wizard.
- Select 'Case and Demographic Incidence Rates' as the table type. Click on 'Continue.'
- Select the year of interest. Click on 'Continue.'
- Select the state of interest. Leave 'Beginning year:' as 'single year.' Click on 'Continue.'
- Select 'Nature of condition' under 'Characteristic Type.' Leave 'Name or description' selected under 'Order.' Click on 'Continue'.
- Select 'Amputations 1311XX' under 'Subcharacteristic.' Leave 'Private industry' selected under 'Ownership.' Click on 'Continue.'
- Review your selections. Select the desired output format – HTML or Excel
  - For Excel, select 'Open' from the pop-up box to view the file. You may get a second pop-up box saying the file is in a different format than specified by the extension, and that you should verify that the file is not corrupted and from a trusted source. Click 'Yes' to open as an Excel file. You will need to change the file type to save it as an Excel file.
- Read across 1st row 'Total' and down 3rd column 'Amputations (code 1311XX)' from the resulting table. This is the number of amputations per 10,000 FTEs.
- Multiply the value of this cell by 10 to get the '**Estimated annual incidence rate of work-related amputations involving days away from work per 100,000 FTEs.**'

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 5: State workers' compensation claims for amputations with lost work time	
Demographic Group:	Workers covered by state workers' compensation system
Numerator:	Amputation cases with lost work-time filed with state workers' compensation system
Denominator:	Estimated number of workers covered by state workers' compensation system for the same calendar year
Measures of Frequency:	Annual number of amputation cases with lost work-time filed with state workers' compensation Annual incidence rate of amputation cases with lost work-time filed with state workers' compensation per 100,000 workers covered by state workers' compensation system
Time Period:	Calendar year
Significance and Background:	In 2014, approximately 4,900 private sector workers in the United States experienced a nonfatal work-related amputation that required days away from work. Eighty-two percent of these workers were male. About 95% involve amputations to the hand (wrist/hand/finger) (BLS, 2015). These injuries may greatly affect a worker's job skills and reduce earnings. Workers' compensation costs in the United States total more than $100 billion per year (Sengupta et al., 2013).
Rationale:	Work-related amputations are preventable, and control of occupational hazards is the most effective means of prevention. Estimating the burden and tracking these injuries can help target prevention programs and activities. Information on reported cases can be used to identify contributory factors and to develop improved or new prevention strategies or regulations to protect workers.
Limitations of Indicator:	Differences in the availability of data (i.e., for lost time cases only versus all medical benefits cases) and eligibility criteria between states indicate that data for this condition should be used to evaluate trends within a state but not to make state-to-state comparisons. Since the adoption of OIICS 2.01 in 2011, the BLS cautions users against directly comparing Event, Source, Secondary Source, Part, and Nature case characteristic codes from 1992-2010 to data from 2011 onward. Information about the original OIICS coding structure as well as the new OIICS 2.01 coding structure is available here: http://www.bls.gov/iif/oshoiics.htm. However, some users may feel that the definitions for Nature of Injury 'Amputations' are similar enough between the coding structures for their needs.
Data Resources:	Workers' compensation system (numerator) National Academy of Social Insurance (NASI) estimate of workers covered by workers' compensation (denominator)

Limitations of Data Resources:	Workers' compensation data are not complete, as the majority of individuals with work-related illnesses and many with work-related injuries do not file for workers' compensation. Workers' compensation claims may be denied. The number of days away from work required before a case is recorded in the workers' compensation system will vary by state. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, railroad or longshore and maritime workers may not be covered by state workers' compensation systems.
HP2020 Objective:	OSH-2
CSTE Positions:	None
Other Available Data:	Age, gender, occupation and industry, type of event and source of injury
Recommendations:	Age, gender, occupation, and industry-specific counts and rates can be used to better define the pattern of occupational injuries/illnesses. Frequency distributions by events and source of injury can highlight important causes.

How-To Guide: Indicator #5

State Workers Compensation Claims for Amputations with Lost Work-Time

5.1 Annual Number of Amputation Cases with Lost Work-time Filed with State Workers' Compensation

Variability in the coding systems used by state workers' compensation (WC) systems precludes a universal method for identifying amputation injuries. Variables within state workers' compensation data systems may be incomplete and are often not subject to quality control. Collaboration with the workers' compensation database manager is essential for completion. Identify the terminology used within the state workers' compensation system for amputation cases with lost work-time; typically, these are considered 'claims.' Ask the database manager what 'claims' are reported for data collection. Some state workers compensation agencies collect only the subset of 'claims' which are legally contested.

The following are tips for constructing the database for analysis:

- Identify cases by date of injury.
  - If date of injury is not available, use the date the claim was filed.
  - If a trend analysis is to be performed for state data, claim filing date is more appropriate to use than claim date of injury.
- Include only filed cases which result in lost workdays or 'time loss.'
- Identify the coding system used for state workers' compensation amputation cases. Common coding systems encountered by states include:
  - American National Standards Institute Z16.2 (ANSI Z16.2) – Nature of Injury Code = 100 'Amputation/Enucleation'
  - Occupational Injury and Illness Classification System (OIICS) – Nature of Injury Code = 031 'Amputation,' or OIICS 2.01 – Nature of Injury Code = 1311 – 'Amputations'
  - National Council on Compensation Insurance, Inc. (NCCI)/Workers' Compensation Insurers Organization – Nature of Injury Code = 02 'Amputation
- Exclude claims that involve the following body parts/regions unlikely to be associated with an amputation: eye, back, chest, abdomen, and body systems (e.g., respiratory system).
- Include claimants of all ages and those with age unknown.
- Include out-of-state residents.
- Recognize and document state workers' compensation laws that may affect state-to-state comparisons.
  - Number of lost workdays for claim to be considered a 'time loss' claim
  - Statute of limitations for work-related injury claim filing
  - Criteria for reporting a claim to state workers' compensation data system
  - Medical care delivery for work-related injury, e.g., physician choice by employee
  - Industries/occupations excluded from mandatory workers' compensation coverage
  - Inclusion or exclusion of claims from self-insured employers in WC data
  - Exclusions by employer size (e.g., exemption of compulsory workers' compensation insurance coverage for small employers)

- This will yield the **'Annual number of amputation cases with lost work-time filed with state workers' compensation.'**

5.2 Annual Incidence Rate of Amputation Cases with Lost Work-time Filed with State Workers'
Compensation per 100,000 Workers Covered by State Workers' Compensation System

a) To obtain the denominator for the rate:

- Go to National Academy of Social Insurance website: http://www.nasi.org/research/workers-compensation
- Click the first report entitled: "Workers' Compensation: Benefits, Coverage, and Costs"
- Click on "download the report" (must have Adobe Acrobat).
- Go to Table 3 titled "Workers' Compensation Covered Workers, by State, <<**YEARS**>> (in thousands)."
- Identify your state for year of interest. Multiply number by 1,000.

b) To calculate the rate:

- Divide the numerator (5.1) by the denominator (5.2a).
- Multiply the result by 100,000 to get the **'Annual incidence rate of amputation cases with lost work-time filed with state workers' compensation per 100,000 workers covered by state workers' compensation system.'**

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 6: Hospitalizations for work-related burns	
Demographic Group:	Employed persons
Numerator:	Inpatient hospital discharges with primary diagnosis of burn injury (ICD-9-CM code 940-949 and (ICD-10-CM code T20-T25, T26-T28, T30-T32) and with primary payer coded as workers' compensation.
Denominator:	Employed population 16 years or older for the same calendar year
Measures of Frequency:	Annual number of work-related burn inpatient hospitalizations for persons age 16 years and older (numerator). Annual rate of work-related burn inpatient hospitalizations per 100,000 employed persons age 16 years or older.
Time Period:	Calendar year
Significance and Background:	Work-related burns are some of the most devastating injuries affecting workers. Although national estimates for the rate of work-related burns are hard to come by, studies in individual states can be instructive. In West Virginia, a study using workers' compensation data estimates that the annual incidence rate of occupational burns was 26.4 per 10, 000 workers, with the highest rate observed in the manufacturing sector for males and in the service sector for females (Islam, 2000). A report from Washington identified 350 workers hospitalized as a result of work-related burns during a five year period (Curwick, 2006). Similarly, a study from Massachusetts found that during a 2-year period, there were 240 work-related burns and young workers and black workers experienced the highest rates of burns, with rates two and for times higher than their older and white counterparts, respectively (Rossignol, 1986). According to data from New England Regional Burn Program, 55 percent of all burns among adults are work-related and the majority of work-related burn injuries were caused by activities to food preparation or consumption, motor vehicle repair and maintenance, and use of flammable liquids. Persons employed as operatives and laborers, or persons employed in the service occupations, appeared to have the highest risk of sustaining a burn injury while at work. (Rossignol, 1989).
Rationale:	Although hospitalized burns are unusual events, they are painful, disabling, and expensive to treat. Many result in significant disfigurement. In addition, burns are the most common cause of work-related hospitalization for young workers.
Limitations of Indicator:	Individuals hospitalized for work-related injuries and illnesses represent less than 10 percent of all workers who receive workers' compensation. 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, railroad or longshore and maritime workers are not covered by state workers' compensation systems. Attribution of payer in hospital discharge may not be accurate. Data between states may not be comparable due to differences in states' workers' compensation programs.

Data Resources:	Inpatient hospital discharge data (numerator) Bureau of Labor Statistics (BLS) Current Population Survey Data (denominator)
Limitation of Data Resources	Work-related burn injuries are experienced by employed individuals less than 16 years old, but corresponding denominator data are not readily available. Practice patterns and payment mechanisms may affect decisions by health care providers to hospitalize patients, to correctly diagnose work-related conditions, and/or to list the condition as a discharge diagnosis. The number of diagnoses listed on discharge summaries may vary by regional practice patterns and by the person completing discharge summaries. Residents of one state may be hospitalized in another state and not be reflected in his/her state's hospitalization data. All admissions are counted, including multiple admissions for a single individual. Until hospital discharge data is available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity is not collected in some states and is incomplete and/or questionable validity in others. Hospital discharge records are only available for non-federal, acute care hospitals.
HP2020 Objectives:	OSH-2
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, and residence zip code
Recommendations:	Age, gender, race/ethnicity, and zip code specific counts and rates can be used to better define the pattern of burns. Can also look at proportion of all burn hospitalizations in the state.

How-To Guide: Indicator #6

Hospitalizations for Work-Related Burns

Note: Effective October 1, 2015 health care organizations and providers were required to start using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). Since 2015 hospitalization data uses both ICD-9-CM and ICD-10-CM, data for 2015 will be submitted by quarter. Total number of hospitalizations will be submitted by quarter and the rate will be calculated for the entire year. If you are unable to submit data by quarter you can submit data for the entire year. Please see the reporting template. Contact Patty Schleiff (pls1@cdc.gov) with questions regarding data submissions for this indicator.

6.1 Annual number of inpatient hospitalizations for work-related burns for persons age 16 years or older

Obtain from State Health Department the following information from the inpatient hospital discharge file.

- Use principle diagnosis from 940 through 949 (ICD-9-CM) for the 1st (1/1/2015-3/31/2015), 2nd (4/1/2015-6/30/2015), and 3rd quarters of 2015 (1/1/2015-9/31/2015).
- Use principle diagnosis T20-T25, T26-T28, T30-T32 (ICD-10-CM) for the 4th quarter of 2015 (10/1/2015-12/31/2015).
- Use only primary payer = Workers' Compensation.
- Limit age to those 16 years and older (age at admission is preferred).
- Select for state of residence = 'your state.'
- Exclude:
  - age unknown
  - out-of-state residents and unknown residents
  - out-of-state inpatient hospitalizations
- Use undeduplicated data (no exclusions for death, readmissions).
- Use discharge during calendar year, not fiscal year.
- Use all cases reported on the discharge file, regardless of length of stay.
- Sequelae and subsequent encounters (codes ending in "D" or "S") for ICD-10-CM codes.
- This will yield the 'Annual number of inpatient hospitalizations for work-related burns.'
- Submit data by quarter and for the total year as indicated on the reporting template.

6.2 Annual rate of inpatient hospitalizations per 100,000 employed persons age 16 years or older

a) To obtain the denominator for the rate:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

b) To calculate the rate:

- To obtain the numerator sum the four quarters from 6.1. Then divide the numerator by the denominator (6.2).
- Multiply this result by 100,000 to get the 'Annual crude rate of work-related burn inpatient hospitalizations per 100,000 employed persons age 16 years or older.'

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 7: Work-related musculoskeletal disorders with days away from work reported by employers	
Demographic Group:	Employed persons in the private sector
Numerator:	1. Estimated cases of all musculoskeletal disorders (MSDs) involving days away from work 2. Estimated cases of MSDs of the upper extremities, neck, and shoulder involving days away from work 3. Estimated cases of carpal tunnel syndrome involving days away from work 4. Estimated cases of MSDs of the back involving days away from work
Denominator:	Estimated full-time equivalents (FTEs) worked for the same calendar year
Measures of Frequency:	Estimated annual number of incident cases Estimated annual incidence rate per 100,000 full-time-equivalents
Time Period:	Calendar year
Significance and Background:	In 2015, about one-third (n=356,910) of all lost workday cases reported by private sector employers in the United States were due to musculoskeletal disorders (MSDs) (https://www.bls.gov/news.release/archives/osh2_11102016.pdf.) This equates to a rate of 298 musculoskeletal disorder cases per 100,000 full-time workers. Forty percent of all MSD cases involved an injury to the back and almost one third (30.4%) involved injury to the upper extremities (BLS, 2016).
Rationale:	Work-related musculoskeletal disorders are preventable and control of occupational hazards is the most effective means of prevention. Estimating the burden and tracking these injuries helps target prevention programs and activities. Information on reported cases can be used to identify contributory factors and develop improved or new prevention strategies or regulations to protect workers.
Limitations of Indicator:	Employers are required to follow OSHA regulations for recording work-related cases of injuries and illnesses. Cases are recordable if they result in death, loss of consciousness, days away from work, restricted work activity or job transfer, or medical treatment beyond first aid. Employers are only required to report the detailed case characteristics (e.g., nature of the disabling condition, body part affected, and event and source producing the condition) when the injury or illness results in at least one day away from work beyond the day of injury or onset of illness. Employers do not always record all relevant events. Also, employers are often unaware of work-related conditions for which employees have obtained medical care from their personal healthcare providers, as well as conditions that have long latencies and develop or worsen long after the workplace exposure. MSD-related cases, for instance, may develop too late for inclusion in the SOII's collection of data or may be reported less frequently to the SOII because of greater difficulty in determining whether or not they are work-related.
Data Resources:	Annual Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII)

Limitations of Data Resources:	The SOII is based on a probability sample of employer establishments, not on a census of all employers. As such, SOII estimates are subject to sampling error. The data are also subject to non-sampling errors such as mistakes in recording or coding the data that are not measured. SOII excludes approximately 14% of the workforce including the military, self-employed individuals, private household workers, workers on farms with 10 or fewer employees, and Federal agencies, because these workers fall outside the scope of the Occupational Health and Safety Act of 1970. Until 2008, SOII also excluded state and municipal workers. Although BLS has produced national estimates for state and local government since 2008, in many states, maintenance of logs of OSHA recordable injuries and illnesses by these agencies is voluntary. Therefore, generation of this indicator is limited to private sector workforce only. Some states do not participate in this Federal-State survey, and in some participating states, the sample sizes are insufficient to generate state-specific estimates. BLS does not publish rates less than .05 per 10,000 full-time equivalent workers in the case and demographics system. The SOII relies on employer reports of injuries and illnesses and is therefore subject to both willful and unintentional underreporting of cases or case details. Employers may place affected workers on restricted work activity, thereby avoiding the reporting of these cases as lost workday cases (which require reporting of additional details). In addition, the SOII only collects data for the incident year, and does not capture lost work-time that may carry over to a new calendar year. For example, a debilitating injury that occurs on the last day of the calendar year will have no lost work-time associated with it in the SOII. Changes to OSHA reporting regulations for employers went into effect as of January 1, 2015, impacting SOII data starting in 2015.
HP2020 Objectives:	OSH-3
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, occupation, industry, type of event, body part affected an nature/source of injury (Details are available only for injuries/illnesses involving days away from work).
Recommendations	States can examine work-related MSDs by industry, age, gender, occupation (counts by body part affected, and nature/source of injury/illness (counts only).

How-To Guide: Indicator #7

Work-Related Musculoskeletal Disorders with Days Away From Work Reported By Employers

***NOTE**: The definition of musculoskeletal disorders (MSDs) involving days away from work used by BLS has changed over time. An early definition included all cases of overexertion and repetitive motion (OIICS event codes 220-239). The definition used from 2000 – 2010 added nature codes as well as an additional event code. In 2011, BLS adopted a new version of the Occupational Injury and Illness Classification System (OIICS v. 2.01) which affected the numbering and hierarchical ordering of codes and resulted in another modification to the MSD definition (see table below). Because of this change in the MSD definition, BLS suggests that estimates for MSD case counts and rates for 2011 should not be compared with prior years (e.g. BLS has designated a 'break in series' starting with the 2011 data). However, data users may decide that the MSD definitions (listed in the table below) are similar enough for analyzing trends in counts and/or rates over time (e.g. 2000 – 2011). For more detailed descriptions of the Nature and Event codes listed below, refer to the OIICS 1.01 coding structure (http://www.bls.gov/iif/oiics_manual_2007.pdf) and the new 2.01 version (http://www.bls.gov/iif/oiics_manual_2010.pdf).*

BLS MSD Definition (prior to 2011), based on OIICS v. 1.01	**BLS MSD Definition (2011 - forward), based on OIICS v. 2.01**
One of the following Nature codes	
021 Sprains, sprains, tears	123* Sprains, sprains, tears
1241 Carpal tunnel syndrome	2241 Carpal tunnel syndrome
153 Hernia	124, 253 Hernia (traumatic and non-traumatic)
17* Musculoskeletal system and connective tissue diseases and disorders	27* Musculoskeletal system and connective tissue diseases and disorders
0972 Back pain hurt back	1972 Soreness, pain, hurt—nonspecified injury
0973 Soreness, pain, hurt, except back	1973 Swelling, inflammation, irritation—nonspecified injury
	1974 Numbness—nonspecified injury
	1131 Pinched nerve
	1211 Herniated disk
	1221 Meniscus tear
	2244 Tarsal tunnel syndrome
	2371 Raynaud's syndrome or phenomenon
AND, one of the following event codes	
211 Bodily reaction/bending, climbing, crawling, reaching, twisting	70 Overexertion and bodily reaction, unspecified
22 Overexertion	71* Overexertion involving outside sources
23 Repetition	72* Repetitive motion involving microtasks
	73*, 78 Other and multiple exertions or bodily reactions
	67* Rubbed, abraded or jarred by vibration

* Denotes all codes that fall in specified 2- or 3-digit series.

7.1 Estimated Annual Number of All Musculoskeletal Disorders Involving Days Away from Work

7.1a. To obtain the 2000 – 2016 data, do the following:

- Go to BLS website: http://www.bls.gov/iif/msd_state.htm
- Scroll down the page to the state of interest
- Under each state are two rows followed by available data by year. The first row is MSD cases by NATURE of injury or illness; the second row is MSD cases by BODY PART affected.

NOTE: *There is an alternate way to get MSD numbers and incidence rates querying the BLS profiles on the Web. Please refer to 7.9 and 7.10 below.*

7.1b Click on year of interest under row one (NATURE).

- From the Nature Table, read across the row ('Total Private Industry' and 'All Selected Natures') under the column 'Total Cases' or 'Number [of Cases]' to obtain the '**Annual number of all musculoskeletal disorders involving days away from work.'**

NOTE*: Beginning in 2003, Nature and Body Part Tables displayed MSD cases by ownership (private industry, local government, state government) in states where the BLS SOII covers these workers. This indicator is limited to private industry employees*.

7.2 Estimated Annual Incidence Rate of All Musculoskeletal Disorders Involving Days Away from Work per 100,000 FTE

7.2a From the Nature Table, read across the row ('Total Private Industry' and 'All Selected Natures') – under the column – 'Incidence Rate.'

7.2b Multiply by 10 to obtain the **"Estimated annual incidence rate of all musculoskeletal disorders involving days away from work per 100,000 FTE."**

NOTE*: Beginning in 2003, Nature and Body Part Tables displayed MSD cases by ownership (private industry, local government, state government) in states where the BLS SOII covers these workers. This indicator is limited to private industry employees.*

7.3 Estimated Annual Number of Musculoskeletal Disorders of the Neck, Shoulder, and Upper Extremities Involving Days Away from Work

7.3a Follow directions for 7.1a.

7.3b Click on year of interest under row two (BODY PART).

- From the Body Part Table, **sum** the 'Total Cases' or 'Number [of Cases]' for the following two 'Private Industry' rows: '**Neck, including throat'** AND '**Upper extremities'** to obtain the **'Estimated annual number of musculoskeletal disorders of the neck, shoulder and upper extremities involving days away from work.'** (FOR 2000 – 2010 data, also include 'Shoulder-including clavicle – scapula' cases to the sum of 7.3b).

NOTE*: Beginning in 2003, Nature and Body Part Tables displayed MSD cases by ownership (private industry, local government, state government) in states where the BLS SOII covers these workers. This indicator is limited to private industry employees.*

7.4 <u>Estimated Annual Incidence Rate of Musculoskeletal Disorders of Neck, Shoulder, and Upper Extremities Involving Days Away from Work per 100,000 FTE</u>

7.4a From the Body Part Table, **sum** the 'Incidence Rates' for the following two 'Private Industry' rows: **'Neck, including throat'** AND **'Upper extremities.'**

(FOR 2000 – 2010 data, also include the incidence rate for 'Shoulder-including clavicle – scapula' cases to the sum of 7.4a).

7.4b Multiply the sum by 10 to obtain the **'Annual incidence rate of musculoskeletal disorders of the neck, shoulder and upper extremities involving days away from work per 100,000 FTE.'**

***NOTE**: Beginning in 2003, Nature and Body Part Tables displayed MSD cases by ownership (private industry, local government, state government) in states where the BLS SOII covers these workers. This indicator is limited to private industry employees.*

7.5 <u>Estimated Annual Number of Carpal Tunnel Syndrome Cases Involving Days Away from Work</u>

7.5a Follow directions for 7.1a.

7.5b Click on year of interest under row one (NATURE).

- From the Nature Table, read across the row ('Private Industry' and 'Carpal Tunnel Syndrome,' under the column – 'Total Cases' or 'Number [of Cases]' to obtain the **'Estimated annual number of carpal tunnel syndrome cases involving days away from work.'**

7.6 <u>Estimated Annual Incidence Rate of Carpal Tunnel Syndrome Cases Involving Days Away from Work per 100,000 FTE</u>

7.6a From the Nature Table, read across the row ('Private Industry' and 'Carpal Tunnel Syndrome'), under the column – 'Incidence Rate' to obtain the number.

7.6b Multiply the number by 10 to get the **'Estimated annual incidence rate of carpal tunnel syndrome cases involving days away from work per 100,000 FTE.'**

7.7 <u>Estimated Annual Number of Musculoskeletal Disorders of the Back Involving Days Away from Work</u>

7.7a Follow directions for 7.1a.

7.7b Click on year of interest under row two (BODY PART).

- From Body Part Table, read across the row ('Private Industry' and 'Back, including spine, spinal cord,' under the column – 'Total Cases' to obtain the **'Estimated annual number of musculoskeletal disorders of the back involving days away from work.'**

7.8 <u>Estimated Annual Incidence Rate of Musculoskeletal Disorders of the Back Involving Days Away from Work per 100,000 FTE</u>

7.8a From the Body Part Table, read across the row, ('Private Industry' and 'Back, including spine, spinal cord' under the column – 'Incidence rate' to obtain the number.

7.8b Multiply the number by 10 to get the **'Estimated annual incidence rate of musculoskeletal disorders of the back involving days away from work per 100,000 FTE.'**

7.9 ALTERNATIVE METHOD for Estimating Annual Number of All Musculoskeletal Disorders Involving Days Away from Work at both the U.S. and state level **** FOR 7.1, 7.3, 7.5, & 7.7 ****

1) Go to BLS website www.bls.gov/iif/data.htm
2) Under row labeled "Non-fatal Cases Involving Days Away from Work: selected characteristics (2011 forward)," **select the multi-screen option which is yellow.**
3) Select your State and select 'Next Form**.'**
4) Select **'Private Industry'** and select 'Next Form**.'**
5) Select **'Injury and Illness Cases'** and select 'Next Form**.'**
6) Select **'M Industry Division or Selected Characteristic by Special Combination'** and select 'Next Form.'
7) Depressing the CTRL key, select the following: **'00X All Industry,' 'P2X Part (Neck),' 'P4X Part (Upper Extremities),' 'N3A Nature (Carpal Tunnel Syndrome),' 'P32 Part (Back).'** Select 'Next Form.'
(FOR 2000 – 2010 data, also include 'Shoulder-including clavicle – scapula').
8) Select **'MSDXXX Musculoskeletal Disorders.'** Select 'Next Form.'
9) Select Retrieve Data.
10) Review the tables displayed.

7.1 Estimated Annual Number of All Musculoskeletal Disorders Involving Days Away from Work – Read annual number from the **'All Industry'** table.

7.3 Estimated Annual Number of Musculoskeletal Disorders of the Neck, Shoulder, and Upper Extremities Involving Days Away from Work – Sum annual numbers from the following tables: **'Part - Neck'** and **'Part - Upper Extremities.'**
(FOR 2000 – 2010 data, also add 'Shoulder-including clavicle – scapula' cases to the sum of 7.3.)

7.5 Estimated Annual Number of Carpal Tunnel Syndrome Cases Involving Days Away from Work – Read annual number from the ***'Nature - Carpal Tunnel Syndrome'*** table.

7.7 Estimated Annual Number of Musculoskeletal Disorders of the Back Involving Days Away from Work – Read annual number from the '***Part -Back'*** table.

7.10 ALTERNATIVE METHOD for Estimating Annual Incidence Rate of All Musculoskeletal Disorders Involving Days Away from Work per 100,000 FTE – at both the U.S. and state level
**** FOR 7.2, 7.4, 7.6, & 7.8 ****

1) Go to BLS website www.bls.gov/iif/data.htm.
2) Under row labeled "Non-fatal Cases Involving Days Away from Work: selected characteristics (2011 forward)," **select the multi-screen option which is yellow.**
3) Select your State and select 'Next Form**.'**
4) Select **'Private Industry'** and select 'Next Form**.'**
5) Select **'Injury and Illness Rate per 10,000 full-time Workers' and** select 'Next Form.'
6) Select **'M Industry Division or Selected Characteristic by Special Combination'** and select 'Next Form.'

7) Depressing the CTRL key, select the following: **'00X All Industry,' 'P2X Part (Neck),' 'P4X Part (Upper Extremities),' 'N3A Nature (Carpal Tunnel Syndrome),' 'P32 Part (Back).''** Select 'Next Form.'
8) Select **'MSDXXX Musculoskeletal Disorders.'** Select Next Form.
9) Select Retrieve Data.
10) Review the tables displayed.

7.2 Estimated Annual Incidence Rate of All Musculoskeletal Disorders Involving Days Away from Work per 100,000 FTE – Read Rate from the **'All Industry'** table and multiply by 10 to obtain **the Estimated Annual Incidence Rate of All Musculoskeletal Disorders Involving Days Away from Work per 100,000 FTE**.

7.4 Estimated Annual Incidence Rate of Musculoskeletal Disorders of the Neck, Shoulder, and Upper Extremities Involving Days Away from Work per 100,000 FTE – Sum Rates from the **'Part – Neck,'** and **'Part – Upper Extremities'** tables. (FOR 2000 – 2010 data, also include the incidence rate for 'Shoulder-including clavicle – scapula' cases to the sum of 7.4.)

Multiply the resulting sum by 10 to obtain the **Estimated Annual Incidence Rate of Musculoskeletal Disorders of the Neck, Shoulder, and Upper Extremities Involving Days Away from Work per 100,000 FTE.**

7.6 Estimated Annual Incidence Rate of Carpal Tunnel Syndrome Cases Involving Days Away from Work per 100,000 FTE – Read Rate from the ***'Nature – Carpal Tunnel Syndrome'*** table and multiply by 10 to obtain the **Estimated Annual Incidence Rate of Carpal Tunnel Syndrome Cases Involving Days Away from Work per 100,000 FTE**.

7.8 Estimated Annual Incidence Rate of Musculoskeletal Disorders of the Back Involving Days Away from Work per 100,000 FTE – Read Rate from the ***'Part – Back' table*** and multiply by 10 to obtain the **Estimated Annual Incidence Rate of Musculoskeletal Disorders of the Back Involving Days Away from Work per 100,000 FTE**.

TOPIC: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES INDICATOR # 8: State workers' compensation claims for Carpal Tunnel Syndrome with lost work time	
Demographic Group:	Workers covered by state workers' compensation
Numerator:	Carpal tunnel syndrome cases with lost work-time filed with state workers' compensation system
Denominator:	Estimated number of workers covered by state workers' compensation system for the same calendar year
Measures of Frequency:	Annual number of carpal tunnel syndrome cases with lost work-time filed with state workers' compensation Annual incidence rate of carpal tunnel syndrome cases with lost work-time filed with state workers' compensation per 100,000 workers covered by state workers' compensation system
Time Period:	Calendar year
Significance and Background:	In 2014, 7,970 cases of carpal tunnel syndrome that resulted in days away from work were reported by private sector employers in the United States. The median number of days away from work was 30 days. The Bureau Labor Statistics (BLS) estimated an annual incidence rate for carpal tunnel syndrome of 0.7 per 10,000 full-time equivalents (FTEs) in the private sector (BLS, 2015). Workers' compensation costs in the United States total more than $100 billion per year (Sengupta et al., 2013).
Rationale:	Carpal tunnel syndrome is preventable, and control of occupational hazards is the most effective means of prevention. Estimating the burden and tracking carpal tunnel syndrome can help target prevention programs and activities. Information on reported cases can be used to identify contributory factors and to develop improved or new prevention strategies or regulations to protect workers.
Limitations of Indicator:	Differences in the availability of data (i.e., for lost time cases only versus medical benefits cases) and eligibility criteria between states indicate that data for this condition should be used to evaluate trends within a state but not to make state-to-state comparisons.
Data Resources:	Workers' compensation system (numerator) National Academy of Social Insurance (NASI) estimate of workers covered by workers' compensation (denominator)
Limitations of Data Resources:	Workers' compensation data are not complete, as the majority of individuals with work-related illnesses and many with work-related injuries do not file for workers' compensation. Workers' compensation claims may be denied. The number of days away from work required before a case is recorded in the workers' compensation system will vary by state. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, railroad or longshore and maritime workers may not be covered by state workers' compensation systems.
HP2020 Objectives:	OSH-3
CSTE Positions:	None

Other Available Data:	Age, gender, occupation and industry, type of event and source of injury
Recommendations:	Age, gender, occupation, and industry-specific counts and rates can be used to better define the pattern of occupational injuries/illnesses. Frequency distributions by events and source of injury can highlight important causes.

How-To Guide: Indicator #8

State Workers Compensation Claims for Carpal Tunnel Syndrome With Lost Work-Time

8.1 Annual Number of Carpal Tunnel Syndrome Cases with Lost Work-time Filed with State Workers' Compensation

Variability in the coding systems used by state workers' compensation systems precludes a universal method for identifying carpal tunnel syndrome cases. Variables within state workers' compensation data systems may be incomplete and are often not subject to quality control. Collaboration with the workers' compensation database manager is essential for completion. Identify the terminology used within the state workers' compensation system for carpal tunnel syndrome cases with lost work-time; typically, these are considered 'claims.' Ask the database manager what 'claims' are reported for data collection. Some state workers' compensation agencies collect only the subset of 'claims' which are legally contested.

> ***NOTE:*** *Since the adoption of OIICS 2.01, the BLS cautions users against directly comparing Event, Source, Secondary Source, Part, and Nature case characteristic codes from 1992-2010 to data from 2011 onward. Information about the original OIICS coding structure as well as the new OIICS 2.01 coding structure is available here: http://www.bls.gov/iif/oshoiics.htm. However, some users may feel that the definitions for Nature of Injury 'Carpal Tunnel Syndrome' are similar enough between the coding structures for their needs.*

The following are tips for constructing the database for analysis:

- Identify cases by date of injury.
  - If date of injury is not available, use date claim was filed.
  - If a trend analysis is to be performed for state data, claim filing date is more appropriate to use than claim date of injury.
- Include only cases which result in lost workdays or 'time loss.'
- Identify the coding system used for state workers' compensation carpal tunnel syndrome cases. Common coding systems encountered by states include:
  - American National Standards Institute Z16.2 (ANSI Z16.2) – Nature of Injury Code = 562 'Nerve Disorder' combined with Type of Injury Code = 12* 'Overexertion' and Body Part Code = 320 'Wrist'
  - Occupational Injury and Illness Classification System (OIICS) – Nature of Injury Code = 1241 'Carpal Tunnel Syndrome,' or OIICS 2.01 = 2241 'Carpal Tunnel Syndrome'
  - International Classification of Diseases – 9th Revision Clinical Modification – ICD-9-CM Codes = 354.0 'Carpal tunnel syndrome' and/or ICD-9-CPT code = 64721 'Neuroplasty; median nerve at carpal tunnel'
  - National Council on Compensation Insurance, Inc. (NCCI)/Workers' Compensation Insurers Organization – Nature of Injury Code = 78 'Carpal Tunnel Syndrome.'
- Include claimants of all ages and those with age unknown.
- Include out-of-state residents.

- Recognize and document state workers' compensation laws that may affect state-to-state comparisons.
  - Number of lost workdays for claim to be considered a 'time loss' claim.
  - Statute of limitations for work-related disease claim filing.
  - Criteria for reporting a claim to state workers' compensation data system.
  - Medical care delivery for a work-related disease (e.g., physician choice by worker).
  - Industries poorly represented in state's workers' compensation data (e.g. agriculture).
  - Inclusion or exclusion of claims from self-insured employers in WC database.
  - Industries/occupations excluded from mandatory workers' compensation coverage.
  - Exclusions by employer size (e.g. exemption of compulsory workers' compensation insurance coverage for small employers).
- This will yield the **'Annual number of carpal tunnel syndrome cases with lost work-time filed with state workers' compensation.'**

8.2 Annual Incidence Rate of Carpal Tunnel Syndrome Cases with Lost Work-time Filed with State Workers' Compensation per 100,000 Workers Covered by State Workers' Compensation System

a) To obtain the denominator for the rate:
- Go to National Academy of Social Insurance web site: http://www.nasi.org/research/workers-compensation
- Click on the report entitled: "Workers' Compensation: Benefits, Coverage, and Costs."
- Click on "Download the report" (must have Adobe Acrobat).
- Go to Table 3 titled "Workers' Compensation Covered Workers, by State, <<**YEARS**>> (in thousands)."
- Identify your state for year of interest. Multiply by 1,000.

b) To calculate the rate:
- Divide the numerator (8.1) by the denominator (8.2a).
- Multiply the result by 100,000 to get the **'Annual incidence rate of carpal tunnel syndrome cases with lost work-time filed with state workers' compensation per 100,000 workers covered by state workers' compensation system.'**

TOPIC: OCCUPATIONAL ILLNESSES INDICATOR # 9: Hospitalizations from or with pneumoconiosis	
Demographic Group:	Resident persons age 15 years or older
Numerator:	1. Inpatient hospital discharges with a primary or contributing diagnosis of "total pneumoconiosis" (ICD-9-CM code 500-505 and ICD-10-CM code for J60-J66). 2. Inpatient hospital discharges with a primary or contributing diagnosis of "coal workers' pneumoconiosis" (ICD-9-CM code 500 and ICD-10-CM code J60). 3. Inpatient hospital discharges with a primary or contributing diagnosis of "asbestosis" (ICD-9-CM code 501 and ICD-10-CM code J61). 4. Inpatient hospital discharges with a primary or contributing diagnosis of "silicosis" (ICD-9-CM code 502 and ICD-10-CM J62). 5. Inpatient hospital discharges with a primary or contributing diagnosis of "other or unspecified pneumoconiosis" (ICD-9-CM code 503-505 and ICD-10-CM code J63-J66).
Denominator:	Midyear resident population age 15 years or older for the same calendar year
Measures of Frequency:	Annual number of inpatient hospitalizations for persons age 15 years or older (numerator) Annual rate of inpatient hospitalizations per million residents Annual, age-standardized, rate of inpatient hospitalization (standardized by the direct method to the Year 2000 U.S. standard population)
Time Period:	Calendar year
Significance and Background:	Nearly all pneumoconioses are attributable to occupational exposures, and millions of workers are at risk. Common types include asbestosis, coal workers' pneumoconiosis, and silicosis. Complications of various pneumoconioses and other conditions associated with exposure to the same dusts that cause pneumoconiosis include respiratory infections (including tuberculosis), chronic bronchitis, emphysema, lung cancer, pleuritis, progressive systematic sclerosis, renal disease, and respiratory failure.
Rationale:	Pneumoconiosis frequency varies geographically being largely determined by local industrial activities and migration of affected individuals. Control of occupational dust exposure is the single most effective means of preventing pneumoconiosis. Tracking of pneumoconiosis is essential for measuring progress towards elimination of the disease, as well as for targeting prevention and disease management programs.
Limitations of Indicator:	Because pneumoconioses are typically diseases of long latency, current incidence is not necessarily indicative of current exposure, and it may be many years before reductions in occupational exposures affect the number of hospitalizations.
Data Resources:	Inpatient hospital discharge data (numerator) State population estimates from the Bureau of the Census (denominator) Year 2000 U.S. Standard population (for age-standardization)

Limitation of Data Resources:	The number of diagnoses listed on discharge summaries may vary by regional practice patterns and by the persons completing the summaries. Practice patterns and payment mechanisms may affect decisions by health care providers to hospitalize patients, to diagnose pneumoconiosis, and/or to list pneumoconiosis as a discharge diagnosis. Residents of one state may be hospitalized in another state and not be reflected in his/her state's inpatient hospitalization data. All admissions are counted, including multiple admissions for a single individual. Until inpatient hospital discharge data is available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity are not collected in some states and are incomplete and/or of questionable validity in others. Hospital discharge records are only available for non-federal, acute care hospitals.
HP2020 Objectives:	OSH-4
CSTE Positions:	1996-Env-02; 1999-ENV-04
Other Available Data:	Age, gender, race/ethnicity, residence zip code, payer code
Recommendations:	Age, gender, race/ethnicity, and zip code-specific counts and rates can be used to better define the pattern of hospitalizations. Information on the payer can be used to provide insight on utilization of workers compensation benefits.

How-To Guide: Indicator #9

Hospitalizations From Or With Pneumoconiosis

Note: Effective October 1, 2015 health care organizations and providers were required to start using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). Since 2015 hospitalization data uses both ICD-9-CM and ICD-10-CM, data for 2015 will be submitted by quarter. Total number of hospitalizations will be submitted by quarter and the rate will be calculated for the entire year. If you are unable to submit data by quarter you can submit data for the entire year. Please see the reporting template. Contact Patty Schleiff (pls1@cdc.gov) with questions regarding data submissions for this indicator.

9.1 Inpatient hospital discharges with a primary or contributing diagnosis of ICD-9-CM code **500-505 ("total pneumoconiosis")** or ICD-10-CM code **J60-J66 ("total pneumoconiosis")**

9.1.1 Annual number of inpatient hospital discharges

Obtain from the State Health Department the number of cases meeting the following criteria from the inpatient hospital discharge file:

- Any diagnosis from 500 through 505 (ICD-9-CM) for the 1st (1/1/2015-3/31/2015), 2nd (4/1/2015-6/30/2015), and 3rd (7/1/2015-9/31/2015) quarters of 2015.
- Any diagnosis from J60 through J66 (ICD-10-CM) for the 4th quarter (10/1/2015-12/31/2015) of 2015.
- Limit age to those 15 years and older (age at admission is preferred).
- Select for state of residence='*your state'*.
- Exclude:
  - age unknown
  - out-of-state residents
  - unknown state of residence
  - out-of-state inpatient hospitalizations
- Use undeduplicated data (no exclusions for deaths, readmissions).
  - Use discharge during calendar year, not fiscal year.
- For each of these categories, obtain the number of inpatient hospitalizations for each of the following age groups: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over.
- This will yield the **'Annual number of total pneumoconiosis inpatient hospitalizations for persons age 15 years of age and older.'**
- Submit data by quarter and for the total year as indicated on the reporting template.

NOTE: *If less than 5 events, the number may be too small to produce reliable estimates or may violate confidentiality requirements. Rates should not be calculated.*

9.1.2 Annual rate of inpatient hospitalization per million residents

a) To obtain the denominator for the rate:
Go to the **American Fact Finder** webpage at:
http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml?_ts=440355717799

- Click on "Advanced Search" at the top of the page. (If you click on "Advanced Search" towards the middle of the page you must click on "Show Me All".

- For Step 1, enter the following in the box titled 'topic or table name': PEPAGESEX. Enter your state name in the box titled 'state, county or place (optional).' After you enter your state, click on your state name again in the screen that pops up. Click on 'Go.'
- You should now see a list of tables entitled "Annual estimates of the resident population for selected age groups by sex for the US states, counties, and Puerto Rico…"
  - Look for the column 'DATASET' at the top of the list of tables and check the box in the row that corresponds to '2015 Population Estimates'. Click on 'VIEW.'
- After table appears, click 'DOWNLOAD.' A pop-up window will appear asking if you want to use or view the data. Click **VIEW** the data (this will also enable you to download the table). Select Microsoft Excel (.xls) as the presentation format, then click OK.
- Once the next pop-up box indicates that your file is complete, click DOWNLOAD. You can then open the table in Excel.
- Use the figures under Both Sexes for 2015 to calculate the number of residents ages 15 and older and to populate the Excel spreadsheet you will use to perform age adjusting.

b) To calculate the crude inpatient hospitalization rate:

- Divide the total number of inpatient hospitalizations (sum four quarters from 9.1.1) by the denominator for all age groups (9.1.2a).
- Multiply this result by 1,000,000 to yield the **'Annual rate of total pneumoconiosis inpatient hospitalizations per million residents.'**

9.1.3 Annual, age-standardized, rate of inpatient hospitalization per million residents

- Note: Age-standardized rate will be calculated for the entire year, not by quarter.
- Use the US 2000 Standard population (provided in column E in table below) found at: http://www.cdc.gov/nchs/data/statnt/statnt20.pdf
  - Use table below to perform the calculations. A spreadsheet such as Excel works well for these calculations.
  - In Column C (State Pop), enter the state's census population (found using population data referenced in 9.1.2) by age group for the relevant year (e.g., population estimates for 2015 if generating rates for 2015).
  - In Column B (# Inpatient Hospitalizations), enter number of inpatient hospitalizations obtained in 9.1.1, by age group for all pneumoconioses.
- Column D = Column B / Column C
  (Inpatient Hospitalizations/Pop) = (# Inpatient Hospitalizations) / (State Pop)
- Column F = Column D * Column E
  (# Expected Inpatient Hospitalizations) = (Inpatient Hospitalizations/Pop) * (US 2000 Standard Pop)
- The **'Annual age-adjusted total pneumoconiosis inpatient hospitalization rate per million' residents'= (F10 / E10) * 1,000,000**
  (The sum (Σ) of all expected total pneumoconiosis inpatient hospitalizations) / (the sum of US 2000 Standard Pop) multiplied by 1,000,000

		Column B	Column C	Column D	Column E	Column F
		State Resident Inpatient Hospitalizations, age 15 and older, [year]				
	Age Group	# Inpatient Hospitalizations	[year] State Pop	Inpatient Hospitalizations/Pop	US 2000 Std Pop	# Expected Inpatient Hospitalizations
2	15-24			B2/C2	38,077,000	D2*E2
3	25-34			B3/C3	37,233,000	D3*E3
4	35-44			B4/C4	44,659,000	D4*E4
5	45-54			B5/C5	37,030,000	D5*E5
6	55-64			B6/C6	23,961,000	D6*E6
7	65-74			B7/C7	18,136,000	D7*E7
8	75-84			B8/C8	12,315,000	D8*E8
9	85+			B9/C9	4,259,000	D9*E9
19	Total				**215,670,000**	**Σ(F2:F9)**

9.2 Inpatient hospital discharges with a primary or contributing diagnosis of ICD-9 code 500 ("Coal Workers' Pneumoconiosis)

9.2.1 Annual number of coal workers' pneumoconiosis inpatient hospital discharges

- To obtain counts for the first three quarters of 2015, follow directions for 9.1.1 using any diagnosis = '500' (ICD-9-CM).
- To obtain counts for the 4th quarter of 2015, follow the directions for 9.1.1 using any diagnosis = J60 (ICD-10-CM).
- The sum of cases from Q1, Q2, Q3, and Q4 should be used to calculate the rate of hospitalizations per million residents (below, step 9.2.2).

NOTE: *If less than 5 events, the number may be too small to produce reliable estimates or may violate confidentiality requirements. Rates should not be calculated.*

9.2.2 Annual rate of coal workers' pneumoconiosis inpatient hospitalizations per million residents

a) To obtain the denominator for the rate:

- Follow directions for 9.1.2a.

b) To calculate the crude inpatient hospitalization rate:

- Divide the sum of all ages (numerator 9.2.1) by the denominator (9.2.2a).
- Multiply this result by 1,000,000 to yield the **'Annual rate of coal workers' pneumoconiosis inpatient hospitalizations per million residents.'**

9.2.3 Annual, age-standardized, rate of inpatient hospitalization per million residents

- Follow directions for 9.1.3 using inpatient hospitalizations from 9.2.1.

9.3 Inpatient hospital discharges with a primary or contributing diagnosis of ICD-9 code 501 ("Asbestosis")

9.3.1 Annual number of asbestosis inpatient hospital discharges

- To obtain counts for the first three quarters of 2015, follow directions for 9.1.1 using any diagnosis = '501' (ICD-9-CM)
- To obtain counts for the 4th quarter of 2015, follow the directions for 9.1.1 using any diagnosis = J61 (ICD-10-CM)
- The sum of cases Q1, Q2, Q3, and Q4 should be used to calculate the rate of asbestosis hospitalizations per million residents (below, step 9.3.2)

NOTE: *If less than 5 events, the number may be too small to produce reliable estimates or may violate confidentiality requirements. Rates should not be calculated.*

9.3.2 Annual rate of asbestosis inpatient hospitalizations per million residents

a) To obtain the denominator for the rate:
- Follow directions for 9.1.2a.

b) To calculate the crude inpatient hospitalization rate:
- Divide the sum of all ages (numerator 9.3.1) by the denominator (9.3.2a).
- Multiply this result by 1,000,000 to yield the **'Annual rate of asbestosis inpatient hospitalizations per million residents.'**

9.3.3 Annual, age-standardized, rate of asbestosis inpatient hospitalizations per million residents

- Follow directions for 9.1.3 using inpatient hospitalizations from 9.3.1.

9.4 Inpatient hospital discharges with a primary or contributing diagnosis of ICD-9 code 502 ("Silicosis")

9.4.1 Annual number of silicosis inpatient hospital discharges

- To obtain counts for the first three quarters of 2015, follow directions for 9.1.1 using any diagnosis = '502' (ICD-9-CM)
- To obtain counts for 4th quarter of 2015 follow the directions for 9.1.1 using any diagnosis = J62 (ICD-10-CM)
- The sum cases from Q1, Q2, Q3, and Q4 should be used to calculate the rate of silicosis hospitalizations per million residents (below, step 9.4.2).

NOTE: *If less than 5 events, the number may be too small to produce reliable estimates or may violate confidentiality requirements. Rates should not be calculated.*

9.4.2 Annual rate of silicosis inpatient hospitalizations per million residents

a) To obtain the denominator for the rate:
- Follow directions for 9.1.2a.

b) To calculate the crude inpatient hospitalization rate: Divide the sum of all ages (numerator 9.4.1) by the denominator (9.4.2a).
- Multiply this result by 1,000,000 to yield the **'Annual rate of silicosis inpatient hospitalizations per million residents.'**

9.4.3 Annual, age-standardized, rate of silicosis inpatient hospitalizations per million residents

- Follow directions for 9.1.3 using inpatient hospitalizations from 9.4.1.

9.5 Inpatient hospital discharges with a primary or contributing diagnosis of ICD-9 code 503, 504 or 505 ("Other and Unspecified Pneumoconiosis")

9.5.1 Annual number of other and unspecified pneumoconiosis inpatient hospital discharges

- To obtain counts for the first three quarters of 2015, follow directions for 9.1.1 using any diagnosis = '503', '504' or '505' (ICD-9-CM)
- To obtain counts for the 4th quarter of 2015, follow the directions for 9.1.1 using any diagnosis = 'J63,' 'J64,' 'J65,' or 'J66.'
- The sum of cases from Q1, Q2, Q3, and Q4 should be used to calculate the rate of hospitalizations for 'other and unspecified pneumoconiosis' (below, step 9.5.2).

9.5.2 Annual rate of other and unspecified pneumoconiosis inpatient hospitalizations per million residents

a) To obtain the denominator for the rate:

- Follow directions for 9.1.2a.

b) To calculate the crude inpatient hospitalization rate:

- Divide the sum of all ages (numerator 9.5.1) by the denominator (9.5.2a).
- Multiply this result by 1,000,000 to yield the **'Annual rate of other and unspecified pneumoconiosis inpatient hospitalizations per million residents.'**

9.5.3 Annual, age-standardized, rate of other and unspecified inpatient hospitalizations per million residents

- Follow directions for 9.1.3 using inpatient hospitalizations from 9.5.1.

NOTE: *The sum of 9.2.1, 9.3.1, 9.4.1 and 9.5.1 may be more than 9.1.1 because cases could be hospitalized with more than one type of pneumoconiosis.*

TOPIC: OCCUPATIONAL ILLNESSES INDICATOR # 10: Mortality from or with pneumoconiosis	
Demographic Group:	Resident persons age 15 years or older
Numerator:	1. Deaths with ICD-10 code of J60-J66 (ICD-9 code 500-505) as the underlying or contributing cause of death ("total pneumoconiosis") 2. Deaths with ICD-10 code of J60 (ICD-9 code 500) as the underlying or contributing cause of death ("coal workers' pneumoconiosis") 3. Deaths with ICD-10 code of J61 (ICD-9 code 501) as the underlying or contributing cause of death ("asbestosis") 4. Deaths with ICD-10 code of J62 (ICD-9 code 502) as the underlying or contributing cause of death ("silicosis") 5. Deaths with ICD-10 code in the range J63 – J66 (ICD-9 code range 503 – 505) ("other and unspecified pneumoconiosis")
Denominator:	Midyear resident population age 15 years or older for the same calendar year
Measures of Frequency:	Annual number of deaths (numerator) Annual death rate (deaths per million residents) Annual age-standardized death rate (standardized by the direct method to the Year 2000 U.S. Standard population) (deaths per million residents)
Time Period:	Calendar year
Significance and Background:	Nearly all pneumoconioses are attributable to occupational exposure, and millions of workers are at risk. Common types include asbestosis, coal workers' pneumoconiosis, and silicosis. Pneumoconiosis is more commonly listed as a contributing cause of death than as the underlying cause of death. Consequently, this indicator monitors all listed causes of death on the death certificate.
Rationale:	Pneumoconiosis frequency varies geographically being largely determined by local industrial activities and migration of affected individuals. Control of occupational dust exposure is the single most effective means of preventing pneumoconiosis. Tracking of pneumoconiosis is essential for tracking progress towards elimination of the disease, as well as for targeting prevention and disease management programs.
Limitations of Indicator:	Because pneumoconioses are typically chronic diseases with a long latency (pre-clinical period), current incidence is not necessarily indicative of current exposures, and it may be several years before reductions in exposures affect mortality. State of residence of the decedent may not have been the state of exposure.
Data Resources:	Death certificate records from vital statistics agency (numerator) State population estimates from the U.S. Bureau of the Census (denominator) Year 2000 U.S. Standard Population (for age-standardization)
Limitations of Data Resources:	Causes of death listed on the death certificate and coding of those causes may be inaccurate. The number of contributing cases of death listed on the death certificate may vary by person completing the death certificate and

	geographic region. Death certificates identify only a small percentage of the individuals who develop pneumoconiosis. Data on race/ethnicity is not collected in some states and is incomplete and/or of questionable validity in others. The state of residence upon death may not be the state of exposure.
HP2020 Objectives:	OSH-4
CSTE Positions:	1996-Env-02; 1999-Env-04
Other Available Data:	Age, gender, race/ethnicity, county of residence, usual occupation and industry
Recommendations:	Age, gender, race/ethnicity, and county-specific counts and rates can be used to better define the pattern of pneumoconiosis mortality. Because usual occupation and usual industry information is not necessarily indicative of the setting in which the causative exposure occurred, industry- and occupation-specific measures should be interpreted and reported with caution.

How-To Guide: Indicator #10

Mortality From Or With Pneumoconiosis

10.1 Deaths with an ICD-10 code in the range J60-J66 as an underlying or contributing cause of death ("Total Pneumoconiosis")

10.1.1 Annual number of total pneumoconiosis deaths

Obtain from State Health Department's Office of Vital Records the following information:

- Number of deaths with ICD-10 code of J60 – J66.8 as the underlying or contributing cause of death. **Make sure that you emphasize that you want these counts based on contributing causes of death in addition to underlying cause. Obtaining counts based on underlying cause only will result in a significant undercount of cases.**
- Limit age to those 15 years and older.
- Select for state of residence='*your state'*.
- Exclude:
  - age unknown
  - out-of-state residents or unknown state of residence
  - out-of-state deaths
- Obtain the number of deaths for each of the following age groups: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over.
- This will yield the **'Annual number of total pneumoconiosis deaths'.**

NOTE: If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.

10.1.2 Annual total pneumoconiosis death rate (deaths per million residents)

a) **To obtain the denominator for the rate:**

- Go to: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml?_ts=440355717799
- Click on "Advanced Search" at the top of the page. (If you click on "Advanced Search" towards the middle of the page you must click on "Show Me All".
- For Step 1, enter the following in the box titled 'topic or table name': PEPAGESEX. Enter your state name in the box titled 'state, county or place (optional).' After you enter your state, click on your state name again in the screen that pops up. Click on Go.
- On the resulting page, click on the box on the left corresponding to 2015 Population Estimates. Next, click on View.
- You should now see population figures for age groups for your state for both sexes, males, and females for 2010, 2011, 2012, and 2013. To see 2015, click on the right arrows just above the table. Click on Download.
- In the Download box that pops up, select "Use the data". Click on OK.
- Once the next pop-up box indicates that your file is complete, click on Download, then open.
- Use the figures under Both Sexes for 2015 to populate the Excel spreadsheet you will use to perform age adjusting.

b) To calculate the crude annual death rate:

- Divide the number of deaths for those aged 15 and older (numerator 10.1.1) by the population aged 15 and older for that year (10.1.2a).
- Multiply this result by 1,000,000 to yield the 'Annual total pneumoconiosis death rate (deaths per million residents)'.

10.1.3. Annual age-standardized total pneumoconiosis death rate (deaths per million residents)

- Use the US 2000 Standard population (provided in column E in table below) found at: http://www.cdc.gov/nchs/data/statnt/statnt20.pdf (listed as Distribution #1 on page 3 of that document)
- Use table below to perform the calculations. A spreadsheet such as Excel works well for these calculations.
- In Column C (State Population), enter the state's census population (found using the downloaded Excel file described in 10.1.2) by age group for the relevant year (e.g., population estimates for 2014 if generating death rates for 2014).
- In Column B (# Deaths), enter number of deaths obtained in 10.1.1 by age group for all pneumoconioses.
- Column D = Column B / Column C
  (Deaths/Pop) = (# Deaths) / (State Population)
- Column F = Column D * Column E
  (# Expected Deaths) = (Deaths/Pop) * (US 2000 Standard Pop)
- **Age-standardized total pneumoconiosis death rate = (F10 / E10) * 1,000,000**
  [(The sum (Σ) of all expected deaths) / (the US 2000 Standard Population ages 15 and older)] multiplied by 1,000,000

		Column B	**Column C**	**Column D**	**Column E**	**Column F**
		State Resident Deaths, ages 15 and older, [year]				
	Age Group	**# Deaths**	**[year] State Population**	**Deaths/Pop**	**US 2000 Std Pop**	**# Expected Deaths**
2	**15-24**			B2/C2	38,077,000	D2*E2
3	**25-34**			B3/C3	37,233,000	D3*E3
4	**35-44**			B4/C4	44,659,000	D4*E4
5	**45-54**			B5/C5	37,030,000	D5*E5
6	**55-64**			B6/C6	23,961,000	D6*E6
7	**65-74**			B7/C7	18,136,000	D7*E7
8	**75-84**			B8/C8	12,315,000	D8*E8
9	**85+**			B9/C9	4,259,000	D9*E9
10	**Total Ages 15+**				**215,670,000**	**Σ(F2:F9)**

10.2 Deaths with ICD-10 code J60 as an underlying or contributing cause of death ("Coal Workers' Pneumoconiosis")

10.2.1 Annual number of coal workers' pneumoconiosis deaths

- Follow directions for 10.1.1 using any cause of death = 'J60'.

NOTE: If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.

10.2.2 Annual coal workers' pneumoconiosis death rate (deaths per million residents)

a) To obtain the denominator for the rate:

- Follow directions for 10.1.2a.

b) To calculate the crude annual death rate:

- Divide the number of deaths for those aged 15 and older (numerator 10.2.1) by the population aged 15 and older for that year (10.2.2a).
- Multiply this result by 1,000,000 to yield the **'Annual coal workers' pneumoconiosis death rate (deaths per million residents)'.**

10.2.3 Annual, age-standardized, coal workers' pneumoconiosis death rate (deaths per million residents)

- Follow directions for 10.1.3 using deaths from 10.2.1.

10.3 Deaths with ICD-10 code J61 as an underlying or contributing cause of death ("Asbestosis")

10.3.1 Annual number of asbestosis deaths

- Follow directions for 10.1.1 using any cause of death = 'J61'.

NOTE: If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.

10.3.2 Annual asbestosis death rate (deaths per million residents)

a) To obtain the denominator for the rate:

- Follow directions for 10.1.2a.

b) To calculate the crude annual death rate:

- Divide the number of deaths for those aged 15 and older (numerator 10.3.1) by the population aged 15 and older for that year (10.3.2a).
- Multiply this result by 1,000,000 to yield the **'Annual asbestosis death rate (deaths per million residents)'.**

10.3.3 Annual, age-standardized, asbestosis death rate (deaths per million residents)

- Follow directions for 10.1.3 using deaths from 10.3.1.

10.4 Deaths with ICD-10 code J62 as an underlying or contributing cause of death ("Silicosis")

10.4.1 Annual number of silicosis deaths

- Follow directions for 10.1.1 using any cause of death = 'J62.0' – 'J62.8'.

NOTE: If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.

10.4.2 Annual silicosis death rate (deaths per million residents)

a) To obtain the denominator for the rate:

- Follow directions for 10.1.2a.

b) To calculate the crude annual death rate:

- Divide the number of deaths for those aged 15 and older (numerator 10.4.1) by the population aged 15 and older for that year (10.4.2a).
- Multiply this result by 1,000,000 to yield the **'Annual silicosis death rate (deaths per million residents)'.**

10.4.3 Annual, age-standardized death rate (deaths per million residents)

- Follow directions for 10.1.3 using deaths from 10.4.1.

10.5 Deaths with an ICD-10 code in the range J63, J64, J65, or J66 as an underlying or contributing cause of death ("Other and Unspecified Pneumoconiosis")

10.5.1 Annual number of other and unspecified pneumoconiosis deaths

- Follow directions for 10.1.1 using any cause of death = 'J63.0'- 'J63.8', 'J64', 'J65', 'J66.0'- 'J66.8'.

NOTE: If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.

10.5.2 Annual other and unspecified pneumoconiosis death rate (deaths per million residents)

a) To obtain the denominator for the rate:

- Follow directions for 10.1.2a.

b) To calculate the crude annual death rate:

- Divide the number of deaths for those aged 15 and older (numerator 10.5.1) by the population aged 15 and older for that year (10.5.2a).
- Multiply this result by 1,000,000 to yield the **'Annual other and unspecified pneumoconiosis death rate (deaths per million residents)'.**

10.5.3 Annual, age-standardized other and unspecified pneumoconiosis death rate (deaths per million residents)

- Follow directions for 10.1.3 using deaths from 10.5.1.

NOTE: *The sum of 10.2.1, 10.3.1, 10.4.1 and 10.5.1 may be greater than 10.1.1 because cases could have more than one type of pneumoconiosis listed on the death certificate.*

TOPIC: OCCUPATIONAL ILLNESSES **INDICATOR # 11: Acute work-related pesticide-associated injuries and illnesses reported to poison control centers**	
Demographic Group:	Employed persons
Numerator:	Reported cases of work-related pesticide poisoning
Denominator:	Employed persons age 16 years and older for the same calendar year
Measures of Frequency:	Annual number of reported cases of work-related pesticide poisoning (numerator) Annual incidence rate of reported cases of work-related pesticide poisoning per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Pesticides are among the few chemicals produced that are specifically designed to kill and cause harm. In the United States, approximately one billion pounds of pesticide active ingredient are used annually, and over 20,000 pesticide products are being marketed (Grube et al., 2011). The Environmental Protection Agency (EPA) estimates 20,000 to 40,000 work-related pesticide poisonings per year (Blondell, 1997).
Rationale:	Workers who handle pesticides are at increased risk for exposure. Poison Control Centers (PCCs) are important sources of reports of acute poisonings and chemical exposures. These data can be useful to target prevention. The type of data collected is comparable across states due to the uniformity in case handling by PCCs.
Limitations of Indicator:	PCCs capture only a small proportion of acute occupational pesticide-related illness cases, an estimated 10%. PCCs do not systematically collect information on industry and occupation; however, cases associated with occupational exposures can be identified.
Data Resources:	Poison Control Center data (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Not all states have poison control centers. State health agencies may have to enter into an agreement with their state-based PCC to obtain local data, or may obtain less timely PCC data from the Toxic Exposure Surveillance System, which is administered by the American Association of Poison Control Centers.
HP2020 Objectives:	None
CSTE Positions:	1996-Env-16; 1999-Env-3
Other Available Data:	Age, gender, pesticide active ingredient, signs/symptoms arising from the pesticide exposures, illness severity, and whether hospitalization/ICU treatment was provided.
Recommendations:	Age, gender, pesticide chemical class, and severity-specific counts and rates can be used to better define the pattern of acute occupational pesticide-related illness. Industry and occupation should be analyzed where available.

How-to guide: Indicator #11

Acute Work-Related Pesticide Associated Illness And Injury Reported To Poison Control Centers

11.1 **Annual number of reported work-related pesticide poisoning cases**[2]

- NIOSH will routinely distribute state data for the current Occupational Health Indicator development year prior to the June 30 submission due date by means of the Consortium of Occupational State Surveillance Listserv (OCC-HLTH-STATE-SURV@LISTSERV.CDC.GOV). Contact Patricia Schleiff at NIOSH at pls1@cdc.gov or 304-285-5874 with questions regarding data needs for this indicator.

11.2 **Annual incidence rate of reported work-related pesticide poisoning cases per 100,000 employed persons age 16 years or older**

a) To obtain the denominator for the rate:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

b) To calculate the rate:

- Divide the numerator (11.1) by the denominator (11.2a).
- Multiply this result by 100,000 to get the 'Annual incidence rate of reported work-related pesticide poisonings per 100,000 employed persons age 16 years or older.'

The criteria utilized by NIOSH/AAPCC for identifying work-related pesticide poisonings are provided below:

1. Reason for the call (ExpReason) = 3 (occupational) OR
   Exposure Site (ExpSite) = 3 (workplace)

[2] These data are derived from data provided by the American Association of Poison Control Centers (AAPCC) using the case definition listed in this guide. There may be a discrepancy between the number of incident cases provided by EPA/NIOSH/AAPCC and the number of cases derived from your local PCC.

States are encouraged to contact their local Poison Control Center (PCC) to share the data obtained through AAPCC and to discuss plans to disseminate it. Contact information can be obtained from AAPCC http://www.aapcc.org/director2.htm. Some states have more than one PCC.

2. Medical outcome (MedicalOutcome) =
   201=minor effect
   202=moderate effect
   203=major effect
   204=death
   206=not followed, minimal clinical effects possible
   207=unable to follow, judged as a potentially toxic exposure

3. Exclude cases where Exposure Site (ExpSite) = 3 (workplace) AND (ExpReason) = 9 (suspected suicide), 10 (intentional misuse), 12 (intentional action but specific intention unknown), 14 (malicious), or 18 (unknown reason).

4. Include only cases exposed to one substance (The variable to make this assessment changed in 1999. Before 1999, cases exposed to only one substance had **Multiple=missing** (if **Multiple=1** then the case was exposed to more than one substance). Beginning in 1999, cases exposed to only one substance had **Noofsubs=1 (**if **Noofsubs > 1** then the case was exposed to more than one substance).

5. Remove children less than 16 years of age. This can be handled by using the variables age (**Age**) and patient age unit variable (**PatAgeUnit**). **Age** must be greater than or equal to 16. If **PatAgeUnit** equals 1 (<=5 years), 2 (6-12 years), 16 (months) or 17 (days) then delete.

6. Include only cases with in-state residence or unknown residence.

7. Exposure to an agent included in one of the pesticide generic categories
   <u>Disinfectants</u>
   0201008 disinfectant industrial cleaner
   0201055 bromine water/shock treatment
   0201056 chlorine water/shock treatment
   0042281 hypochlorite disinfectant: hypochlorite, non-bleach product
   0040280 phenol disinfectant: phenol (eg, lysol)
   0039282 pine oil disinfectant
   0077286 other/unknown disinfectant

   <u>Fungicides (non-medicinal)</u>
   0243566 carbamate fungicide
   0201033 copper compound fungicide
   0077564 mercurial fungicide
   0077565 non-mercurial (inactive) fungicide
   0253000 phthalimide fungicide
   0254371 wood preservative
   0077566 other/unknown (inactive) non-medicinal fungicide
   0201034 other non-medicinal fungicide
   0201035 unknown non-medicinal fungicide

   <u>Fumigants</u>
   0201036 aluminum phosphide fumigant
   0201037 metam sodium (fumigant, fungicide, or herbicide)
   0201038 methyl bromide (fumigant, fungicide, or herbicide)
   0201039 sulfuryl fluoride fumigant
   0201040 other fumigant
   0201041 unknown fumigant

Herbicides (includes algicides, defoliants, dessicants, plant growth regulators)
0201054 algicide
0254370 anti-algae paint: anti-algae
0243561 carbamate herbicide
0017000 2,4-d or 2,4,5-t (inactive)
0201042 chlorophenoxy herbicide
0049562 diquat
0201043 glyphosate
0049000 paraquat
0049561 paraquat/diquat combination
0077121 plant hormone
0213000 triazine herbicide
0215000 urea herbicide
0077561 other herbicide
0077567 unknown herbicide

Insecticides (includes insect growth regulators, molluscicides, nematicides)
0004562 arsenic pesticide
0062562 borate/boric acid pesticide
0070000 carbamate only (alone)
0070560 carbamate with other insecticide
0050000 chlorinated hydrocarbon only (alone)
0050560 chlorinated hydrocarbon with other insecticide
0201044 insect growth regulator
0172000 metaldehyde(molluscicide)
0208562 nicotine(excluding tobacco products)
0038000 organophosphate
0038560 organophosphate/carbamate combined
0038561 organophosphate/chlorinated hydrocarbon (inactive)
0038562 organophosphate/other insecticide
0038563 organophosphate/carbamate/chlorinated hydrocarbon (inactive)
0176000 piperonyl butoxide only (inactive)
0144000 piperonyl butoxide/pyrethrin (inactive) (without carbamate or o.p.)
0144001 pyrethrins only (inactive)
0201045 pyrethrin
0201046 pyrethroid
0145000 rotenone
0077568 veterinary insecticide (inactive) (for pets-flea collars, etc.)
0077562: other type of insecticide/pesticide
0077569: unknown type of insecticide/pesticide

Repellents
0201047 bird, dog, deer or other mammal repellent
0201048 insect repellent with deet
0201049 insect repellent without deet
0218000 *insect repellent: unknown (inactive) insect repellents: unknown*
0033000 naphthalene moth repellent
0050430 paradichlorobenzene moth repellent
0077431 other mothball or moth repellent

0077430 unknown mothball or moth repellent

Rodenticides
0174000 antu
0048563 anticoagulant: warfarin-type anticoagulant rodenticide
0048564 anticoagulant: long-acting, superwarfarin anticoagulant rodenticide
0244577 barium carbonate barium carbonate containing rodenticides
0201050 bromethalin
0201051 cholecalciferol rodenticide
0012563 cyanide rodenticide (excluding industrial or misc. Chemical)
0162000 monofluoroacetate 1080/monofluoroacetate/smfa
0043000 strychnine rodenticide
0197000 vacor/pnu
0201052 zinc phosphide
0217000 thallium
0077563 other rodenticide
0077577 unknown rodenticide

TOPIC: OCCUPATIONAL ILLNESSES INDICATOR # 12: Incidence of malignant mesothelioma, ages 15 and older	
Demographic Group:	Resident persons age 15 years or older
Numerator:	Incident cases with mesothelioma
Denominator:	Midyear resident population age 15 years or older for the same calendar year
Measures of Frequency:	Annual number of incident mesothelioma cases (numerator) Annual mesothelioma incidence rate (cases per million residents) Annual, age-standardized, mesothelioma incidence rate (standardized by the direct method to the Year 2000 U.S. Standard population) (cases per million residents)
Time Period:	Calendar year
Significance and Background:	About 3,000 deaths with malignant mesothelioma occur each year in the United States (North American Association of Central Cancer Registries, 2012). The only well-established risk factor for malignant mesothelioma is exposure to asbestos and related fibers. It has been estimated that as much as 90 percent of cases are caused by exposure to asbestos.
Rationale:	Malignant mesothelioma, while relatively rare, is a fatal cancer largely attributable to workplace exposure to asbestos. Tracking of malignant mesothelioma should be undertaken to document the burden of occupational disease, to design, target, and evaluate the impact of prevention efforts over time, and to identify previously unrecognized settings in which workers may continue to be at risk of asbestos exposure.
Limitations of Indicator:	Not all cases of malignant mesothelioma are caused by occupational exposures. Because cancer is a disease of long latency, current incidence is not indicative of current exposures and it may be many years before reductions in occupational exposures affect incidence. State of residence of the decedent may not have been the state of exposure.
Data Resources:	State-wide Cancer Registry data (numerator) State population estimates from the U.S. Bureau of the Census (denominator) Year 2000 US Standard population (for age-standardization)
Limitations of Data Resources:	Data from some existing statewide central cancer registries do not yet meet standards for data completeness and quality. Until complete cancer registry data are available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Because CSTE uses a different methodology, the state specific incidence rates calculated using this Guidance Document may differ from those published by State Cancer Registries.
HP2020 Objectives:	None
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, county of residence, usual occupation and industry

Recommendations:	Age, gender, race/ethnicity, county counts and rates can be used to better define patterns of malignant mesothelioma. Because usual occupation and usual industry information is not necessarily indicative of the setting in which the causative exposure occurred, industry- and occupation-specific measures should be interpreted and reported with caution.

How-To Guide: Indicator #12
Incidence of Malignant Mesothelioma

12.1 Annual number of incident mesothelioma cases

a) To obtain the numerator for the rate:

Obtain from the State Cancer Registry the number of incident cases meeting the following criteria:

- ICD-O histology code of 9050-9053.
- Limit age to those 15 years and older
- Select for state of residence = '*your state'*
- Exclude:
  - age unknown
  - out-of-state residents and unknown state of residence
- Obtain the number of cases for each of the following age groups: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over.
- This will yield the **'Annual number of incident mesothelioma cases'**.

NOTE: *If less than 5 events, the number will be too small to produce reliable estimates. Rates should not be calculated.*

12.2 Annual mesothelioma incidence rate (cases per million residents)

a) To obtain the denominator for the rate:

- Go to: http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml?_ts=440355717799
- Click on "Advanced Search" at the top of the page. (If you click on "Advanced Search" towards the middle of the page you must click on "Show Me All".
- For Step 1, enter the following in the box titled 'topic or table name': PEPAGESEX. Enter your state name in the box titled 'state, county or place (optional).' After you enter your state, click on your state name again in the screen that pops up. Click on Go.
- On the resulting page, click on the box on the left corresponding to 2015 Population Estimates. Next, click on View.
- You should now see population figures for age groups for your state for both sexes, males, and females for 2010, 2011, 2012 and 2013. To see 2015, click on the right arrows just above the table. Click on Download.
- In the Download box that pops up, select Microsoft Excel as the format. Click on OK.
- Once the next pop-up box indicates that your file is complete, click on Download, then open.
- Use the figures under Both Sexes for 2014 to populate the Excel spreadsheet you will use to perform age adjusting.

b) To calculate the annual incidence rate:

- Divide the number of cases for those aged 15 and older (numerator 12.1) by the population aged 15 and older for that year (12.2a).
- Multiply this result by 1,000,000 to obtain the **'Annual mesothelioma incidence rate (cases per million residents)'.**

12.3 <u>Annual, age-standardized mesothelioma incidence rate (cases per million residents)</u>

- Use the US 2000 Standard population (provided in column E in table below) found at: http://www.cdc.gov/nchs/data/statnt/statnt20.pdf (listed as Distribution #1 on page 3 of that document)
- Use table below to perform the calculations. A spreadsheet such as Excel works well for these calculations.
- In Column C (State Population), enter the state's census population (found using the downloaded Excel file described in 10.1.2) by age group for the relevant year (e.g., population estimates for 2014 if generating death rates for 2014).
- In Column B (# Mesothelioma Cases), enter the number of mesothelioma cases, obtained in 12.1, by age group.
- Column D = Column B / Column C
  (Mesothelioma Cases/Pop = # Mesothelioma Cases / State Population)
- Column F = Column D * Column E
  (# Expected Mesothelioma Cases = (Mesothelioma Cases/Pop) * (US 2000 Standard Pop))
- **Age-standardized incidence rate for mesothelioma = (F10 / E10) * 1,000,000**
  [(The sum (Σ) of all expected mesothelioma cases) / (the US 2000 Standard Population ages 15 and older)] multiplied by 1,000,000

		Column B	**Column C**	**Column D**	**Column E**	**Column F**
		State Resident Mesothelioma Cases, ages 15 and older, [year]				
	Age Group	**# Mesothelioma Cases**	**[year] State Population**	**Mesothelioma Cases/Pop**	**US 2000 Std Pop**	**# Expected Mesothelioma Cases**
2	**15-24**			B2/C2	38,077,000	D2*E2
3	**25-34**			B3/C3	37,233,000	D3*E3
4	**35-44**			B4/C4	44,659,000	D4*E4
5	**45-54**			B5/C5	37,030,000	D5*E5
6	**55-64**			B6/C6	23,961,000	D6*E6
7	**65-74**			B7/C7	18,136,000	D7*E7
8	**75-84**			B8/C8	12,315,000	D8*E8
9	**85+**			B9/C9	4,259,000	D9*E9
10	**Total**				**215,670,000**	**Σ(F2:F9)**

TOPIC: OCCUPATIONAL EXPOSURES **INDICATOR # 13: Elevated blood lead levels among adults**	
Demographic Group:	Employed persons
Numerators:	All reported state residents age 16 years or older, with blood lead level of: 1. ≥5 µg/dL, 2. ≥ 10 µg/dL, 3. ≥25 µg/dL, 4. ≥ 40 µg/dL
Denominator:	Employed population age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of residents with elevated blood lead levels (numerator) Annual prevalence rate per 100,000 employed persons age 16 years or older Annual number of incident cases of residents with elevated blood lead levels Annual incidence rate per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Since November 2015, the surveillance case definition for an elevated blood lead level (BLL) used by the Centers for Disease Control and Prevention (CDC) and National Institute of Occupational Safety and Health (NIOSH) includes workers age 16 and older, with blood lead concentrations of greater than or equal to 5 μg/dL (≥five micrograms per deciliter) of whole blood, in a venous blood sample. This case definition is used by the ABLES program, the Council of State and Territorial Epidemiologists (CSTE), and CDC's National Notifiable Diseases Surveillance System (NNDSS)*****. In 2010, the CDC included, for the first time, elevated BLLs defined as a blood lead concentration greater than or equal to 10 μg/dL, as a Nationally Notifiable Non-Infectious Condition. The U.S. Department of Health and Human Services recommends that BLLs among all adults be reduced to <10 μg/dL. In 2016, As of September 2017, 21 states submitted 2016 data on 2,312 adults with BLLs ≥25 μg/dL and on 13,153 adults with BLLs ≥10 μg/dL. Overall, the national prevalence of BLLs ≥10 μg/dL declined from 26.6 adults per 100,000 employed in 2010 to 14.1 in 2016. The national prevalence of BLLs ≥25 μg/dL declined from 14.0 adults per 100,000 employed in 1994 to 2.5 in 2016. In 2016, state prevalence rates of BLLs ≥25 μg/dL were above the national rate (2.5/100,000) in 8 states and state prevalence rates of BLLs ≥10 μg/dL were above the national rate (14.1/100,000) in 10 states. Historically, in the United States, most adult lead exposures have been occupational. During 2016, 18 states reported the exposure source for 2,057 adults with BLLs ≥25µg/dL. Among these 2,057 adults, 83.2% had occupational exposures. The proportion of occupational cases by state ranged from 50% to 100%. ***Note that the current case definition for elevated blood lead levels (≥ 5 *ug*/dL) came into effect in late 2015. States are encouraged to calculate**

	and report blood lead levels ≥ 5 *ug*/dL if it is feasible to do so, for any reporting year, including for 2014 data.
Significance and Background: **Rebecca: the above was difficult for me to edit in track changes, so I wrote out a "clean" version, and inserted it here, for your consideration**	Since November 2015, an elevated blood lead level (BLL) among individuals ages 16 and older has been defined as a blood lead concentration of ≥5 five micrograms per deciliter (μg/dL) of whole blood, in a venous blood sample. This surveillance case definition is used by the National Institute for Occupation Safety and Health (NIOSH)'s ABLES program, the Council of State and Territorial Epidemiologists (CSTE), and the Centers for Disease Control and Prevention (CDC)'s National Notifiable Diseases Surveillance System (NNDSS)*****. Prior to the current case definition of ≥ 5 μg/dL, a case definition of ≥ 10 μg/dL was used. As of September 2017, 21 states submitted 2016 data on 2,312 adults with BLLs ≥25 μg/dL and 13,153 adults with BLLs ≥10 μg/dL. Overall, the national prevalence of BLLs ≥10 μg/dL declined from 26.6 adults per 100,000 employed in 2010 to 14.1 per 100,000 employed in 2016; prevalence rates of BLLs ≥10 μg/dL were above the national rate in 10 states. Historically, in the United States, most adult lead exposures have been occupational. During 2016, 19 states reported an exposure source for 6,263 adults with BLLs ≥10µg/dL; among these, 87.7% were occupational exposures. The proportion of occupational cases by state ranged from 50% to 100%. ***Note that the current case definition for elevated blood lead levels (≥ 5 *ug*/dL) came into effect in late 2015. States are encouraged to calculate and report blood lead levels ≥ 5 *ug*/dL if it is feasible to do so, for any reporting year.**
Rationale:	Among adults, lead poisoning is a persistent, mainly occupational, health issue that continues to be an important public health problem. The most reliable test for recent exposure is the BLL. The Federal Occupational Safety and Health Administration (OSHA) lead standards, enacted to protect workers from lead-associated health effects, require B L L monitoring for employees who meet exposure criteria. The standards are based on medical information that is now more than 4 0 years old and are not protective against the adverse health effects of lead. Lower medical removal protection (MRP) recommendations have been proposed to protect workers against the adverse health effects of both acute and cumulative lead exposures. Several states along with FedOSHA are in the process of revising their lead regulations to include lower MRP levels. It is important to note that the average BLL for the adult general population is less than 1 µg/dL.
Limitations of Indicator:	BLLs reflect the contributions of acute external exposure to lead as well as the release of internal bone lead stores into the blood. For persons without significant lead body burden, a BLL is a good indicator of recent (preceding 3-5 weeks) external lead exposure. For persons with significant body

	burden, a single BLL may not be an accurate indicator of recent external exposure, as lead is also being released into the blood from bone stores.
Data Resources:	Reports of elevated BLLs from laboratories (numerator). BLS Current Population Survey Data – Geographic Profile of Employment and Unemployment (denominator)
Limitations of Data Resources:	Some states do not require laboratories to report all BLLs, or have no BLL reporting requirement in place. Even with a reporting requirement, reports from laboratories are frequently incomplete. Not all employers in lead-using industries offer BLL testing to their employees, so the number of persons reported to states may underestimate the number of workers exposed to lead on the job. In addition, some workers may not be tested using appropriate methods. Individuals may be exposed to lead outside their state of residence Not all states are able to determine both state of employment/exposure and state of residence of their reported cases. Approximately 1 5% of elevated BLLs among adults can be caused by non-occupational exposures. Not all states may be able to distinguish occupationally exposed individuals from non-occupationally exposed individuals.
HP2020 Objectives:	OSH-7
CSTE Positions:	1990-Env-9; 1995-Env-14; 1999-Env-02; 2000-Occ-01; 2001-Occ-01; 2010-Occ-02
Other Available Data:	Age, gender, industry, occupation, exposure source, and individual BLL.
Recommendations:	Many states have data elements that can be used to better define the pattern of elevated blood lead levels. Report numbers and rates for occupational cases only, rather than including both occupationally and non-occupationally exposed persons in the numerator. Include occupationally exposed cases working in your state (e.g., employer is based in your state, or, if able to determine, worksite is in your state), regardless of their state of residence. Age, gender, and race/ethnicity- specific counts and rates can be used to better define the pattern of elevated BLLs. Industry and occupation information can be used to provide additional insight. Individual BLLs can help identify particularly egregious exposures. Follow-up of selected cases and/or clusters can help identify where and how individuals with high BLLs were exposed. Obtaining reports on all BLLs can provide insight about the overall frequency of BLL testing, and allow follow-up of employers not doing required testing. Because the entire working population in a state is not exposed to lead and rates using a working population denominator are therefore inaccurate, it may be more useful to calculate rates among persons tested. If rates of elevated BLLs among persons tested are calculated, comparing rates over time and between geographies may provide a more accurate comparison.

How-To Guide: Indicator #13

Elevated Blood Lead Levels among Adults

The public health burden of elevated BLLs in adults is measured as prevalence. The following steps will describe how to calculate the prevalence and incidence rates of elevated BLLs at the current case definition for an elevated BLL of ≥5 µg/dL and at previous definitions of ≥10 µg/dL, ≥25 µg/dL, and ≥40 µg/dL. This approach allows states to monitor elevated BLLs at different case definitions and permits longitudinal analysis.*****

***Note: the current case definition for elevated blood lead levels (≥5 *ug*/dL) came into effect in late 2015. States are encouraged to calculate and report blood lead levels ≥ 5 *ug*/dL if it is feasible to do so, for any reporting year. If you do not have data <10 *ug*/dL available please indicates not available in the reporting template.**

13.1. Obtain numerator data:

13.1.1. Prevalent Case Criteria

A. Access your State ABLES Program database and these criteria to identify each case to be counted as a **prevalent** case (new plus old case) in a given year:

a) An adult is a person age 16 years and older at the time of blood draw
b) Use the earliest date of either draw date (preferred), date laboratory received sample, or date laboratory analyzed sample
c) When an adult has more than one BLL test reported during the time period, count that person one time only, and use his/her highest BLL
d) Include all cases, both occupationally and non-occupationally exposed, and those with unknown exposure source
e) Include all residents of state and unknown residence
f) Exclude out-of-state residents

13.1.2. Incident Case Criteria

A. Access your State ABLES Program database and these criteria to identify each case to be counted as an **incident** (new) case:

To identify an incident (new) case follow the ABLES definition of new case used to code variable STATUS.

Example based on case definition at BLLs ≥5 µg/dL:

An incident (new case) is an adult whose highest BLL was ≥5 µg/dL in the current calendar year, but who was not in the State lead registry in the immediately preceding calendar year with a BLL ≥5 µg /dL. This adult may have been in the registry with a BLL ≥5 µg/dL in earlier calendar years or with a BLL <5 µg /dL in the immediately preceding calendar year. A new case should remain coded as such for all other BLL tests for that adult done in the same calendar year.

If you have difficulties, you can contact the NIOSH ABLES program to obtain the number of incident cases for your state or for assistance in obtaining these numbers.

13.1.3 Worksheet for Calculating Prevalence and Incidence Numerator.

Note: Numbers in RED are for illustration purposes and need to be replaced with your own numbers. ALSO, the numbering in the tables below match the numbering in the reporting template.

Access your State ABLES Program data base and determine the number of adults with Blood lead levels in these five BLL range categories (prevalent and incident cases).

BLL Range
BLL <5 µg/dL
BLL 5 to <10 µg/dL
BLL 10 to < 25 µg/dL
BLL 25 to < 40 µg/dL
BLL ≥ 40 µg/dL

Prevalence range	Annual number of prevalent cases with BLLs ≥
p1	100
p2	80
p3	85
p4	30
p5	10

Incidence range	Annual number of incident cases with BLLs ≥
i1	
i2	
i3	
i4	
i5	

Next, plug the numbers you have from the table above into the formulas provided in the tables below to get the final count for the four BLL categories (prevalent and incident cases).

BLL Category	Prevalence numerator	Formula based on prevalence range numerator	Annual number of prevalent cases with BLLs ≥
BLL ≥5 µg/dL	Prev#_BLL ≥5µg/dL	p2 +p3 +p4 +p5	80+85+30+10 =205
BLL ≥10 µg/dL	Prev#_BLL≥10µg/dL	p3 +p4 +p5	85+30+10 =125
BLL ≥25 µg/dL	Prev#_BLL≥25µg/dL	p4 +p5	30+10 =40
BLL ≥ 40 µg/dL	Prev#_BLL≥40µg/dL	p5	10

BLL Category	Prevalence numerator	Formula based on incidence range numerator	Annual number of incident cases with BLLs ≥
BLL ≥5 µg/dL	Inc#_BLL≥5µg/dL	i2 +i3 +i4 +i5	
BLL ≥10 µg/dL	Inc#_BLL≥10µg/dL	i3 +i4 +i5	
BLL ≥25 µg/dL	Inc#_BLL≥25µg/dL	i4+i5	
BLL ≥ 40 µg/dL	Inc#_BLL≥40µg/dL	i5	

Please note that the number of adults in categories with higher BLLs are included in categories with lower BLLs. For example, the number of adults with BLL ≥40 µg/dL is a subset of the number of adults with BLL ≥10 µg/dL. Hence BLL ≥5 µg/dL will always have the largest annual number, followed by BLL ≥10 µg/dL, BLL≥25 µg/dL, and BLL ≥40 µg/dL.

13.2 Obtain denominator data. To obtain the denominator for the rate, access the Bureau of Labor Statistics (BLS).

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- 13.2.8 Multiply the value for Total Employment by 1,000.
- This will yield the number of employed persons.

13.3 Calculate the State annual prevalence (or incidence) rate using this formula:

To calculate the prevalence or incidence rate:

13.3.1 Divide the numerator for each specific BLL category obtained following 13.1, by the denominator obtained in 13.2. The numerator changes by category, but the denominator is the same.

13.3.2 Multiply this result by 100,000 to obtain the "Annual prevalence (incidence) rate per 100,000 employed persons age 16 years or older".

$$\textbf{\textit{Prevalence (incidence) rate}} = \frac{\textbf{\textit{Number of cases with BLLs in a given year}}}{\textbf{\textit{Annual employed population}} \geq \textbf{16 \textit{years in corresponding year}}} * \textbf{100,000}$$

For example:

- Prevalence rate of BLL ≥5 µg/dL = number from [Prev#_BLL ≥5µg/dL] = 205 / number from 13.2. [Use 2,000,000 for this example] x 100,000 → 10.25 cases per 100,000 employed
- Incidence rate of BLL ≥25 µg/dL = number from [Inc#_BLL≥25µg/dL] / number from 13.2 x 100,000

Annual prevalence rates:

Prevalence rate of BLL ≥5 µg/dL	=	Annual number of prevalent cases with BLL ≥5 µg/dL / Number of employed persons	x 100,000	=
Prevalence rate of BLL ≥10 µg/dL	=	Annual number of prevalent cases with BLL ≥10 µg/dL / Number of employed persons	x 100,000	=
Prevalence rate of BLL ≥25 µg/dL	=	Annual number of prevalent cases with BLL ≥25 µg/dL / Number of employed persons	x 100,000	=
Prevalence rate of BLL ≥ 40 µg/dL	=	Annual number of prevalent cases with BLL ≥ 40 µg/dL / Number of employed persons	x 100,000	=

Annual incidence rates:

Incidence rate of BLL ≥5 µg/dL	=	Annual number of incident cases with BLL ≥5 µg/dL / Number of employed persons	x 100,000	=
Incidence rate of BLL ≥10 µg/dL	=	Annual number of incident cases with BLL ≥10 µg/dL / Number of employed persons	x 100,000	=
Incidence rate of BLL ≥25 µg/dL	=	Annual number of incident cases with BLL ≥25 µg/dL / Number of employed persons	x 100,000	=
Incidence rate of BLL ≥ 40 µg/dL	=	Annual number of incident cases with BLL ≥ 40 µg/dL / Number of employed persons	x 100,000	=

TOPIC: OCCUPATIONAL HAZARDS INDICATOR # 14: Percentage of workers employed in industries at high risk for occupational morbidity	
Demographic Group:	Employed persons
Numerator:	Employed workers, 16 years of age and older, in private sector industries at high-risk for occupational morbidity
Denominator:	Employed persons age 16 years or older in all private sector industries for same calendar year
Measures of Frequency:	Number of employed persons in high morbidity risk NAICS industries* Percentage of employed persons in high morbidity risk North American Industry Classification System (NAICS) industries.
Time Period:	Calendar year
Significance and Background:	In 2015, there were almost 3 million work-related injuries and illnesses reported by employers in the private industry sector in the United States. Of those, 95.2% were recordable injuries and 4.8% were recordable illnesses. Over half of injury and illness cases reported in 2015 were of a more serious nature that involved days away from work, job transfer, or restriction (DART cases). These cases occurred at a rate of 1.6 cases per 100 full-time workers (BLS, 2016).
Rationale:	Work-related injuries and illnesses are preventable, and control of occupational hazards is the most effective means of prevention. Concentrating on high-risk industries for non-fatal injuries and illnesses helps prioritize limited resources.
Limitations of Indicator:	It is possible that some new employers are not counted in the County Business Patterns mid-March survey. In addition, differences in regional industrial practices may cause the ranking of high-risk industries within a specific State to differ from those identified from national data. The industries for which data are available also vary among States, primarily due to the differences in industry concentration and sample size from one State to the next; as a result, it is not recommended to compare numbers or rates between State or National data.
Data Resources:	U.S. Census Bureau County Business Patterns (CBP) (numerator and denominator)
Limitations of Data Resources:	**Limitations pertaining to how the list of "high risk" industries were conceived:** The SOII is a function of BLS using a probability sample and not a census of all employers. It is based on injury and illness data maintained by employers and is subject to sampling error. Excluded from the survey are the military, self-employed individuals, farms with fewer than 11 employees, and Federal agencies. In some states, the survey does not cover the state and municipal employees. Therefore, the recommended measures of frequency are limited to private sector workforce only. Some states do not participate in the Federal-State survey, and in some participating states, the sample sizes are insufficient to generate State-specific estimates. Numbers and rates may not be published/released by BLS due to the reliability of the estimates. Employers vary with respect to how much they may reduce their potential reporting burden by placing affected workers on restricted work activity, thereby avoiding the reporting of lost workday cases (which require reporting of additional details). In addition, the SOII only collects data for the incident year, and does not capture lost

	work-time that may carry over to a new calendar year. For example, a debilitating injury that occurs on the last day of the calendar year will have no lost work-time associated with it in the SOII. The CBP is based on mid-March payrolls of all employers in the United States, but does not cover farms, public administration, or the self-employed. Exact employment counts for a particular NAICS may not be provided within a State because of confidentiality issues. **Further limitations pertaining specifically to the estimated proportion of workers employed in high-risk industries:** Although this list of high-risk industries for this indicator derives from injury rates reported in the BLS SOII survey, the estimate for the number of workers in any given state employed in a high-risk industry comes from the CDC Employed Labor Force (ELF) query system. The ELF system in turn is based on a subset of Community Population Survey (CPS) data. CPS is a weekly household survey conducted with a multistage cluster sampling design. As such, it has potential for sampling error. CPS could over– or under-estimate the number of workers in any given industry, and estimates of fewer than 1,000 individuals are deemed unstable by BLS. Furthermore, due to differences in the way population controls are applied to estimates in the ELF system and in other BLS reports, certain employment estimates obtained through ELF may differ slightly from values reported directly by BLS. Finally, it is worth noting that values obtained using CPS-based data represent average number of workers in any given category and year, based on surveys conducted throughout the year.
HP2020 Objectives:	OSH-2
CSTE Positions:	None
Other Available Data:	None
Recommendations:	States could additionally identify their own State-specific high-risk industries and associated employment patterns.

How-To Guide: Indicator #14

Percentage of Workers Employed In Industries At High Risk For Occupational Morbidity

14.1 Number of employed persons in high morbidity risk North American Industry Classification System (NAICS) industries

The following are the high risk morbidity industries based on Bureau of Labor Statistics "total reportable cases incidence rates" for private sector workers for the year 2014. These 54 industries had occupational injury and illness rates of more than double the national rate, or 6.4 cases per 100 full-time workers or higher. For this indicator, these industries are classified as high risk industries and they accounted for 6.3 million workers in the United States (5.3% of the private sector non-farm wage and salary employment). **So that states may collect trend data for this indicator, this list was used with 2013 data and is planned for use through 2018.**

Table 1. NAICS codes and Industry Titles for High Morbidity Risk Industries (n=54)

Industry code	Industry name
311212	Rice milling
311313	Beet sugar manufacturing
311611	Animal (except poultry) slaughtering
311613	Rendering and meat byproduct processing
312111	Soft drink manufacturing
313220	Narrow fabric mills and schiffli machine embroidery
314994	Rope, Cordage, Twine, Tire Cord, and Tire Fabric Mills
321113	Sawmills
321114	Wood preservation
321214	Truss manufacturing
321912	Cut stock, resawing lumber, and planing
321918	Other millwork (including flooring)
321920	Wood container and pallet manufacturing
321991	Manufactured home (mobile home) manufacturing
321992	Prefabricated wood building manufacturing
326122	Plastics pipe and pipe fitting manufacturing
327390	Other concrete product manufacturing
331222	Steel wire drawing
331511	Iron foundries
331513	Steel foundries (except investment)
331523	Nonferrous Metal Die-Casting Foundries
331524	Aluminum foundries (except die-casting)
331529	Other Nonferrous Metal Foundries (except Die-Casting)
332313	Plate work manufacturing
332439	Other metal container manufacturing
333111	Farm machinery and equipment manufacturing

336111	Automobile manufacturing
336112	Light truck and utility vehicle manufacturing
336211	Motor vehicle body manufacturing
336212	Truck trailer manufacturing
336214	Travel trailer and camper manufacturing
336370	Motor vehicle metal stamping
336611	Ship building and repairing
336612	Boat building
337215	Showcase, partition, shelving, and locker manufacturing
339995	Burial casket manufacturing
44229	Other home furnishings stores
448320	Luggage and leather goods stores
453910	Pet and pet supplies stores
481111	Scheduled passenger air transportation
4852	Interurban and rural bus transportation
488320	Marine cargo handling
4921	Couriers and express delivery services
541940	Veterinary services
562111	Solid waste collection
562219	Other nonhazardous waste treatment and disposal
562920	Materials recovery facilities
621910	Ambulance services
6222	Psychiatric and Substance Abuse Hospitals
6231	Nursing Care Facilities (Skilled Nursing Facilities)
6233	Continuing Care Retirement Communities and Assisted Living Facilities for the Elderly
6239	Other Residential Care Facilities
713110	Amusement and Theme Parks
713920	Skiing Facilities

- To facilitate tracking and calculating number of employed persons, it is recommended that you copy and paste Table 1 into an excel spreadsheet.

- Go to https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t
  - In step 1 ("Enter search terms and an optional geography and click GO"), enter your state name in the "state, county, or place" box. The "topic or table name" box can be left blank. Click "Go".
  - From the left side menu, select the "Industry Codes" box.
  - Under "Industry Code Filter Options" and "Include in results:" select "Individual codes"
  - There are two options for selecting individual NAICS codes:
    1. Page through the lists of NAICS codes using the arrows at the top or bottom of the list and select all codes on the high risk industry list. After selecting codes on a page, you will need to select  before you advance to the next page. Note that you can adjust the codes displayed per page in the right-hand corner of the "Industry Code Results:" box.

2. Enter a high risk industry NAICS code in the search bar and select "Go." Select the desired code in the "Industry Code Results" box. Select Add. Prior to searching for the next code, you will need to select "Clear all filters" under the "Your Industry Code Filters" box.

- Once all high risk industry NAICS codes are selected, select CLOSE in the right hand corner of the "Select Industry Codes" box.
- In the upper right corner of the table list, there are two drop down boxes following "Show results from:" Select the year of interest in the first box.
- Click directly on the table title "Geography Area Series: County Business Patterns."
- The employment number for each high risk industry NAICS code is in the column titled, "**Paid employees for pay period including March 12."**
- Copy and paste the number into an Excel spreadsheet.
- If you cannot find the exact code, enter 0. For some codes, a letter will be entered in place of a number. This letter refers to the range of employees for that particular industry. Refer to the table below for number ranges associated with each letter. Use the midpoint of the range.

A	0-19
B	20-99
C	100-249
E	250-499
F	500-999
G	1,000-2,499
H	2,500-4,999
I	5,000-9,999
J	10,000-24,999
K	25,000-49,999
L	50,000-99,999

- Add the numbers of employees from each industry (using midpoints where necessary). This is the **"Number of workers employed in high-risk industries"**.

14.2 Percentage of employed persons in high morbidity risk North American Industry Classification System (NAICS) industries

a) To obtain the denominator for the percentage:

- Go to https://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?refresh=t.
- If you recently completed another search, you may need to go the "Your Selections" box and select "Clear all selections and start a new search."
- In step 1 ("Enter search terms and an optional geography and click GO"), enter your state name in the "state, county, or place" box. The "topic or table name" box can be left blank. Click "Go".
- In the upper right corner of the table list, there are two drop down boxes following "Show results from:" Select the year of interest in the first box. Select "Business Patterns" in the second box.

- Click directly on the table title "Geography Area Series: County Business Patterns."
- The data on the total employed population is in the top row ("Total for all sectors") in the column **"Paid Employees for pay period including March 12".**

b) To calculate the percentage:

- Divide the number of workers employed in high-risk industries (14.1) by the number of employed persons (14.2a).
- Multiply this result by 100 to get the **"Percentage of employed persons in high morbidity risk industries."**

Reference:
Bureau of Labor Statistics (BLS). Economic News Release: Occupational Injuries and Illnesses (Annual) News Release. Employer-Reported Workplace Injuries and Illnesses – 2015. USDL-16-20156. 2016. Available at: https://www.bls.gov/news.release/archives/osh_10272016.htm

TOPIC: OCCUPATIONAL HAZARDS INDICATOR # 15: Percentage of workers employed in occupations at high risk for occupational morbidity	
Demographic Group:	Employed persons
Numerator:	Employed persons age 16 years or older, in private sector occupations at high risk for occupational morbidity
Denominator:	Employed persons age 16 years or older, in all private sector industries for the same calendar year
Measures of Frequency:	Average number of employed persons in 2014 SOII high-risk occupations Percentage of employed persons in 2014 SOII high-risk occupations
Time Period:	Calendar year
Significance and Background:	In 2015, there were almost 3 million work-related injuries and illnesses reported by employers in the private industry sector in the United States. Of those, 95.2% were recordable injuries and 4.8% were recordable illnesses. Over half of injury and illness cases reported in 2015 were of a more serious nature that involved days away from work, job transfer, or restriction (DART cases). These cases occurred at a rate of 1.6 cases per 100 full-time workers (BLS, 2016).
Rationale:	Work-related injuries and illnesses are preventable, and control of occupational hazards is the most effective means of prevention. Concentrating on high-risk occupations for non-fatal injuries and illnesses helps prioritize limited resources.
Limitations of Indicator:	Differences in regional industrial practices may cause the ranking of high-risk occupations within a specific state or industry to differ from those identified from national data. The industries for which data are available also vary among States, primarily due to the differences in industry concentration and sample size from one State to the next; as a result, it is not recommended to compare numbers or rates between State or National data.
Data Resources:	Bureau of Labor Statistics' Current Population Survey (CPS) (numerator and denominator)
Limitations of Data Resources:	**Limitations pertaining to how the list of "high risk" occupations was conceived:** The BLS annual Survey of Occupational Injuries and Illnesses (SOII) is based on injury and illness data maintained by employers and is subject to sampling error, a function of BLS using a probability sample and not a census of all employers. Excluded from the survey are the military, self-employed individuals, farms with fewer than 11 employees, and Federal agencies. The CPS can be used to estimate the private sector employment in the US, excluding the self-employed, but may not match perfectly those workers covered in the SOII. **Further limitations pertaining specifically to the estimated proportion of workers employed in high-risk occupations:** Although this list of high-risk occupations for this indicator derives from injury rates reported in the BLS SOII survey, the estimate for the number of workers in any given state employed in a high-risk industry comes from the CDC Employed Labor Force (ELF) query system. The ELF system in turn is based on a subset of

	Community Population Survey (CPS) data. CPS is a weekly household survey conducted with a multistage cluster sampling design. As such, it has potential for sampling error. CPS could over– or under-estimate the number of workers in any given occupation, and estimates of fewer than 1,000 individuals are deemed unstable by BLS. Furthermore, due to differences in the way population controls are applied to estimates in the ELF system and in other BLS reports, certain employment estimates obtained through ELF may differ slightly from values reported directly by BLS. Finally, it is worth noting that values obtained using CPS-based data represent average number of workers in any given category and year, based on surveys conducted throughout the year.
HP2020 Objectives:	OSH-2
CSTE Positions:	None
Other Available Data:	The BLS SOII and the CPS provide occupation data for some states.
Recommendations	States could additionally identify their own state-specific high-risk occupations and assess associated employment patterns.

How-To Guide: Indicator #15

Percentage of Workers Employed In Occupations At High Risk For Occupational Morbidity

15.1 Number of Employed Persons in High Morbidity Risk 2010 Bureau of Census Occupations

The following are the high risk morbidity occupations based on Bureau of Labor Statistics "days away from work" cases and employment estimates for private sector workers for the year 2014. In 2014, the injury DAFW rate for all private sector workers was 97.8 per 10,000 FTE. Following the standard set in 2008, the 49 high risk occupations are those whose rates are more than double the rate for all workers (i.e., greater than 195.6 per 10,000 FTE). **So that states may collect trend data for this indicator, this list was used with 2013 data and is planned for use through 2018.**

Table 1. List of high risk occupations for occupational morbidity (N =49)

BOC occupation codes	BOC code title
1310	Surveyors, cartographers, and photogrammetrists
2720	Athletes, coaches, umpires, ad related workers
3400	Emergency medical technicians and paramedics
3600	Nursing, psychiatric, and home health aides
3648	Veterinary assistants and laboratory animal caretakers
3850	Police and sheriff's patrol officers/ (3860-Transit & railroad police are included in 3850)
3940	Crossing guards
4030	Food preparation workers
4210	First-line supervisors of landscaping, lawn service, and groundskeeping workers
4220	Janitors and building cleaners
4230	Maids and housekeeping cleaners
4250	Grounds maintenance workers
4350	Nonfarm animal caretakers
5410	Reservation and transportation ticket agents and travel clerks
5500	Cargo and freight agents
6130	Logging workers
6230	Carpenters
6240	Carpet, floor, and tile installers and finishers
6260	Construction laborers
6515	Roofers
6530	Structural iron and steel workers
6750	Septic tank servicers and sewer pipe cleaners
6765	Miscellaneous construction and related workers
6820	Earth drillers, except oil and gas
6840	Mining machine operators
7020	Radio and telecommunications equipment installers and repairers

7040	Electric motor, power tool, and related repairers
7120	Electronic home entertainment equipment installers and repairers
7160	Automotive glass installers and repairers
7200	Automotive service technicians and mechanics
7220	Heavy vehicle and mobile equipment service technicians and mechanics
7260	Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers
7300	Control and valve installers and repairers
7315	Heating, air conditioning, and refrigeration mechanics and installers
7340	Maintenance and repair workers, general
7420	Telecommunications line installers and repairers
7610	Helpers--installation, maintenance, and repair workers
8100	Part of Molders and molding machine setters, operators, and tenders, metal and plastic
8510	Furniture finishers
8530	Sawing machine setters, operators, and tenders, wood
8830	Photographic process workers and processing machine operators
8940	Tire builders
9050	Flight attendants
9120	Bus drivers
9130	Driver/sales workers and truck drivers
9140	Taxi drivers and chauffeurs
9240	Railroad conductors and yardmasters
9620	Laborers and freight, stock, and material movers, hand
9720	Refuse and recyclable material collectors

NOTE: For the 2015 data submission, NIOSH's Employed Labor Force (ELF) query system will be used to calculate the number and percentage of workers employed in occupations at high risk for occupational morbidity instead of DataFerrett, which was used for data submissions through the 2012 submission. ELF is a simpler and faster method, and it uses a single screen with pull-down menus and checkboxes to select data analysis options. Output is available in Excel, Word or Pdf.

NOTE: *To facilitate tracking and calculating number of employed persons, it is recommended that you copy and paste Table 1 into an excel spreadsheet.*

a) **To obtain the Number of Employed Persons in High Morbidity Occupations**

- Go to NIOSH's Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/. ELF is a web-based query system designed by NIOSH. It provides employed worker population estimates, for workers at least 15 years of age, from 1980 to the present.
- Click on ELF Estimates under the Queries tab on the upper left side of the screen.
- Step 1: Select type of labor estimates. Check "Number of workers."
- Step 2: Select query parameters.
  - Go to "Time Period" section. Under "Year(s)," select the year of interest.
  - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.

- Go to "Workforce" section. Click on "Expand Options." Scroll down to "Class of Worker (Primary Job 1994-2016). Keep "CPS groups" button selected. Using the Ctrl button, select both "Private, For Profit" and "Private, Nonprofit."
- Go to "Industry/Occupation" section. Click on Expand Options.
- Go to "B.O.C. Occupation (Primary Job 2011+)." Click on the "Select" button next to the box labeled "All Occupation Codes." Click on the "+" button next to each major occupation category.
- Click the "+" button again next to the occupation subgroups and check the boxes for the occupation codes of interest from Table 1.
- Click on "Hide" (the options are still selected, but less space is taken up on the screen). To check the occupation codes that you've selected already, click the "View" button next to "B.O.C. Occupation (Primary Job 2011+)." To add or delete selected codes, double-click on "Selected Codes."

- Step 3: Select report variables (optional).
  - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
  - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to "Occupation Code (Primary Job 2011+)" and select it.
- Advanced Options: Leave "Composite Weight" selected.
- Step 4: Submit the Query
  - Click the "Submit Query" button to process the data.
- Output: Results can be exported in Word, Excel or Pdf. Export in Excel to copy and paste results into your spreadsheet. All of the values together make up the **"Average number of employed persons in high morbidity risk occupations."**

15.2 Percentage of Employed Persons In High Morbidity Risk 2010 Bureau Of Census Occupations

a) To obtain the average annual number of employed persons using ELF
- Step 1: Select type of labor estimates. Check "Number of workers."
- Step 2: Select query parameters.
  - Go to "Time Period" section. Under "Year(s)," select the year of interest.
  - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.
  - Go to "Workforce" section. Click on "Expand Options."
  - Scroll down to "Class of Worker (Primary Job 1994-2016). Keep "CPS groups" button selected. Using the Ctrl button, select both "Private, For Profit" and "Private, Nonprofit."
- Step 3: Select report variables (optional).
  - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
  - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to "Labor force status" and select it.
- Advanced Option: Leave "Composite Weight" selected.
- Step 4: Submit the Query.

    - Click the button marked “Submit Query” to process the data.
- The total number includes the “Employed-At Work” and the “Employed-Absent.” This is the “**Average number of employed persons**”.

b) To calculate the percentage:

- Divide the number of workers employed in high-risk occupations (15.1a) by the number of employed persons (15.2a).
- Multiply this result by 100 to get the **“Percentage of workers employed in occupations at high risk for occupational morbidity.”**

Reference:
Bureau of Labor Statistics (BLS). Economic News Release: Occupational Injuries and Illnesses (Annual) News Release. Employer-Reported Workplace Injuries and Illnesses – 2015. USDL-16-20156. 2016. Available at: https://www.bls.gov/news.release/archives/osh_10272016.htm

TOPIC: OCCUPATIONAL HAZARDS INDICATOR # 16: Percentage of workers employed in industries and occupations at high risk for occupational mortality	
Demographic Group:	Employed persons
Numerator:	Employed persons age 16 years or older, in private sector industries and occupations at high risk for occupational mortality
Denominator:	Employed persons age 16 years or older, in all private industries for the same calendar year
Measures of Frequency:	Number of employed persons in high mortality risk 2012 Bureau of the Census industries.* Percentage of employed persons in high mortality risk 2012 Bureau of the Census industries. Number of employed persons in high mortality risk 2010 Bureau of the Census occupations.* Percentage of employed persons in high mortality risk 2010 Bureau of the Census occupations.
Time Period:	Calendar year
Significance and Background:	In 2015, 4,836 fatal work injuries were reported to the Census of Fatal Occupational Injuries (CFOI) Program administered by the Bureau of Labor Statistics (BLS). The 2015 total was the highest annual total since 2008. The overall fatal work injury rate for the U.S. in 2015 was 3.38 fatal injuries per 100,000 full-time equivalent workers, slightly lower than the final rate of 3.43 reported for 2014. On an average day, 14 workers die each day as a result of these injuries sustained at work (CFOI, 2016).
Rationale:	Multiple factors and risks contribute to work-related fatalities, including workplace and process design, work organization, worker characteristics, economics and other social factors. Surveillance of work-related fatalities can identify new hazards and case clusters, leading to the development of new interventions and development of new or revised regulations to protect workers. Concentrating on high-risk industries and occupations for fatalities helps prioritize limited resources.
Limitations of Indicator:	Differences in regional industrial practices may cause the ranking of high-risk industries and occupations within a specific State to differ from those identified from national data. State industry rates are not comparable to other states because of the large differences in the industry composition of employment by state.
Data Resources:	Bureau of Labor Statistics' Current Population Survey (CPS) (numerator and denominator)
Limitations of Data Resources:	**Limitations pertaining to how the list of "high risk" industries and occupations was conceived:** The CFOI program counts suicides at work as work-related fatalities, even when the cause of death may not be due to factors at work. CFOI does not count military deaths. To be consistent with Indicators #14 and #15, this

	indicator has been limited to private sector workers. Although, unlike Indicators #14 and #15, the self-employed are included. **Further limitations pertaining specifically to the estimated proportion of workers employed in high-risk industries and occupations:** Although this list of high-risk industries and occupations for this indicator derives from fatality rates reported in the BLS CFOI survey, the estimate for the number of workers in any given state employed in a high-risk industry comes from the CDC Employed Labor Force (ELF) query system. The ELF system in turn is based on a subset of Community Population Survey (CPS) data. CPS is a weekly household survey conducted with a multistage cluster sampling design. As such, it has potential for sampling error. CPS could over– or under-estimate the number of workers in any given occupation, and estimates of fewer than 1,000 individuals are deemed unstable by BLS. Furthermore, due to differences in the way population controls are applied to estimates in the ELF system and in other BLS reports, certain employment estimates obtained through ELF may differ slightly from values reported directly by BLS. Finally, it is worth noting that values obtained using CPS-based data represent average number of workers in any given category and year, based on surveys conducted throughout the year.
HP2020 Objectives:	OSH-1
CSTE Positions:	None
Other Available Data:	The BLS CFOI and the CPS provide industry and occupation data for most States.
Recommendations:	States could report their own high-risk industries and occupations and associated employment patterns.

How-To Guide: Indicator #16

Percentage of Workers Employed In Industries and Occupations At High Risk for Occupational Mortality

16.1 Average Number of Employed Persons in High Mortality Risk Industries

The following are the high risk mortality industries based on Bureau of Labor Statistics' Census of Fatal Occupational Injuries (CFOI) for private sector workers 16 years of age and older for the year 2014. These 38 industries had fatality rates more than twice as high (7.3 and higher) as the overall rate of 3.6 per 100,000 full-time equivalent workers. Rates calculated for workers aged 16 years or older in private sector industries.

Table 1. Bureau of Census industry codes and industry titles for high mortality risk private sector industries (N = 38)

2012 Census Industry Codes	Bureau of Census Industry Title
0170	Crop production
0180	Animal production and aquaculture
0270	Logging
0280	Fishing, hunting and trapping
0290	Support activities for agriculture and forestry
0370	Oil and gas extraction
0380	Coal mining
0390	Metal ore mining
0470	Nonmetallic mineral mining and quarrying
0490	Support activities for mining
0770	Construction
2180	Agricultural chemical manufacturing
2570	Cement, concrete, lime, and gypsum product manufacturing
2890	Coating, engraving, heat treating, and allied activities
3095	Commercial and service industry machinery manufacturing
3770	Sawmills and wood preservation
4070	Motor vehicle and motor vehicle parts and supplies merchant wholesalers
4180	Metals and minerals, except petroleum, merchant wholesalers
4280	Recyclable material merchant wholesalers
4480	Farm product raw material merchant wholesalers
4490	Petroleum and petroleum products merchant wholesalers
4570	Farm supplies merchant wholesalers
4580	Miscellaneous nondurable goods merchant wholesalers
4990	Beer, wine, and liquor stores
5680	Fuel dealers
6090	Water transportation

6170	Truck transportation
6190	Taxi and limousine service
6280	Scenic and sightseeing transportation
6290	Services incidental to transportation
7180	Other consumer goods rental
7190	Commercial, industrial, and other intangible assets rental and leasing
7770	Landscaping services
7790	Waste management and remediation services
7880	Business, technical, and trade schools and training
8390	Vocational rehabilitation services
8670	Recreational vehicle parks and camps, and rooming and boarding houses
8690	Drinking places, alcoholic beverages

**Industries selected based on those with rates more than twice as high (7.3 and higher) as the overall rate of 3.6 per 100,000 full-time equivalent workers. Rates calculated for workers aged 16 years or older in private sector industries.*
*** The overall rate and the rates for the categories listed in Table 1 were generated by NIOSH with restricted access to the Bureau of Labor Statistics Census of Fatal Occupational Injuries microdata.*

For the 2015 data submission, the National Institute for Occupational Safety and Health (NIOSH)'s Employed Labor Force (ELF) query system will be used to calculate the number and percentage of workers employed in industries at high risk for occupational mortality instead of DataFerrett, which was used through the 2012 data submission. ELF is a simpler and faster method, and it uses a single screen with pull-down menus and checkboxes to select data analysis options. Output is available in Excel, Word or Pdf.

To facilitate tracking and calculating number of employed persons, it is recommended that you copy and paste Table 1 into an excel spreadsheet.

16.1 Number of Persons Employed in High Mortality Risk Industries

a) To obtain the Number of Employed Persons in High Mortality Industries

- Go to NIOSH's Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/. ELF is a web-based query system designed by NIOSH. It provides employed worker population estimates, for workers at least 15 years of age, from 1980 to the present.
- Click on Elf Estimates under the Queries tab on the upper left side of the screen.
- Step 1: Select type of labor estimates. Check "Number of workers."
- Step 2: Select query parameters:
  - Go to "Time Period" section. Under "Year(s)," select the year of interest.
  - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.
  - Go to "Demographics" section. Click on "Expand options." Under "Age By," select "Individual Year" and highlight "All."
  - Go to "Workforce" section. Click on "Expand options."
  - Scroll down to "Class of Worker (Primary Job 1994-2016)." Keep "CPS groups" button selected. Using the CTRL button, select both "Private, For Profit," "Private, Nonprofit," "Self-Employed, Incorporated," and "Self-Employed, Unincorporated."
  - Go to "Industry/Occupation" section. Click on "Expand options."

- Select "B.O.C. Ind. Codes 2012" toggle button next to "Industry By".
- Click on the "Select" button next to the box labeled "B.O.C. Industry (Primary Job 2014+)."
- Click on the "+" button next to each major industry code of industry from Table 1.
- Click on "Hide" (the options are still selected, but less space is taken up on the screen). To check the industry codes that you've selected already, click the "View" button next to "B.O.C. Industry (Primary Job 2014+)." To add or delete selected codes, double-click on "Selected Codes."

- Step 3: Select report variables (optional).
  - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
  - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to "Industry Code (Primary Job 2014+)" and select it.
- Advanced Option: Leave "Composite Weight" selected.
- Step 4: Submit the Query
  - Click the "Submit Query" button to process the data.
- Output: Results can be exported in Word, Excel or Pdf. Export in Excel to copy and paste results into your spreadsheet. All of the values together make up the **"Average number of employed persons in high mortality risk industries."**

16.2 Percentage of Employed Persons in High Mortality Risk Industries

a) To obtain the average annual number of employed persons using ELF:

- Step 1: Select type of labor estimates. Check "Number of workers."
- Step 2: Select query parameters:
  - Go to "Time Period" section. Under "Year(s)," select the year of interest.
  - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.
  - Go to "Demographics." Click on "Expand options." Under "Age By," select "Individual Year" and highlight "All."
  - Go to "Workforce" section. Click on "Expand options."
  - Scroll down to "Class of Worker (Primary Job 1994-2016)."
  - Keep "CPS groups" button selected. Using the CTRL button, select "Private, For Profit", "Private, Nonprofit", "Self-Employed, Incorporated" and "Self-Employed, Unincorporated."
  - Go to "Industry/Occupation" section. If you have any industry codes selected, be sure to clear those selections before proceeding to ensure that all industries are included in the denominator calculations.
- Step 3: Select report variables (optional)
  - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
  - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to Labor Force Status" and select it.
- Advanced Option: Leave "Composite Weight" selected.
- Step 4: Submit the Query.
  - Click the button marked "Submit Query" to process the data.

- The total number includes the "Employed-At Work" and the "Employed-Absent." This is the "**Average number of employed persons.**"

b) To calculate the percentage:
- Divide the number of workers employed in high-risk mortality industries (16.1a) by the number of employed persons (16.2a).
- Multiply this result by 100 to get the **"Percentage of workers employed in industries at high risk for occupational mortality."**

16.3 Number of Employed Persons in High Mortality Risk Occupations

The following are the high risk mortality occupations based on Bureau of Labor Statistics' Census of Fatal Occupational Injuries (CFOI) for private sector workers 16 years of age and older for the year 2014. These 63 occupations had fatality rates more than twice as high (7.3 and higher) as the overall rate of 3.6 per 100,000 full-time equivalent workers. Rates calculated for workers aged 16 years or older in private sector industries.

Table 2. Bureau of Census occupation code and occupation titles for high mortality risk occupations (N = 63)

2010 Census Occupation Codes	BOC Occupation Titles
0205	Farmers, ranchers, and other agricultural managers
1310	Surveyors, cartographers, and photogrammetrists
2720	Athletes, coaches, umpires, and related workers
2760	Entertainers and performers, sports and related workers, all other
3940	Crossing guards
4210	First-line supervisors of landscaping, lawn service, and groundskeeping workers
4250	Grounds maintenance workers
4340	Animal trainers
4540	Tour and travel guides
6005	First-line supervisors of farming, fishing, and forestry workers
6050	Miscellaneous agricultural workers
6100	Fishers and related fishing workers
6130	Logging workers
6200	First-line supervisors of construction trades and extraction workers
6220	Brickmasons, blockmasons, and stonemasons
6250	Cement masons, concrete finishers, and terrazzo workers
6260	Construction laborers
6300	Paving, surfacing, and tamping equipment operators
6320	Operating engineers and other construction equipment operators
6355	Electricians
6400	Insulation workers

6420	Painters, construction and maintenance
6515	Roofers
6530	Structural iron and steel workers
6600	Helpers, construction trades
6660	Construction and building inspectors
6710	Fence erectors
6730	Highway maintenance workers
6750	Septic tank servicers and sewer pipe cleaners
6800	Derrick, rotary drill, and service unit operators, oil, gas, and mining
6840	Mining machine operators
6920	Roustabouts, oil and gas
6940	Other extraction workers
7000	First-line supervisors of mechanics, installers, and repairers
7020	Radio and telecommunications equipment installers and repairers
7210	Bus and truck mechanics and diesel engine specialists
7220	Heavy vehicle and mobile equipment service technicians and mechanics
7240	Small engine mechanics
7260	Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers
7315	Heating, air conditioning, and refrigeration mechanics and installers
7340	Maintenance and repair workers, general
7350	Maintenance workers, machinery
7360	Millwrights
7410	Electrical power-line installers and repairers
7420	Telecommunications line installers and repairers
7610	Helpers--installation, maintenance, and repair workers
7940	Rolling machine setters, operators, and tenders, metal and plastic
8530	Sawing machine setters, operators, and tenders, wood
8630	Miscellaneous plant and system operators
8650	Crushing, grinding, polishing, mixing, and blending workers
9000	Supervisors of transportation and material moving workers
9030	Aircraft pilots and flight engineers
9130	Driver/sales workers and truck drivers
9140	Taxi drivers and chauffeurs
9150	Motor vehicle operators, all other
9240	Railroad conductors and yardmasters
9300	Sailors and marine oilers
9310	Ship and boat captains and operators
9510	Crane and tower operators
9520	Dredge, excavating, and loading machine operators
9560	Hoist and winch operators
9650	Pumping station operators
9720	Refuse and recyclable material collectors

**Occupations selected based on those with rates more than twice as high (7.3 and higher) as the overall rate of 3.6 per 100,000 full-time equivalent workers. Rates calculated for workers aged 16 years or older in private sector industries.*

*** The overall rate and the rates for the categories listed in Table 2 were generated by NIOSH with restricted access to the Bureau of Labor Statistics Census of Fatal Occupational Injuries microdata.*

For the 2015 data submission, NIOSH's Employed Labor Force (ELF) query system will be used to calculate the number and percentage of workers employed in occupations at high risk for occupational mortality instead of DataFerrett, which was used through the 2012 data submission. ELF is a simpler and faster method, and it uses a single screen with pull-down menus and checkboxes to select data analysis options. Output is available in Excel, Word or Pdf.

16.3 Number of Persons Employed in High Mortality Risk Occupations

a) To obtain the Number of Employed Persons in High Mortality Occupations

- Go to NIOSH's Employed Labor Force (ELF) website at: https://wwwn.cdc.gov/wisards/cps/. ELF is a web-based query system designed by NIOSH. It provides employed worker population estimates, for workers at least 15 years of age, from 1980 to the present.
- Click on Elf Estimates under the Queries tab on the upper left side of the screen.
- Step 1: Select type of labor estimates- Make sure "Number of workers" is checked.
- Step 2: Select query parameters:
    - Go to "Time Period" section. Under "Year(s)," select the year of interest.
    - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.
    - Go to "Demographics" section. Click on "Expand options." Under "Age By," select "Individual Year" and highlight "All."
    - Go to "Workforce" section. Click on "Expand options."
    - Scroll down to "Class of Worker (Primary Job 1994-2016)." Keep "CPS groups" button selected. Using the CTRL button, select both "Private, For Profit," "Private, Nonprofit," "Self-Employed, Incorporated," and "Self-Employed, Unincorporated."
    - Go to "Industry/Occupation" section. Click "Expand options."
    - Select "B.O.C. Occupation (Primary Job 2011+)." Click on the "Select" button next to the box labeled "All Occupation Codes."
    - Click on the "+" button next to each major occupation category.
    - Click the "+" button again next to the occupation subgroups and check the boxes for the occupation codes of interest from Table 2. Click on "Hide" (the options are still selected, but less space is taken up on the screen).
    - To check the occupation codes that you've selected already, click the "View" button next to "B.O.C. Occupation (Primary Job 2011+)." To add or delete selected codes, double-click on "Selected Codes."
- Step 3: Select report variables (optional)
    - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
    - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to "Occupation Code (Primary Job 2011+)" and select it.
- Advanced Option: Leave "Composite Weight" selected.
- Step 4: Submit the Query

        - Click the button marked "Submit Query" to process the data.
    - Output: Results can be exported in Word, Excel or Pdf. Export in Excel to copy and paste results into your spreadsheet. All of the values together make up the **"Average number of employed persons in high mortality risk occupations."**

16.4 Percentage of Employed Persons in High Mortality Risk Occupations

a) To obtain the average annual number of employed persons using ELF:

- Step 1: Select type of labor estimates. Check "Number of workers."
- Step 2: Select query parameters:
    - Go to "Time Period" section. Under "Year(s)," select the year of interest.
    - Go to "Location" section. Click on "Expand options." Under "State(s)," select your state.
    - Go to "Demographics." Click on "Expand options." Under "Age By," select "Individual Year" and highlight "All."
    - Go to "Workforce" section. Click on "Expand options."
    - Scroll down to "Class of Worker (Primary Job 1994-2016)." Keep "CPS groups" button selected. Using the CTRL button, select "Private, For Profit", "Private, Nonprofit", "Self-Employed, Incorporated" and "Self-Employed, Unincorporated."
    - Go to "Industry/Occupation" section. If you have any occupation codes selected, be sure to clear those selections before proceeding to ensure that all industries are included in the denominator calculations.
- Step 3: Select report variables (optional)
    - Click on the arrow next to "Column Variable (1-Major Group)." Scroll down to "State" and select it.
    - Click on the arrow next to "Row Variable (2-Major Group)." Scroll down to Labor Force Status" and select it.
- Advanced Option: Leave "Composite Weight" selected.
- Step 4: Submit the Query.
    - Click the button marked "Submit Query" to process the data.
- The total number includes the "Employed-At Work" and the "Employed-Absent." This is the "**Average number of employed persons.**"

b) To calculate the percentage:

- Divide the number of workers employed in high-risk mortality occupations (16.3a) by the number of employed persons (16.4a).
- Multiply this result by 100 to get the **"Percentage of workers employed in occupations at high risk for occupational mortality.**

Reference:
Bureau of Labor Statistics (BLS). Economic News Release: Census of Fatal Occupational Injuries News Release. National Census of Fatal Occupational Injuries in 2015. USDL-16-2304. 2016. Available at: https://www.bls.gov/news.release/archives/cfoi_12162016.htm

TOPIC: INTERVENTION RESOURCES FOR OCCUPATIONAL HEALTH INDICATOR # 17: Occupational safety and health professionals	
Demographic Group:	Employed persons.
Numerator:	1. Number of board-certified occupational medicine physicians 2. Number of members of the American College of Occupational and Environmental Medicine (ACOEM) 3. Number of board-certified occupational health nurses 4. Number of members of the American Association of Occupational Health Nurses (AAOHN) 5. Number of board-certified industrial hygienists 6. Number of members of the American Industrial Hygiene Association (AIHA) 7. Number of board certified safety health professionals (BCSP) 8. Number of members of the American Society of Safety Engineers (ASSE)
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	1. Number of board-certified occupational medicine physicians. 2. Rate of board-certified occupational medicine physicians per 100,000 employees. 3. Number of members of ACOEM. 4. Rate of ACOEM membership per 100,000 employees. 5. Number of board-certified occupational health nurses. 6. Rate of board-certified occupational health nurses per 100,000 employees. 7. Number of members of AAOHN. 8. Rate of AAOHN membership per 100,000 employees. 9. Number of board-certified industrial hygienists. 10. Rate of board-certified industrial hygienists per 100,000 employees. 11. Number of members of AIHA. 12. Rate of AIHA membership per 100,000 employees. 13. Number of BCSP. 14. Rate of board certified safety health professionals per 100,000 employees. 15. Number of members of ASSE. 16. Rate of ASSE membership per 100,000 employees.
Time Period:	Calendar year.
Significance and Background:	Physicians with training and/or special interest in occupational medicine provide both primary, secondary and tertiary occupational health preventive services. In 1989, the American Medical Association recommended that there be one physician per 1,000 employees. Occupational health nurses provide a great deal of the onsite occupational health care. Industrial hygienists and safety professionals are typically the primary individuals responsible for evaluating

	workplaces and making recommendations to prevent occupational injuries and illnesses.
Rationale:	Work-related injuries and illnesses are preventable. It is important to determine if there are sufficient trained personnel to implement occupational health preventive services.
Limitations of Indicator:	Other important occupational health specialties such as fire prevention, health physicists, ergonomists are not included.
Data Resources:	American Board of Preventive Medicine (ABPM) diplomates database (www.abprevmed.org). (#1,2) Annual roster of members of the ACOEM (www.acoem.org). (#3,4) American Board of Occupational Health Nurses Directory (www.abohn.org). (#5,6) Annual roster of members of the AAOHN member directory (www.aaohn.org). (#7,8) American Board of Industrial Hygiene (www.abih.org). (#9,10) AIHA member directory (www.aiha.org). (#11,12) BCSP member directory (www.bcsp.org). (#13,14) ASSE member directory (www.asse.org). (#15,16) Bureau of Labor Statistics Current Population Survey Data. (denominator)
Limitations of Data Resources:	The numerator data include retired individuals and individuals who may devote the majority of their time to research and limited or no time to provision of actual preventive services. An individual may practice part-time or even full-time in the field of occupational health and not be board certified or a member of the organization representing occupational health professionals. The completeness and frequency of updating addresses varies by each organization. Members are often listed in a database by a preferred address, which may not be the address where they practice. Due to privacy concerns, individuals may opt out of being listed in membership rolls.
HP2020 Objectives:	None
CSTE Positions:	None
Other Available Data:	None
Recommendations:	States could contact the occupational health specialists in the state to confirm address and assess status and nature of activity.

How-To Guide: Indicator #17

Occupational Safety and Health Professionals

NOTE: For 2015, data are not available from the American Association of Occupational Health Nurses (AAOHN).

17. 1 Number of occupational safety and health professionals in each category

a) NIOSH will routinely distribute state data for the current Occupational Health Indicator development year prior to the June 30 submission due date by means of the Consortium of Occupational State Surveillance Listserv: (OCC-HLTH-STATE-SURV@LISTSERV.CDC.GOV).
Contact Patricia Schleiff at NIOSH at pls1@cdc.gov or 304.285.5874.with questions regarding data needs for this indicator.

NOTE: *This is administrative data that changes over time. Therefore, these data are collected at the same time each year.*

b) To obtain the denominator

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

c) To calculate the rate of occupational safety and health professionals in each category

- Divide the number of occupational safety and health professionals by the denominator.
- Multiply this result by 100,000 to get the **'Rate of occupational health and safety professionals per 100,000 employed persons age 16 years or older'**

TOPIC: INTERVENTION RESOURCES FOR OCCUPATIONAL HEALTH INDICATOR # 18: OSHA enforcement activities	
Demographic Group:	Employed persons.
Numerator:	Total number of OSHA inspections Total number of employed persons covered by OSHA inspections
Denominator:	Estimated number of establishments under OSHA jurisdiction Estimated number of employees under OSHA jurisdiction for the same calendar year
Measures of Frequency:	Annual number of establishments inspected by OSHA Estimated percentage of all establishments under OSHA jurisdiction inspected by OSHA Annual number of employees whose work areas were inspected by OSHA Estimated percentage of all employees under OSHA jurisdiction whose work areas were inspected
Time Period:	Calendar year
Significance and Background:	In 1970, Congress established the Occupational Safety and Health Administration (OSHA). The OSHA mission is to "assure safe and healthful conditions for working men and women by setting and enforcing standards and providing training, outreach, education and compliance assistance." Under the OSHA law, employers are responsible for providing a safe and healthful workplace for their workers. To this end, OSHA targets with inspections workplaces in high-hazard industries and employers with the highest injury and illness rates. Inspections can also be triggered by a fatality, a hospitalization of at least one worker, a work-related amputation, a work-related injury resulting in the loss of an eye, worker complaint or referral (including outside health/safety agency or media). Comprehensive information about inspections is found in the OSHA Field Operations Manual CPL 02-00-160, available on the OSHA web-site (https://www.osha.gov/OshDoc/Directive_pdf/CPL_02-00-160.pdf).
Rationale:	The measures of frequency for this indicator may approximate the added health and safety benefits and protections felt by workers as a result of their worksites being inspected.
Limitations of Indicator:	This indicator measures only enforcement activity, not other measures of OSHA activity such as education and compliance assistance. Because OSHA may conduct multiple inspections of the same establishment during the calendar year, the % of establishments inspected may be slightly overestimated. In addition, if OSHA conducts multiple inspections of the same worksite during the year, the number of workers covered by OSHA inspections may be over counted. In federal OSHA states and some OSHA state plan states, OSHA does not inspect farms with 10 or fewer employees. Agricultural establishments are excluded from the denominator in this indicator except for a few states; therefore, the percentages of establishments and employees covered may be overestimated in states that do inspect smaller farms.

Data Resources:	OSHA annual reports of total inspections conducted and the number of workers covered by these inspections (numerators). Bureau of Labor Statistics' data on Covered Employers and Wages (commonly referred to as the ES-202/QCEW data http://www.bls.gov/cew/home.htm) for the number of workers employed and establishments in the public and private sectors (denominators).
Limitations of Data Resources:	Employers participating in an OSHA Voluntary Protection Program (VPP) or the Safety and Health Achievement and Recognition Program (SHARP) are exempted from routine inspections. Excluding workers from these programs will reduce the numerator, resulting in an underestimate of the protective function. In QCEW data, individuals holding more than one job are counted multiple times.
HP2020 Objectives:	None
CSTE Positions:	None
Other Available Data:	Other indicators can be generated from the VPP and SHARPS program, the local emphasis programs and the participants of the 21D consultation program. Other data that can be generated from the inspections include type of violations and penalties, the number of all workers at the work-site inspected, union affiliation, inspection type, local or national emphasis initiatives, inspection and investigation reports by industrial classification and employer's name.
Recommendations:	Collaborate with state or regional OSHA Office to obtain more detailed informa above.

How-To Guide: Indicator #18

OSHA Enforcement Activities

18.1 Annual number of establishments inspected by OSHA in all OSHA-covered sectors

a) To obtain the annual number of establishments inspected

- NIOSH will routinely distribute state data for the current Occupational Health Indicator development year prior to the June 30 submission due date by means of the Consortium of Occupational State Surveillance Listserv (OCC-HLTH-STATE-SURV@LISTSERV.CDC.GOV). Contact Patricia Schleiff at NIOSH pls1@cdc.gov or at 304.285.5874 with questions regarding data needs for this indicator.
- From the data provided, obtain the number for TOTAL INSPECTIONS. This is the "**annual number of employer establishments inspected by OSHA**."

> ***NOTE:*** *These data will need to be collected for future years for all states from OSHA at one point in time each year. The procedure for doing so is detailed below. Please skip to section 18.2 if you have already obtained the data from NIOSH.*

OR

- Contact your federal or regional OSHA office to obtain OSHA Inspection reports with criteria #5 and 9 (also called INSP-5 and INSP-9 (state-plan states only)), which contain summary data on OSHA inspections and number of employees covered by these inspections for the calendar year. **Specify that you want the report for all sectors (private and/or public) over which OSHA has jurisdiction.** Regional office contact information can be found on the OSHA web site at www.osha.gov by scrolling to the bottom of the page and clicking on "OSHA Offices," then "Regional, Area Offices" and then selecting your region.
- In your request, specify that you would like the following:
  - The total number of OSHA inspections of establishments conducted within your state for the calendar year.
  - The total number of employees covered by inspections in all covered sectors (i.e., private and federal only for federal states and all sectors for state-plan states).
- On page 1 of the INSP-5 report, obtain the number for TOTAL INSPECTIONS. If your state has an INSP-9 report as well, add the total inspections from each report for a grand total. This will yield the **"Annual number of establishments inspected by OSHA"**.
- On page 2 of the INSP-5/INSP-9 report under "Employee information," obtain the number for EMPLOYMENT COVERED. This will yield the "**Annual number of employees whose work areas were inspected by OSHA"**.

NOTE: *OSHA sometimes conducts inspections that are limited to reviewing OSHA logs at the worksites. These are called "Records Inspections" and are included in the number of Total Inspections. Typically, the number of records inspections will be small relative to total inspections, so including these as part of the total should not have any substantial effect on the estimates.*

- Useful state data on OSHA inspections is also available at http://www.osha.gov/oshstats/index.html. However, the numbers of inspections for states may differ slightly from those included in the INSP-5 and INSP-9 reports, which are used in generating this indicator. The OSHA web site does not include information about number of employees covered.

18.2A Number of OSHA-Covered Establishments that are Eligible for OSHA Inspections

a) To obtain the number of OSHA-Covered Establishments that are Eligible for OSHA Inspections

- Go to the BLS web site http://www.bls.gov/cew/data.htm**.**
- Access your state's ES-202/QCEW statistics. Next to "State and County Wages" **click the yellow box "Multi-screen Data Search."** PLEAE NOTE: Estimates of establishments from the QCEW may not be reported as annualized. If that's the case, average the estimates from the four quarters (Qtr1 – Qtr4).
- In the first screen **select the first option "Total, all Industries,"** then **select next form**
- S**elect state**. For example, "25000- Massachusetts- Statewide," then **select next form.**
- **Select the relevant ownership sector(s)** for your search (i.e. federal government and private for federal OSHA states; all options "Total Covered" for state-plan OSHA states.) Depress the CTRL key to select more than 1 sector then **select next form.**
- **Select "Number of Establishments,"** then **select next form.**
- **Select "All Establishment Sizes."** then **select next form**
- Review the form and **select "Retrieve Data."**
- If the **Annual Number** is not provided, average the four quarterly estimates to obtain the **Annual Number** of establishments for the year of interest for each resulting table. This is the average number of OSHA-covered establishments in your state that are eligible for OSHA inspection.
- Go to 18.2B to exclude mines and farms from this denominator

18.2B Number of OSHA-Covered Establishments that are Eligible for OSHA Inspections (EXCLUDING MINES AND FARMS)

a) To adjust the denominator (18.2A) for exclusion of mines and farms in the numerator (18.1).

NOTE: *Mines are not covered by OSHA. For states that know their OSHA inspects all farms including farms with less than 10 employees, don't exclude agriculture from the denominator. Include this in a footnote when you submit your data.*

- Follow the first two bullets in 18.2A above. In the first screen, **depress the CTRL key to select the NAICS industry (codes) 111,112,212,213)** (Crop Production, Animal Production and Aquaculture, Mining except Oil and Gas, and Support Activities for Mining), then **select next form**
- **Select state**. (ex. 25000- Massachusetts – Statewide)
- **Select the relevant ownership sector(s)**
- **Select, "Number of Establishments"**
- **Select, "All Establishment Sizes"**
- **Select, "Retrieve Data"**

- If the **Annual Number** is not provided, average the four quarterly estimates to obtain the **Annual Number** of establishments for the year of interest for each resulting table **(NAICS 111, 112, 212, 213).**
- Subtract this sum from the number of establishments in18.2A to get the final denominator, "Average number of OSHA-covered establishments in the state (excluding mines and farms) that are eligible for inspection". *[18.2A – total # of mines & farms = final denominator (18.2B)]*

18.3 Percentage of OSHA-Covered Establishments Eligible for Inspection that were Inspected by OSHA

a) To calculate the percentage:

- Divide the numerator (18.1) by the **final denominator** adjusted for mines and farms (18.2B).
- Multiply by 100 to obtain the "**Percentage of all OSHA-covered establishments eligible for inspection that were inspected by OSHA"**.

18.4 Annual Number of Employees Whose Work Areas were Inspected by OSHA

- NIOSH will routinely distribute state data for the current Occupational Health Indicator development year prior to the June 30 submission due date by means of the Consortium of Occupational State Surveillance Listserv (OCC-HLTH-STATE-SURV@LISTSERV.CDC.GOV). Contact Patricia Schleiff at NIOSH at pls1@cdc.gov or 304.285.5874 with questions regarding data needs for this indicator.
- From the data provided, obtain the number for EMPLOYMENT COVERED. This is the **"annual number of employees whose work areas were inspected by OSHA".**

18.5A Number of OSHA-Covered Employees in the State that are Eligible for Inspection

- Go to the BLS web site http://www.bls.gov/cew/data.htm**.**
- Access your state's ES-202/QCEW statistics. Next to "State and County Wages" **click the yellow box "Multi-screen Data Search."** PLEAE NOTE: Estimates of employees from the QCEW may not be reported as annualized. If that's the case, average the estimates from the four quarters (Qtr1 – Qtr4).
- In the first screen **select the first option "Total, all Industries,"** then **select next form**
- S**elect state**. For example, "25000- Massachusetts- Statewide," then **select next form.**
- **Select the relevant ownership sector(s)** for your search (i.e. federal and private for federal OSHA states; all options "Total Covered" for state-plan OSHA states.) Depress the CTRL key to select more than 1 sector.
- **Select "All Employees,"** then **select next form.**
- **Select "All Establishment Sizes."** then **select next form**
- Review the form and **select "Retrieve Data."**
- If the **Annual Number** is not provided, average the four quarterly estimates to obtain the **Annual Number** of employees for the year of interest for each resulting table. This is the average total number of OSHA-covered employees in the state.
- Go to 18.5B to exclude mines and farms from this denominator

18.5B Number of OSHA-Covered Employees in the State that are Eligible for Inspection (EXCLUDING MINERS AND FARMERS)

Adjust denominator (18.5A) for exclusion of miners and farmers in the numerator (18.4).
NOTE: *Mines are not covered by OSHA. For states that know their OSHA inspects all farms including farms with less than 10 employees, don't exclude agriculture from the denominator. Include this in a footnote when you submit your data.*

- Follow 1) and 2) in 18.5A above. In the first screen, **depress the CTRL key to select the NAICS (industry) codes 111,112,212,213)** (Crop Production, Animal Production and Aquaculture, Mining except Oil and Gas, and Support Activities for Mining), then **select next form**
- **Select state**. (ex. 25000- Massachusetts – Statewide)
- **Select the relevant ownership sector(s)**
- **Select, "All Employees"**
- **Select, "All Establishment Sizes"**
- **Select, "Retrieve Data"**
- If the **Annual Number** is not provided, average the four quarterly estimates to obtain the **Annual Number** of employees for the year of interest for each resulting table **(NAICS 111, 112, 212, 213).**
- Subtract this sum from the number of employees in18.5A to get the final denominator, "Average number of OSHA-covered employees in the state (excluding miners and farmers) that are eligible for inspection". *[18.5A – total # of miners & farmers = final denominator (18.5B)]*

18.6 Percentage of OSHA-Covered Employees Eligible for Inspection Whose Work Areas were Inspected by OSHA

a) To calculate the percentage:
- Divide the numerator (18.4) by the denominator adjusted for miners and farmers (18.5B).
- Multiply by 100 to obtain the "**Percentage of all OSHA-covered employees eligible for inspection whose work areas were inspected by OSHA.**"

TOPIC: SOCIOECONOMIC IMPACT OF OCCUPATIONAL INJURIES AND ILLNESSES INDICATOR # 19: Workers' compensation awards	
Demographic Group:	Employed persons
Numerator:	Total amount of workers' compensation benefits paid
Denominator:	Number of workers with workers' compensation coverage for the same calendar year Total employed civilians 16 years and older
Measures of Frequency:	Total amount of workers' compensation benefits paid Average amount of workers' compensation benefits paid per covered worker
Time Period:	Calendar year
Significance and Background:	In 2015, workers' compensation covered an estimated 135.6 million U.S. workers, an increase of 7.7% across the five years reported in the study (2011-2015) (McLaren CF, Baldwin ML, 2016). In 2015, workers' compensation total benefits paid were $61.9 billion, 1.4 percent decline from 2013. Total benefits paid were $0.86 per $100 of covered wages, a decrease of $0.15 since 2011.
Rationale:	Workers' compensation awards are reviewed to establish whether the reported medical condition is work-related. Accepted awards represent known work-related injuries and illnesses, and often more severe cases. The total and average amounts of benefits paid estimate the burden of these events, which can help justify prevention programs and activities.
Limitations of Indicator:	This is a gross indicator of the burden of occupational injury and illness. It does not include human, noneconomic costs nor all the economic costs associated with occupational injuries and illnesses. These data are more appropriate for evaluating trends within a state rather than comparisons between states because of differences in wages and medical costs, the compensation determination, industry types and risks, and policies on permanent disability payments. Even within a state, changes in policies, wages and medical care expenses must be considered.
Data Resources:	National Academy of Social Insurance (www.nasi.org).
Limitations of Data Resources:	Workers' compensation data are not complete, as the majority of individuals with work-related illnesses and many with work-related injuries do not file for workers' compensation. Workers' compensation claims may be denied. The number of days away from work required before a case is recorded in the workers' compensation system will vary by state. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, railroad or longshore and maritime workers may not be covered by state workers' compensation systems. Compensation award payments are frequently made over time, thus annual awards may not reflect the full cost of injuries and illnesses for a given year.
HP2020 Objectives:	OSH-2
CSTE Positions:	None

Other Available Data:	NASI tables with state-specific data have included: Number of Workers Covered by Workers' Compensation and Total Covered Wages Workers' Compensation Benefits by Type of Insurer and Medical Benefits
Recommendations:	NASI also provides the employers' costs for workers' compensation. State workers' compensation system and state employment data may provide additional information about incidence and costs that would increase the usefulness of these data for prevention efforts. States may supply industry- and occupation-specific counts, costs and rates of accepted workers' compensation claims. Age and gender can also be used to better define the burden of occupational injuries/illnesses. Many states report data collected for the subset of accepted time-loss claims—those involving days away from work—which are likely to have the highest costs to and affects upon workers and employers.

How-To Guide: Indicator #19

Workers' Compensation Awards

19.1 Total amount of workers' compensation benefits paid

- Go to National Academy of Social Insurance web site: http://www.nasi.org/research/workers-compensation
- Click on the report entitled: "Workers' Compensation: Benefits, Coverage, and Costs".
- Click on 'Download the report' (must have Adobe Acrobat).
- Go to Table titled "Workers' Compensation Total Benefits Paid and Five-Year Percent Change, by State, <<**YEARS**>> ".
- Identify state and read 'Total Benefits (thousands)' column for appropriate year. Multiply by 1,000.

19.2 Average amount of workers' compensation paid per covered worker

- Go to National Academy of Social Insurance web site: http://www.nasi.org/research/workers-compensation
- Click on the first report entitled: "Workers' Compensation: Benefits, Coverage, and Costs".
- Click on 'Download' (must have Adobe Acrobat).
- Go to Table 3 titled "Workers' Compensation Covered Workers, by State, <<**YEARS**>> (in thousands)".
- Identify your state for year of interest. Multiply by 1,000.

b) To calculate the average amount of workers' compensation benefits paid per covered worker:

- Divide the numerator (19.1) by the denominator (19.2) – expresses the result in dollars per covered worker.

Reference:
McLaren CF, Baldwin ML, Workers' Compensation: Benefits, Coverage, and Costs, 2014. National Academy of Social Insurance. Washington, DC. October 2017.

TOPIC: CUMULATIVE OCCUPATIONAL INJURY INDICATOR # 20: Work-related low-back disorder hospitalizations	
Demographic Group:	Employed persons
Numerator:	Inpatient hospital discharges for low back disorders with primary payer coded as workers' compensation
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of work-related surgical low back disorder hospitalizations for persons age 16 years or older (numerator) Annual rate of work-related surgical low back disorder hospitalization per 100,000 employed persons age 16 years or older Annual number of work-related low back disorder hospitalizations for persons age 16 years or older (numerator) Annual rate of work-related low back disorder hospitalization per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Each year 15-20% of Americans report back pain, resulting in over 100 million workdays lost and more than 10 million physician visits. National Health Interview survey data estimates that two-thirds of all low back pain cases are attributable to occupational activities. The cost of back pain is also disproportionate, as it represents about 20% of workers' compensation claims, but nearly 40% of the costs. In 2003, 3.2% of the total U.S. workforce experienced a loss in productive time due to back pain. The total cost of this productive time lost to back pain is estimated to be in excess of $19.8 billion dollars (Stewart, 2003; Ricci, 2003).
Rationale:	Hospitalizations for work-related back disorders have serious and costly effects including: high direct medical costs, significant functional impairment and disability, high absenteeism, reduced work performance, and lost productivity. Well-recognized prevention efforts can be implemented for high risk job activities and reduce the burden of work-related low back disorders.
Limitations of Indicator:	Hospital discharge records are only available for non-federal, acute care hospitals. Many individuals with work-related injuries do not file for workers' compensation or fail to recognize work as the cause of their injury. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, railroad or longshore and maritime workers are not covered by state workers' compensation systems. The expected payer on hospital discharge records may not be accurate and reflect the actual payer. Data between states may not be comparable due to differences in benefit adequacy in states' workers' compensation programs. Trends in the use of outpatient surgical centers may limit the interpretation of this indicator. The indicator utilizes only the first seven diagnosis and four procedure code fields to include and exclude cases. Many states have more diagnosis and procedure code fields that could be used to include and exclude cases. The indicator excludes patients hospitalized outside their state of residence.

Data Resources:	Inpatient hospital discharge data (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Practice patterns and benefit payment systems may affect decisions by health care providers to hospitalize patients, to correctly diagnose work-related conditions, authorize surgery and/or to list the condition as a discharge diagnosis. The number of diagnoses listed on discharge summaries may vary according to regional practice patterns and by the persons completing discharge summaries. All admissions are counted, including multiple admissions for a single individual. Residents of one state may be hospitalized in another state and not be reflected in his or her state's inpatient hospitalization data. Until hospital discharge data are available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity are not collected or may be incomplete in some states. Hospital discharge records are only available for non-federal, acute care hospitals.
HP2020 Objectives:	OSH-2 and OSH-3
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, diagnosis, residence zip code, hospitalization cost
Recommendations:	Age, gender, race/ethnicity, zip code specific counts and rates can be used to bett pattern of work-related hospitalizations. States that have access to statewide outp surgery data can compare trends of outpatient surgery for low back disorders to data from indicator.

How-To Guide: Indicator #20

Hospitalizations for Work-Related Low Back Disorders*

Note: Effective October 1, 2015 health care organizations and providers were required to start using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). ICD-10-CM codes for Low Back Disorders have not been finalized. Therefore, we will only be collecting 1st, 2nd, and 3rd quarters for 2015. Rates will not be collected this year for this OHI. If you are unable to submit data by quarter you can submit data for the entire year. Please see the reporting template. Contact Patty Schleiff (pls1@cdc.gov) with questions regarding data submissions for this indicator.

This indicator has two measures: 1) Surgical low back disorder hospitalizations; and 2) all low back disorder hospitalizations. Initially surgical cases are identified. Then to obtain all low back disorder hospitalizations, non-surgical cases are identified and added to the surgical cases. Certain hospitalizations – those listed in Table 3 – are excluded because the conditions are likely related to trauma or a non-occupational disease.

A generic SAS program has been developed that will generate values for X.1 and X.3 below. The program requires minor modifications: state-specific variable names and value ranges must be inserted where indicated. The program is available separately.

20.1 Annual number of work-related surgical low back disorder hospitalizations for persons age 16 years and over

a) Obtain from the hospital discharge data file the number of cases meeting the following criteria for the 1st (1/1/2015-3/31/2015), 2nd (4/1/2015-6/30/2015), and 3rd (7/1/2015-9/30/2015) quarters of 2015:

- Definite surgical low back disorder hospitalizations are identified with a relevant diagnostic code (Table 1) in any of the first seven diagnosis fields in combination with a relevant surgical procedure code (Table 2) in any of the first four procedure fields. You must then exclude cases that have an exclusion criteria listed in Table 3, A or B.
- Primary payer = Workers' Compensation.
- Limit age to those 16 years or older (age at admission is preferred).
- Select for state of residence = '*your state*.'
- Exclude:
  - age unknown or <16 years old
  - out-of-state residents and unknown state of residence
  - out-of-state hospitalizations
- Use un-deduplicated data (no exclusions for deaths, readmissions).
- Use discharge during calendar year, not fiscal year.
- Use all cases reported on the discharge file, regardless of length of stay.
- This will yield the **'Total annual number of work-related surgical low back hospitalizations for persons age 16 years or older.'**
- Submit data by quarters 1, 2, and 3 as indicated on the reporting template.

20.2 Annual crude rate of hospitalization for low back surgery per 100,000 employed persons age 16 years or older

Note: We will NOT be collecting rates for this OHI for 2015.

a) To obtain the denominator for the rate:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

***NOTE:** Data from 1997 through 2002 can be found at http://www.bls.gov/opub/gp/laugp.htm.*

b) To calculate the rate:

- Divide numerator (X.1) by the denominator (X.2a).
- Multiply this result by 100,000 to get the **'Annual crude rate of hospitalization for low back surgery per 100,000 employed persons age 16 years or older'**

20.3 Annual number of work-related low back disorder hospitalizations for persons age 16 years and over

In order to generate the total number of low back hospitalizations you first need to generate the number of non-surgical hospitalizations. This result is then added to the number of surgical hospitalizations (X.1). The procedure below generates the number of low back non-surgical hospitalizations.

Obtain from the hospital discharge data file the number of cases meeting the following criteria:

- Definite non-surgical low back disorder hospitalizations are identified with a relevant diagnostic code from Table 1 in any of the first seven diagnosis fields excluding cases identified by codes in Table 3, A or C.
  - Primary payer = Workers' Compensation.
  - Limit age to those 16 years and older (age at admission is preferred).
  - Select for state of residence = '*your state*.'
  - Exclude:
    - age unknown
    - out-of-state residents and unknown state of residence
    - out-of-state hospitalizations
  - Use un-deduplicated data (no exclusions for deaths, readmissions).
  - Use discharge during calendar year, not state or federal fiscal year.
  - Use all cases reported on the discharge file, regardless of length of stay.
  - This will yield the total annual number of work-related non-surgical low back hospitalizations for persons age 16 years or older. = "NON-SURGICAL CASES"
  - Add "NON-SURGICAL CASES" and results from X.1 from the preceding step.
  - This will yield the **'Total annual number of work-related low back hospitalizations for persons age 16 years or older.'**

20.4 Annual crude rate of hospitalization for work-related low back disorder per 100,000 employed persons age 16 years or older

To calculate the rate:

Note: We will NOT be collecting rates for this OHI for 2015.

- Divide numerator (X.3) by the denominator (X.2a).
- Multiply this result by 100,000 to get the **'Annual crude rate of hospitalization for work-related low back disorders per 100,000 employed persons age 16 years or older'**

Table 1. Diagnostic categories and ICD-9-CM codes that are associated with low back disorders.

Diagnostic Category:	ICD-9-CM Codes: (All Seven Diagnosis Fields)	Definitions:
Herniated Disc	722.10	Lumbar disc displacement without myelopathy
	722.73	Lumbar disc disorder with myelopathy
Probable degenerative changes	721.3	Lumbosacral spondylosis without myelopathy
	722.52	Lumbar or lumbosacral disc degeneration
	722.93	Other or unspecified lumbar disc disorder
Spinal stenosis	721.42	Lumbar spinal cord spondylogenic compression
	724.02	Lumbar stenosis
Possible instability	724.6	Sacral disorders including lumbosacral instability
	738.4	Acquired spondylolisthesis
	756.11	Lumbosacral spondylolysis
	756.12	Spondylolisthesis
Miscellaneous	722.32	Schmorl's node, Lumbar Region
	722.83	Lumbar postlaminectomy synd.
	724.2	Lumbago
	724.3	Sciatica
	739.3	Non-allopathic lesions, lumbar region.
	739.4	Non-allopathic lesions, sacral region.

Table 2. Procedural Categories and ICD-9-CM codes for identifying possible cases of low back surgery.

Procedural Category:	ICD-9-CM Procedure Codes: (All Four Procedure Fields)	Definition:
Laminectomy	03.02, 03.09	Spinal cord exploration and decompression
Discectomy	80.50, 80.51, 80.59	Intervertebral disc excision or destruction
	80.52	Intervertebral chemonucleolysis
Fusion	81.00, 81.04-7, 81.09	Spinal fusion
	81.08	Spinal refusion
Other	03.6	Lysis of spinal cord or nerve root adhesion
	78.69	Removal of internal fixation device

Table 3. Exclusion criteria for surgical and non-surgical low back disorder cases

A. Exclusions from both surgical and non-surgical cases

Diagnostic Category	ICD-9 CM Diagnosis Code
Neoplasms	140.0 - 239.9
Intraspinal abscess and osteomyelitis	324.1, 730.0 - 730.99
Inflammatory spondyloarthropathies	720.0 – 720.9
Pregnancy	630 – 676
Vertebral fractures with spinal cord injury, open vertebral fractures, and vertebral dislocations	805 – 806.9, 839 -839.59

Procedural Category	ICD-9 CM Procedure Code
Chordotomy	03.20-0.3.29

B. Exclusions from surgical cases only

Diagnostic Category	ICD-9 CM Diagnosis Code
Pathological fractures	733.1, 733.13
Closed vertebral fractures without spinal cord injury	805.0, 805.2, 805.4, 805.6, 805.8
Cervical and thoracic disorders **(First diagnosis field only)**	353.2-353.3, 721.0-721.2, 721.41, 722.0, 722.11, 722.72, 722.81, 722.82, 722.91-722.92, 723.0, 723.4, 724.01

Procedural Category	ICD-9 CM Procedure Code
Cervical spinal fusions	81.01-81.03

C. Exclusions from non-surgical cases only

Procedural Category	ICD-9 CM Procedure Code
Back surgery	03.01-03.09, 03.1, 03.4-03.8, 03.93-03.94, 03.97-03.98, 80.5-80.59, 81.00, 81.04-81.09
Possible Back surgery	78.59, 78.69

* The algorithm to identify low back hospitalizations was derived from Cherkin DC, Deyo RA, Volinn E, Loeser JD: Use of the International Classification of Diseases (ICD-9-CM) to identify hospitalizations for mechanical low back problems in administrative databases. Spine 17:817-824, 1992.

TOPIC: OCCUPATIONAL ILLNESSES INDICATOR # 21: Asthma among adults caused or made worse by work	
Demographic Group:	Ever-employed adults with current asthma
Numerator:	Ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work
Denominator:	Ever-employed adults (18 years or older) with current asthma
Measures of Frequency:	Weighted estimate of the number of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work. Estimated percent of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work
Time Period:	Calendar year
Significance and Background:	Asthma is a chronic inflammatory disease of the airways that affects more than 18 million adults in the United States (Centers for Disease Control and Prevention [CDC] & National Center for Health Statistics [NCHS], 2010). Work-related asthma is a term used to describe asthma that has a temporal association between asthma symptoms and the work environment (Vandenplas & Malo, 2003; Tarlo et al., 2008). It has been estimated that approximately 36% to 58% of adult asthma is caused or made worse by workplace exposures, which translates to approximately 9.7 million adults in the United States (Knoeller, Mazurek, & Moorman, 2011). However, work-related asthma continues to be underdiagnosed (Tarlo et al., 2008; Henneberger et al., 2008; Balmes et al., 2003). If diagnosed early, work-related asthma may be partially or completely reversible if exposures can be identified and properly stopped or controlled (Tarlo et al., 2008). The Asthma Call-Back Survey (ACBS) contains multiple questions related to the work-relatedness of a respondent's asthma and these questions are administered to adults 18 years or older. Four of the questions ask about asthma caused or made worse by the respondent's current or previous jobs. Two other questions ask about whether the respondent was told by or ever told their health care provider that their asthma was work related. The latter two questions require that the respondent both encountered a healthcare professional and that a discussion took place about work-relatedness of their asthma. This occurs in approximately 22 to 25% of respondents who report their asthma is caused or aggravated by work (Lutzker et al., 2010). The two questions on whether the respondent was told by or ever told their healthcare provider that their asthma was work related may also underestimate the true burden of work-related asthma because work-related asthma is often under-diagnosed. Physicians document asking about work-related asthma in only 15% of medical charts of asthma patients, suggesting under-diagnosis of work-related asthma (Milton et al., 1998). Additionally, the American Thoracic Society estimates that as much as 58% of asthma is attributable to work (Balmes et al., 2003), a measure much closer to that which can be obtained by using the four questions on asthma caused or made worse by work.

Rationale:	Work-related asthma is preventable but often goes undiagnosed by physicians. Research has shown that work-related asthma can have adverse effects on the worker, including increased morbidity, adverse socioeconomic impacts and difficulty getting and sustaining work. Estimating the burden of asthma caused or made worse by work can help target prevention programs and activities.
Limitations of Indicator:	The data represents a population-based estimate of asthma caused or made worse by work and are subject to measurement, nonresponse and sampling errors. The indicator does not distinguish between new-onset asthma and work-aggravated asthma. The Asthma Call Back Survey began new weighting methods in 2011 and the wording and order of questions changed in 2012, therefore any trend analysis would need to be restricted to 2012 forward. States using landline only versus landline and cellphone methodology do not have comparable estimates.
Data Resources:	Asthma Call-Back Survey (numerator) Asthma Call-Back Survey (denominator)
Limitations of Data Resources:	The Asthma Call-back Survey (ACBS) is an in-depth asthma survey conducted among Behavioral Risk Factor Surveillance System (BRFSS) respondents who report an asthma diagnosis and agree to participate. BRFSS is a cross-sectional telephone health survey of non-institutionalized adults being collected on a monthly basis in all 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, and Guam. Not all states participate in the ACBS. In 2010, 39 States participated in the ACBS, 40 in 2011 and 42 in 2012. Because it is a telephone health survey, individuals must have a telephone to participate. It is also only conducted in select languages which can vary by State; therefore, it does not include individuals who speak all languages. The data is subject to the bias of self-reported data. Additional limitations in estimation methods (i.e., measurement, nonresponse, and sampling errors) are described in the "BRFSS Operational and User's Guide." ftp://ftp.cdc.gov/pub/Data/Brfss/userguide.pdf
HP2010 Objectives:	None
CSTE Positions:	None
Other Available Data:	There are other data available in the BRFSS and ACBS that can be used for analysis, including: BRFSS: Age, gender, race/ethnicity, education level, household income, industry and occupation (some states) ACBS: Age of asthma diagnosis, cost-barriers, health insurance, health care use, asthma symptoms, asthma control.
Recommendations:	State programs may want to cross-tabulate by variables mentioned above. If you are interested in analyzing data by different subgroups do not subset your data to create these subgroups and analyze separately. Creating a new dataset will result in incorrect confidence intervals, standard errors, and tests of significance. If you are interested in testing for significance, presenting confidence intervals, or presenting standard errors, you must use the whole dataset and then perform a domain analysis.

How-To-Guide: Indicator #21

Asthma among Adults Caused or Made Worse By Work

This indicator uses data from the Asthma Call Back Survey (ACBS). Contact your Behavioral Risk Factor Surveillance System (BRFSS) coordinator or your State Asthma Program to obtain the data or for assistance analyzing this data, if necessary. A list of BRFSS State Coordinators can be found here: http://www.cdc.gov/brfss/state_info/coordinators.htm The asthma data are also available on the CDC website at http://www.cdc.gov/BRFSS/acbs/index.htm.

The ACBS uses a complex sample design. Computer programs that take such complex sample designs into account are available. SAS, SUDAAN, Epi Info, SPSS and STATA are among those suitable for analyzing these data. When using these software products, users must specify that the sample design is "With Replacement" and also specify the stratum variable (_STSTR), the cluster or primary sampling unit variable (_PSU), and the record weight (LLCPWT_F). In 2013, some states did not implement the Asthma Call-back Survey using both landline telephone and cellphone sampling. Data from these states should be weighted using the landline sample weight (LANDWT_F). State estimates using the landline only methodology are not comparable to state estimates using landline and cellphone methodology. For more information, speak to your BRFSS Coordinator or see http://www.cdc.gov/brfss/acbs/2012/pdf/ACBS_2012.pdf.

Sample SAS code is included for this indicator; however, the other software packages named above can be used as well. There are also other methods within SAS that may be used. If you do not have access to the statistical software you need, you may want to reach out to your State Asthma Epidemiologist or BRFSS Coordinator for assistance.

21.1 and 21.2 Weighted frequency and proportion of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work

a) To create a dataset variable selecting for ever-employed adults with current asthma: (Do not create a new dataset based on selected variables because this will negatively alter the weighting and provide inaccurate results.)
    - Select for respondents that were ever employed outside the home using the variable EMP_EVER and values "1" and "6". (Question from survey: Have you ever been employed outside the home?).

      ***NOTE**: The question on whether a respondent has ever been employed outside the home is only asked of adult respondents who indicated not being currently employed. Therefore, if they were previously employed but not currently employed they will have a value of "1". Those who are currently employed (EMP_STAT values "1" or "2") are auto- filled into this variable with a value of "6" because of skip patterns.*

    - Select for respondents with current asthma by using the variable _CUR_ASTH_C with the value of "1".

NOTE: *The variable_CUR_ASTH_C is a calculated variable in the ACBS data file and is not identical to the BRFSS asthma variables ASTHNOW and ASTHMA2. This is because at the time of the call-back interview, the respondent is asked to confirm the responses to the two asthma questions from the BRFSS interview. Not all respondents agree with the responses that were recorded from the initial interview. The combined call-back variable _CUR_ASTH_C uses the responses at the time of the call-back interview.*

Sample SAS code:

```
if _cur_asth_c = 1 and EMP_EVER1 in ( 1 6 ) then curastheveremp = 1;
else curastheveremp = 9;
```

b) Within the dataset, create a calculated variable called WRA_4Q (asthma caused or made worse by exposures at work)

- To define WRA_4Q combine the following four questions from the ACBS:
  - WORKENV5: Are your asthma symptoms MADE WORSE by chemicals, smoke, dust, or mold in your CURRENT job
  - WORKENV6: Was your asthma first CAUSED by things like chemicals, smoke, dust or mold in your CURRENT job
  - WORKENV7: Were your asthma symptoms MADE WORSE by things like chemicals, smoke, dust, or mold in any PREVIOUS job you ever had?"
  - WORKENV8: Was your asthma first CAUSED by things like chemicals, smoke, dust, or mold in any PREVIOUS job you ever had?
- If *any* of these four variables has a yes response (value of "1") then the calculated variable (WRA_4Q) has a "yes" response and coded as 1.
- If *all* of the four variables have a no response then the calculated variable (WRA_4Q) has a "no" response and coded as 2. For purposes of this indicator, values "2" and "10" should be considered a "no" response for variables WORKENV5 and WORKENV6. Value "2" should be considered a "no" response for variables WORKENV7 and WORKENV8.
- All other responses are coded to 9 for the calculated variable (WRA_4Q).

NOTE*: Be aware of complex skip patterns that auto fill responses into variables if you use this data for other analyses.*

Sample SAS code:

```
if WORKENV5=1 or WORKENV6=1 or WORKENV7=1 or WORKENV8=1 then
WRA_4Q=1;
else if WORKENV5 in (2 10) and WORKENV6 in (2 10) and WORKENV7
in (2) and WORKENV8 in (2) then WRA_4Q=2;
else WRA_4Q=9;
```

c) Calculate the weighted frequency and proportion of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work. Be sure to specify the stratum variable (_STSTR), the cluster or primary sampling unit variable (_PSU), and the record weight. In states using the landline telephone only sample, use LANDWT_F as the record weight. In states using the landline telephone and cellphone sample, use LLCPWT_F as the

record weight. To determine if your state used the landline or landline and cellphone sample, see http://www.cdc.gov/brfss/acbs/2012/pdf/ACBS_2012.pdf.

Sample SAS code for states using landline telephone only sample:

```
proc surveyfreq;
strata _ststr;
cluster _psu;
weight landwt_f;
table curastheveremp*wra_4Q/row cl; run;
```

Sample SAS code for states using landline telephone and cell phone sample:

```
proc surveyfreq;
strata _ststr;
cluster _psu;
weight llcpwt_f;
    table curastheveremp*wra_4Q/row cl; run;
```

d) To determine the weighted estimate of the number **of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work and the estimated proportion of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work**" Go to your output

- Only look at the results where curastheveremp=1 and WRA_4Q = 1.
  - 21.1 - The Weighted Frequency is the "**Weighted estimate of the number of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work.**"
  - 21.2 - The Row Percent is the "**Estimated proportion of ever-employed adults with current asthma who report that their asthma was caused or made worse by exposures at work**".

NOTE: *You can also obtain the 95% CIs.*

TOPIC: HEALTH EFFECT INDICATOR # 22: Work-related severe traumatic injury hospitalizations	
Demographic Group:	Employed persons
Numerator:	Inpatient hospital discharges with (1) primary payer coded as workers' compensation, AND (2) first-listed diagnosis contained in the specified list of severe traumatic injuries
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of work-related inpatient hospitalizations for severe traumatic injury for persons age 16 years or older (numerator) Annual crude rate of work-related inpatient hospitalizations for severe traumatic injury per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Acute work-related trauma is a leading cause of death and disability for U.S. workers. In 2010, more than 4,500 U.S. workers died from occupational injuries [NIOSH, 2012]. Severe traumatic injury can lead to long-term pain and disability and is very costly for workers' compensation systems and society as a whole. The total national medical and productivity cost for occupational injuries was recently estimated at $192 billion annually [Leigh, 2011].
Rationale:	Acute work-related trauma is a leading cause of death and disability among U.S. workers. Changes in hospitalization practices and workers' compensation coverage/reporting may increasingly reduce capture of minor injuries but have little effect on severe injuries. Use of a severity threshold can decrease the impact of changing utilization and service delivery patterns on observed injury trends [Cryer and Langley, 2008; NCHS, 2004]. When hospitalization data are used to calculate occupational injury trends in the absence of severity restriction, observed trends are biased downward [Sears, et al.]. Accurate characterization of injury trends is critical to understanding how we are doing as a nation with regard to occupational injury prevention.
Limitations of Indicator:	Hospital discharge records are only available for non-federal, acute care hospitals. Many individuals with work-related injuries do not file for workers' compensation or fail to recognize work as the cause of their injury. Additionally, self-employed individuals such as farmers and independent contractors, federal employees, railroad or longshore and maritime workers are not covered by state workers' compensation systems. The expected payer on hospital discharge records may not be accurate and may not reflect the actual payer. Data between states may not be comparable due to the differences in states' workers' compensation programs. The indicator excludes patients hospitalized outside their state of residence. Severe traumatic injury hospitalizations are based only on first-listed ICD-9-CM diagnoses (following STIPDA/Safe States Alliance Consensus Recommendations, 2007) that have been estimated to have an Abbreviated Injury Scale (AIS) severity of 3 or above. As a result, some severe traumatic injuries will not be counted.

Data Resources:	Inpatient hospital discharge data (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Traumatic injuries may occur in workers under age 16, but corresponding denominator data are not readily available. Additionally, practice patterns and payment mechanisms may affect decisions by health care providers to hospitalize patients, to correctly diagnose work-related conditions, and/or to list the condition as a discharge diagnosis. The number of diagnoses listed on discharge summaries may vary by regional practice patterns and by the person completing discharge summaries. Residents of one state may be hospitalized in another state and not be reflected in his/her state's hospitalization data. All admissions are counted, including multiple admissions for a single individual. Until hospital discharge data is available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity are not collected in some states, and are incomplete or have unverified validity in others. Hospital discharge reports are only available for non-federal, acute care hospitals.
HP2020 Objectives:	OHS-2
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, diagnosis, residence zip code
Recommendations:	Age, gender, race/ethnicity, zip code specific counts and rates can be used to better define the pattern of work-related hospitalizations. Proportion of all hospitalizations in the state can be examined.

How-To Guide: Indicator #22

WORK-RELATED SEVERE TRAUMATIC INJURY HOSPITALIZATIONS

Note: Effective October 1, 2015 health care organizations and providers were required to start using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). ICD-10-CM codes for Severe Traumatic Injuries have not been finalized. Therefore, we will only be collecting 1st, 2nd, and 3rd quarters for 2015. Rates will not be collected this year for this OHI. If you are unable to submit data by quarter you can submit data for the entire year. Please see the reporting template. Contact Patty Schleiff (pls1@cdc.gov) with questions regarding data submissions for this indicator.

22.1 Annual number of work-related inpatient hospitalizations for severe traumatic injury for persons age 16 years or older

a) Obtain from the State Health Department the number of cases meeting the following criteria from the inpatient hospital discharge file:

- Primary (i.e., principal or first-listed) diagnosis for a severe traumatic injury as listed below. This list includes those injury diagnostic codes in the range 800–959.9 that have been estimated to have an Abbreviated Injury Scale (AIS) severity of 3 or above or that have a high probability of hospital admission. The list excludes the following diagnostic codes: 905.x–909.x (late effects of injury), 910.x–924.x (superficial injuries), 930.x–939.x (foreign bodies), 940.x-949.x (burns, which are not well-characterized by AIS-based severity measures), and 958.x (traumatic complications).
- List of specific ICD-9-CM codes for severe traumatic injuries ("x" means that all subcodes are also included):

800.x	807.2	824.7	887.x	952.x
801.x	807.3	850.2	896.x	
803.x	807.4	850.3	897.x	
804.x	807.5	850.4	900.x	
805.x	807.6	851.x	901.x	
806.x	808.x	852.x	902.x	
807.03	812.1x	853.x	904	
807.04	812.3x	854.x	904.1	
807.05	812.5x	860.x	904.2	
807.06	813.1x	861.x	904.3	
807.07	813.3x	862.8	904.4x	
807.08	813.5x	862.9	904.5x	
807.13	813.9x	863.x	925.x	
807.14	820.x	864.x	926.x	
807.15	821.x	865.x	927.x	
807.16	823.1x	866.x	928.x	
807.17	823.3x	874.1x	929.x	
807.18	824.5	874.5	950.3	

Sample Stata code for severe traumatic injury diagnosis flag:

```
generate dxflag= ///
/*diagnoses specified to 3 digits*/ ///
        inlist(substr(dx,1,3),"800","801","803","804","805","806","808","820","821") | ///
        inlist(substr(dx,1,3),"851","852","853","854") | ///
        inlist(substr(dx,1,3),"860","861","863","864","865","866","887","896","897") | ///
        inlist(substr(dx,1,3),"900","901","902","925","926","927","928","929","952") | ///
/*diagnoses specified to 4 digits*/ ///
        inlist(substr(dx,1,5),"807.2","807.3","807.4","807.5","807.6") | ///
        inlist(substr(dx,1,5),"812.1","812.3","812.5","813.1","813.3","813.5","813.9") | ///
        inlist(substr(dx,1,5),"823.1","823.3","824.5","824.7") | ///
        inlist(substr(dx,1,5),"850.2","850.3","850.4","862.8","862.9","874.1","874.5") | ///
        inlist(substr(dx,1,5),"904.0","904.1","904.2","904.3","904.4","904.5","950.3") | ///
/*diagnoses specified to 5 digits*/ ///
        inlist(substr(dx,1,6),"807.03","807.04","807.05","807.06","807.07","807.08") | ///
        inlist(substr(dx,1,6),"807.13","807.14","807.15","807.16","807.17","807.18")
```

- Primary payer = Workers' Compensation.
- Limit age to those 16 years or older (age at admission is preferred).
- Select for state of residence = *'your state'*.
- Exclude:
  - age unknown
  - out-of-state residents and unknown residence
  - out-of-state inpatient hospitalizations
- Use undeduplicated data (no exclusions for deaths, readmissions)
- Use discharge data during calendar year, not fiscal year
- Use all cases reported on the discharge file, regardless of length of stay
- This will yield **'Annual number of work-related inpatient hospitalizations for severe traumatic injury for persons age 16 years or older'**.

22.2 Annual crude rate of work-related inpatient hospitalizations for severe traumatic injury per 100,000 employed persons age 16 years or older

Note: We will NOT be collecting rates for this OHI for 2015.

a) To obtain the denominator for the rate:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply the value for Total Employment by 1,000.

NOTE: *Data from 1997 through 2002 can be found at http://www.bls.gov/opub/gp/laugp.htm.*

b) To calculate the rate:

- Divide the numerator (22.1) by the denominator (22.2a).

- Multiply this result by 100,000 to get the **‘Annual crude rate of work-related inpatient hospitalizations for severe traumatic injury per 100,000 employed persons age 16 years or older’**.

Topic: Hazard **INDICATOR # 23: Influenza vaccination coverage among healthcare personnel**	
Demographic Group:	Health care personnel (HCP) in licensed acute care facilities.
Numerator:	All those who received an influenza vaccination administered at the healthcare facility, or reported in writing (paper or electronic) or provided documentation that influenza vaccination was received elsewhere.
Denominator:	Number of HCP who are working in the healthcare facility regardless of clinical responsibility or patient contact. Calculated separately for each of the following categories: 1. Employees: all persons who receive a direct paycheck from the reporting facility (i.e., on the facility's payroll). 2. Licensed independent practitioners: include physicians (MD, DO, MBBS), advanced practice nurses, and physician assistants only who are affiliated with the reporting facility who do not receive a direct paycheck from the reporting facility. 3. Students/trainees and volunteers: all students/trainees and adult volunteers who do not receive a direct paycheck from the reporting facility.
Measures of Frequency:	HCP influenza vaccination coverage for all healthcare personnel in licensed acute care facilities.
Time Period:	October 1 (or when the influenza vaccine becomes available) through March 31 of the following year.
Significance and Background:	Influenza has long been recognized as a significant cause of morbidity and mortality, especially among vulnerable populations (Fiore 2009). From 1976-2007, influenza virus infections caused an average of 23,607 influenza-related deaths with a wide yearly range of 3,349 to 48,614 over 31 influenza seasons; approximately 90% of these deaths occurred among persons aged 65 and older (Thompson 2010). Healthcare personnel are an important source of transmission of the influenza virus in the health care setting. (Perex-Padilla 2009, Wicker 2009, Bertin 2010, Safdar 2010). Additionally, healthcare personnel often work while they are ill due to worker shortages, need for compensation, and dedication to their patients (Talbot 2005, Talbot 2010, Pavia 2010, CDC 2009). The H1N1 pandemic influenza strain during the 2009-2010 influenza season further highlighted the need for public health interventions, including increasing vaccination percentages among health care workers. Healthcare personnel (HCP) can serve as vectors for influenza transmission because they are at risk for both acquiring influenza from patients and transmitting it to patients and HCP often come to work when ill (Wilde 1999). Nosocomial

	influenza outbreaks in healthcare facilities result in longer stays and greater mortality for patients (Cunney 2000, Bridges 2003, Weinstock 2000) and missed work for HCP (Wilde 1999, Sartor 2002). Higher influenza vaccination coverage among HCP is associated with reductions in nosocomial influenza among hospitalized patients (Weinstock 2000, Salgado 2004) and nursing home residents (Hayward 2006, Potter 1997, Lemaitre 2009). Influenza vaccination of HCP is also associated with decreased all-cause mortality among nursing home residents. (Carman 2000). A report of HCP influenza infections during the 2009 H1N1 influenza pandemic estimated 50% of infected HCP had contracted the influenza virus from patients or coworkers in the healthcare setting (Harriman 2009). One study suggested that nearly one-quarter of HCP were infected during influenza season, but few of these recalled having influenza (Elder 1996). Therefore, the CDC recommends that all HCP receive the seasonal influenza vaccine annually to protect themselves and their patients (Fiore 2010): Other organizations including the Society for Healthcare Epidemiology of America, the Infectious Diseases Society of America, the Association of Professionals in Infection Control and Epidemiology, and the American Academy of Pediatrics, also strongly recommend influenza vaccination of HCP. Hospitals accredited by The Joint Commission (TJC) are also required to measure HCP influenza vaccination. In the Spring of 2011, TJC released proposed requirements addressing influenza vaccination of staff and licensed independent practitioners (IC.02.04.01 – Influenza Vaccination for Licensed Independent Practitioners and Staff – available at *w*ww.jointcommission.org/.../Vaccination_of_Healthcare_Workers_HAP_20110401-3.pdf). These requirements mirror the CDC goals to achieve a 90% vaccination rate by 2020, and require a written plan and documentation of declination forms. These revised standards have undergone a field review and would likely be implemented in late 2012 or in 2013. The seasonal influenza vaccine is highly effective in healthy, younger adults, which include many healthcare personnel; therefore, vaccination campaigns in this group can be simple, safe, and cost effective (Pavia 2010). However, overall poor performance in healthcare personnel vaccination has been demonstrated for a number of years. From 1998-2005, influenza vaccination coverage among HCP peaked at 43% (Lu 2008). During the 2008-2009 influenza season, the National Health Interview Survey measured HCP influenza vaccination at 53% nationally (CDC 2011). Seasonal influenza vaccination coverage among HCP during the 2009-2010 influenza season reached 62%, the first time

	that the Healthy People 2010 goal of 60% influenza vaccination coverage among HCP was achieved (CDC 2010). However, both of these estimates are substantially lower than the Healthy People 2020 goal of 90% influenza vaccination coverage among HCP. Variation in influenza vaccination coverage based on location of employment has also been noted, with HCP working in hospitals more likely to receive influenza vaccine than those working in long-term care facilities or other settings (Strikas 2010). Effective strategies have been identified to increase compliance among healthcare personnel with annual influenza vaccination: education combined with free and easily accessible vaccine, a mandatory signed declination statement acknowledging the benefits and risks of the vaccination, and mandatory vaccination with refusal enforced by respiratory masks, reassignment to non-patient care roles, or termination of employment. (Talbot 2005, Pavia 2010, Babcock 2010). Several organizations have recently recommended mandatory influenza vaccination (Talbot 2005, ACP 2009, Greene 2008, NPSF 2009, IDSA 2009). Most recently, the National Vaccine Advisory Committee has voted to adopt guidelines for influenza vaccination among healthcare personnel. (See http://www.hhs.gov/nvpo/nvac/influenza_subgroup_final_report.pdf).
References to Significance/Background:	• American College of Physicians (ACP), ACP policy on influenza vaccination of health care workers. See http://www.acponline.org/running_practice/quality_improvement/projects/adult_immunization/flu_hcw.pdf. • Babcock HM, Gemeinhart N, Jones M, Claiborne Dunagan W, Woeltje KF. Mandatory influenza vaccination of health care workers: translating policy to practice. CID 2010; 50: 459- 64. • Bertin M, Rii J, Fraser T, Yen-Liberman B, Gordon SM. (2010, March). A cluster of 2009 pandemic influenza A (H1N1) in patients and healthcare providers in a hematology oncology unit. Panel presented at the Fifth Decennial International Conference on Healthcare- Associated Infections, Atlanta, GA. • Bridges CB, Kuehnert MJ, Hall CB. Transmission of influenza: implications for control in health care settings. Clin Infect Dis 2003; 37: 1094–1101. • California Health Care Associated Infections Program: Influenza vaccination among employees in California general acute care hospitals for the 2008-2009 respiratory season. September 30, 2010. Available at: http://www.cdph.ca.gov/programs/hai/Pages/default.aspx. • California Health Care Associated Infections Program: Influenza vaccination among employees in California general acute care hospitals for the 2009-2010 respiratory season. Available at: http://www.cdph.ca.gov/programs/hai/Pages/default.aspx.

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Rationale:	In 2008, the National Quality Forum issued a time-limited endorsement to a CDC-sponsored standardized measure (NQF measure 0431) for reporting influenza vaccination among healthcare personnel, which is designed to ensure reported HCP influenza vaccination is

	comprehensive within single institutions and comparable across separate institutions (NQF 2010). The National Quality Forum (NQF) is a private sector, consensus standard-setting organization whose efforts center on the evaluation and endorsement of standardized healthcare performance measurement. Their mission is to improve the quality of healthcare by setting national priorities and goals for performance improvement, endorsing national consensus standards for measuring and publicly reporting on performance, and promoting the attainment of national goals through education and outreach programs. The recommendations of the NQF are frequently used by the Centers for Medicare and Medicaid Services (CMS) to enact regulations for health care providers and institutions. The Hospital Inpatient Quality Reporting Program (IQR Program - formerly known as the Reporting Hospital Quality Data for Annual Payment Update or RHQDAPU) program was initially developed as a result of the Medicare Prescription Drug, Improvement and Modernization Act (MMA) of 2003. Section 5001(a) of Pub. 109-171 of the Deficit Reduction Act (DRA) of 2005 set out new requirements for the RHQDAPU program, which built on the ongoing voluntary Hospital Quality Initiative. The IQR Program is intended to equip consumers with quality of care information to make more informed decisions about their health care. It is also intended to encourage hospitals and clinicians to improve the quality of inpatient care provided to all patients. The hospital quality of care information gathered through the program is available to consumers on the Hospital Compare website (see http://www.hospitalcompare.hhs.gov/%28S%28i00cp5455zrrra554mcain45%29%29/hospital-search.aspx). This program requires "sub-section (d)" hospitals to submit data for specific quality measures for health conditions common among people with Medicare, and which typically result in hospitalization. Hospitals that do not participate in the IQR Program will receive a reduction of 2.0 percent in their Medicare Annual Payment Update for fiscal year 2012. In September 2009, the CDC released the Healthcare Personnel Safety (HPS) Component of the National Health Care Safety Network (NHSN), which complements Patient Safety and Biovigilance components (see http://www.cdc.gov/nhsn/hps.html). The HPS Component replaced the CDC National Surveillance System for Health Care Workers (NaSH) and is comprised of two modules: the Blood/ Body Fluid Exposure Module and the Influenza Vaccination and Management and Exposure Module. As detailed individual-level data is included in the HPS, few institutions have reported data. CDC currently supports more than 3000 hospitals that are using NHSN and 22 states require hospitals to report Hospital Acquired Infections using

	this system. If HCP influenza vaccination is added to the IQR Program, the NHSN will be the primary method by which these data are reported to the CDC. The results of 2010-2011 national pilot testing of health care worker influenza vaccination suggested that a feasible, national reporting system can be implemented that can provide useful and valid data to track progress towards the 2020 Healthy People goal of 90% vaccination percentage. In addition, health care facilities were very receptive to outreach efforts and do not perceive this reporting as an undue burden. Based on the results of this national pilot testing, the CDC submitted a proposal in July of 2011 to the NQF for adoption of influenza vaccination as a final quality measure (available from Faruque Ahmed, MD - NCIRD ISD). After a public comment period in January-February, the NQF will hold a final vote on whether to adopt this final measure in May of 2012. In addition, on August 1, 2011, the CMS finalized the HCP Vaccination Measure by relying on NQF endorsement and NHSN (DHHS CMS 2011). Required data collection for the FY 2015 payment determination will cover the period from January 1, 2013 through March 31, 2013. For future payment determinations, data collection will cover the period from October 1 through March 31st to coincide with the flu season. In adopting this measure, CMS concluded that the NHSN modules will serve as the basis of reporting beginning in 2013: In anticipation of the final NQF measure, the CDC has completed an NHSN module that will be used by acute care facilities for their CMS-required IQR Program measure beginning in 2013. The CDC has published the first aggregate data from the 2013-2014 influenza season (see http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6337a2.htm?s_cid=mm6337a2_w)
Limitations of Indicator:	Calculation of overall mean influenza vaccination coverage for all facilities will not provide specific information on significant predictors for vaccination coverage for each group of HCP.
Data Resources:	1. State-based NHSN user groups and/or mandatory reporting systems 2. National NHSN data covered under State-CDC data use agreement 3. State-specific aggregate NHSN data provided by CDC
Limitations of Data Resources:	Results of pilot testing of reporting of influenza vaccination coverage among HCP in acute care facilities has demonstrated that acute care hospitals were more likely than other types of facilities to be unable to report denominator data for credentialed non-employees and other non-employees, as were larger healthcare institutions (as measured by

	number of employees). Measure specifications were modified by the CDC to include a more limited number of non-employee healthcare personnel.
HP2010 Objectives:	The Healthy People 2020 target goal is to increase the percentage of Health Care Personnel who are vaccinated annually against seasonal influenza to 90%. See http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=23.
CSTE Positions:	06-ID-04 Assessment of Influenza Surveillance in the United States
Other Available Data:	The NHSN influenza reporting system also includes information on these 3 additional numerators: 1. Offered but declined the vaccination. 2. Determined to have a medical contraindication/condition of severe allergic reaction to eggs or to other component(s) of the vaccine, or history of Guillain-Barré Syndrome within 6 weeks after a previous influenza vaccination. 3. Unknown: Persons with unknown vaccination status or who do not meet any of the definitions #1-2. States that are interested in obtaining more information on these groups may contact the CDC.
Recommendations:	Utilize the CMS-required measure for acute care facility reporting of HCP influenza vaccination coverage

How-To Guide: Indicator #23

Influenza Vaccination Rates Among Health Care Providers

23.1 Percentage of Healthcare Personnel (HCP) who have Received an Influenza Vaccination

- Go to the Healthcare Safety Network (NHSN) web page: https://www.cdc.gov/nhsn/datastat/index.html.
- Select specific year needed under Annual Reports.
- Click on the link to the PDF file "NHSN Healthcare Personnel Influenza Vaccination Summary Data Tables by State, Acute Care Hospitals, 20XX-20XX)."
- Find your state in the alphabetical list in the left hand column.
- The OHI measure is under "All Healthcare Personnel Vaccination %" in the right hand column.

TOPIC: OCCUPATIONAL INJURIES AND ILLNESSES COMBINED INDICATOR # 24: Occupational heat-related emergency department visits	
Demographic Group:	Employed persons
NUMERATOR	Emergency department (ED) visits for persons aged 16 years or older with a primary or contributing diagnosis of heat-related illness (ICD-9-CM code 992.0-992.9 or Ecode of E900.0, E900.1, or E900.9) and with primary payer coded as workers' compensation or a work-related Ecode (E000.0, E000.1, E800-E807 [4th digit = 0], E830-E838 [4th digit = 2 or 6], E840-E845 [4th digit = 2 or 8], E846, E849.1, E849.2, or E849.3)
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of ED visits for persons age 16 years or older (numerator) Annual crude rate of ED visits per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Exposure to environmental heat is a clear recognized hazard for many occupations where individuals are not able to maintain thermal equilibrium due to their work environment (e.g. hot and humid), required clothing type, and usage of protective equipment. In 2010, approximately 3,470 private sector workers experienced a nonfatal work-related illness (e.g. heat stroke) due to environmental heat exposure which required days away from work. Up to 17% of individuals with heat stroke have permanent neurological damage, the likelihood of which increases the longer it takes to receive treatment. Further, workers suffering from heat-related illness are at higher risk of other occupational injuries due to neurological impairment. A 2015 study of occupational heat-related illness in 9 southeastern states found significantly elevated ED rates among males, younger workers, and blacks. Significant variation in age-adjusted rates among the states was observed with rates ranging from 4.8 per 100,000 workers in Florida to 17.3 per 100,000 workers in Louisiana.
Rationale:	Minimal epidemiological information about occupational heat-related morbidity is available. Tracking occupational heat-related illness using emergency department data will establish a baseline for occupational epidemiologists to understand the magnitude of the disease burden in the population and support implementation and evaluation of prevention measures.
Limitations of Indicator:	The number of diagnostic fields in ED records varies by state, and utilization of EDs varies geographically. The majority of individuals with work-related illnesses and injuries do not file for workers' compensation. Self-employed individuals such as farmers and independent contractors, federal employees, railroad, longshore, and maritime workers are not covered by state workers' compensation systems. Out-of-state workers are not captured. Attribution of payer in ED discharge may not be accurate. Data between states may not be comparable due to the differences in states' workers' compensation

	programs. Further, the effectiveness of identifying work-relatedness through Ecodes will vary by Ecode usage within each medical facility.
Data Resources:	Emergency department visits data (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Heat-related emergency department visits may occur in workers under age 16, but corresponding denominator data are not readily available. Furthermore, practice patterns and payment mechanisms may affect decisions by health care providers to correctly diagnose occupational heat-related illness and/or to list the condition as a discharge diagnosis. All visits are counted, including multiple admissions for a single individual. The number of diagnoses listed on discharge summaries may vary by regional practice patterns and by the person completing discharge summaries. Until ED data are available in all states, aggregation of state data to produce nationwide estimates will be incomplete. Data on race/ethnicity is not collected in some states and is incomplete and/or of questionable validity in others. Additionally, industry and occupation are not collected in the ED making it difficult to identify those industries/occupations at high risk of heat-related illness.
HP2010 Objectives:	None
CSTE Positions:	None
Other Available Data:	Age, sex, race/ethnicity, diagnosis, co-morbidities, county, residence zip code (or county), quarter/month
Recommendations:	Age, sex, race/ethnicity, zip code (or county) specific counts and rates can be used to better define the pattern of occupational heat-related illness. Heat-related ED visits as a proportion of all ED visits in the state can also be examined. Heat-related ED visits stratified by month or quarter can be used to identify the at-risk time period for each state. The same methodology used in the how-to-guide can be used to examine heat-related hospitalizations.

How-To Guide: Indicator #24

OCCUPATIONAL HEAT-RELATED ED VISITS

Note: Effective October 1, 2015 health care organizations and providers were required to start using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM). ICD-10-CM codes for Heat-Related ED Visits have not been finalized. Therefore, we will only be collecting 1st, 2nd, and 3rd quarters for 2015. Rates will not be collected this year for this OHI. If you are unable to submit data by quarter you can submit data for the entire year. Please see the reporting template. Contact Patty Schleiff (pls1@cdc.gov) with questions regarding data submissions for this indicator.

Data Source: Emergency Department (ED) visits

24.1 – Annual number of ED visits for occupational heat-related illness for persons 16 years and older:

a) Obtain from the State Health Department the number of cases meeting the following criteria from the ED visit data file:

- Select record if primary or any of the secondary diagnoses is 992.0 through 992.9 (ICD-9 CM [Effects of heat and light]) ***OR*** if record contains a heat-related Ecode:

ICD-9-CM	Definition
E900.0	Excessive heat due to weather conditions
E900.1	Excessive heat of man-made origin
E900.9	Excessive heat of unspecified origin

AND

- Record is work-related. Define work-related as primary payer = Workers' Compensation ***OR*** record contains a work-related Ecode:

ICD-9-CM	Definition
E000.0	Civilian activity done for income or pay
E000.1	Military activity
E800-E807	Railway accident among railway employee (4th digit = 0)
E830-E838	Water transport accident among crew, Dockers and stevedores (4th digit = 2 or 6)
E840-E845	Air and space transport accidents among crew and ground crew (4th digit = 2 or 8)
E846	Accidents involving powered vehicles used solely within the buildings and premises of industrial or commercial establishment
E849.1	Place of occurrence: farm building/land under cultivation
E849.2	Place of occurrence: mine or quarry
E849.3	Place of occurrence: industrial place and premises

- Limit age to those 16 years and older
- Use ED visits during calendar year, not fiscal year.
- Exclude record if:
  - Age unknown

  - Out-of-state and unknown resident
  - Case was admitted to the hospital
- Use unduplicated data (no exclusions for death, readmissions)

24.2: Annual rate of ED visits for occupational heat-related illness per 100,000 employed persons age 16 years or older

Note: We will NOT be collecting rates for this OHI for 2015.

a) To obtain the denominator for the rate:

- In the file "2015_GPS_employment_data.xlsx" select the tab labeled "state-ft&pt15".
- Find the row corresponding to your state.
- The value under "Total Employed" (1st data column) represents the number of employed persons age 16 and older in thousands.
- Multiply this number by 1,000. This is the **'Number of employed persons age 16 years or older'.**

NOTE: *Data from 1997 through 2002 can be found at* https://www.bls.gov/opub/gp/laugp.htm.

b) To calculate the rate:

- Divide the numerator by the denominator.
- Multiply this result by 100,000 to get the **'Annual crude rate of occupational heat-related ED visits per 100,000 employed persons age 16 years or older'**.

***If you would like to calculate heat-related hospitalizations: repeat steps 1 and 2 using hospitalizations instead of ED visits. Hospitalizations will include those admitted to the hospital regardless of admission source (e.g. admitted through the ED).**

****Note that this is not required for data collection by the CSTE OHI workgroup.***

Appendix A: Original Work Group Members

NIOSH-CSTE OCCUPATIONAL HEALTH SURVEILLANCE WORK GROUP

Occupational Health Surveillance Indicators
For tracking work-related health effects and their determinants

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Appendix B: Core State Members of the Occupational Health Surveillance Pilot Project

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Appendix C: Current OHI Work Group State Representatives

Membership Information and Work Group Operating Guidelines are available online: www.cste.org/webpdfs/OHIWorkgroupOperatingGuidelines.doc

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Appendix D: Current Occupational Health Indicator and Work Group Leads

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INDICATOR	STATE LEADS		NATIONAL LEADS	
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