



Council of State and Territorial Epidemiologists

Occupational Indicators: A Guide for Tracking Work-Related Health Effects and Their Determinants

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Council of State and Territorial Epidemiologists

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

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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 maintain and utilize data from this minimal list of indicators on a regular basis.

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 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 crosscutting surveillance issues and made several recommendations to NIOSH for the implementation of comprehensive state-based occupational health surveillance systems (CSTE 2001). A draft of this Work Group report contributed to the NIOSH Surveillance Strategic Plan (NIOSH 2001).

The Work Group report described draft “profiles” for priority conditions that may be placed under surveillance as part of state-based surveillance systems. Since the publication of the Work Group report, however, public health surveillance “indicators” have been developed in several areas, including chronic disease, injury control and environmental health (CSTE 1999, STIPDA 1999, Davies, et al. 2001, CDC 2002, CSTE 2002). These indicators are a construct of public health surveillance that define 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 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.

This document describes the recommended set of indicators for occupational health surveillance as defined by the Work Group in 2001 through 2003. These occupational health indicators represent the consensus view of state and NIOSH representatives and are intended as advisory to the states. The indicators represent a core set of data that, if generated at the state level, would assist in the development of programs to prevent workplace injuries and illnesses. The indicators are designed to be used in conjunction with other guidelines for the state-based surveillance of occupational injuries and illnesses (NIOSH 1995), and complement overall state and national goals to improve the health of the population (DHHS, 2000). These indicators are intended to:

- Promote program and policy development at the national, state and local levels to protect worker safety and health
- Build core capacity for occupational health surveillance at the state level.
- Provide guidance to states regarding the minimum level of occupational health surveillance activity

- Bring consistency to time trend analyses of occupational health status of the workforce within states and to comparisons among states.

Background

State health agencies, which are vested with the legal authority to require disease reporting and collect other 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:

- *Provide critically needed 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, 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 and validate the Bureau of Labor Statistics (BLS) data sources as well as understand the 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 feasible and effective 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 prevention strategies to reduce the incidence of 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 1995). 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, targeted diseases, injuries and hazards.

Methods for indicator development

From 2001-2003 the Work Group members developed an approach for indicator selection, and then 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 available in all states was considered to be 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 defines a “core” or minimum set of occupational health indicators that rely 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 21 indicators were accepted by Work Group consensus:

- 12 **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),
- 3 **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),
- 2 **Economic impact** indicators (measures of the economic impact of work-related injuries and illnesses), and

- **1 Demographic** indicator (measure of workforce demographics).

The Work Group recognizes there may be other occupational health indicators that are important to individual states or local areas depending on state and local needs. In addition, 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 access to all of the data resources.

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 states with NIOSH Cooperative Agreements to conduct "Core Occupational Health Surveillance" (California, Massachusetts, Michigan, New York, and Washington, known as the "Core States." See Appendix B) agreed to both pilot-test the indicators and to create "how-to" guides describing the methods for generating the indicators. This pilot project met one of the established 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."

After an implementation plan was established, and the Core States worked on the indicators independently, communicating primarily through conference calls and e-mail. All five pilot states generated each indicator; however, individual states elected to take 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 subsequently 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 the states.

Based upon the results of the pilot, the Core States and Work Group mutually redefined 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. Another modification included creating more general "how-to" guides for indicators 5 and 8 ("Amputations and Carpal Tunnel Syndrome Cases Filed with the State Workers' Compensation System") because of differences among states with regards to their data systems, particularly Workers' Compensation data.

The Occupational Health Indicators document is a work in progress. This version (August 2003), contains final "how-to" guides for 12 of the first 13 indicators. . While these "how-to" guides may need to be revised in the future based upon changes in the content and accessibility of various data sets, they provide straightforward directions to states that presently wish to implement these indicators. "How to" guides for the remaining 8 indicators are under development and will be incorporated within the next six months. Additional indicators may also be added in the future. The Core States and the Work Group are also developing a separate data document that will present the indicator data from the pilot states.

These indicators and the "how-to" guides are meant to assist states in building a capacity for occupational health surveillance. Results from the pilot project have shown that the process of generating the indicators is as useful as the data itself. Not every state will be able to complete all indicators, nor will the indicators alone provide all of the information necessary for a comprehensive state occupational health program. However, the process of generating the indicators will help raise awareness and build capacity for using available data, and also promote dialogue among occupational health partners within the state. The Work Group remains committed to completing this project and assisting all states in addressing 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 developing and 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 nearly 500 members with surveillance and epidemiologic expertise in a broad range of areas including chronic disease, communicable disease, immunization, environmental health, occupational health, and injuries. 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: 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
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
Time Period:	Calendar year
Significance and Background:	In 1999, the U.S. Bureau of Labor Statistics (BLS) reported an estimated total of 5.7 million injury and illness cases within the private sector workforce, an estimated incidence rate of 6.3 cases per 100 full-time-equivalent workers. This included a total of 1.7 million injury and illness cases (1.9 cases per 100 FTE workers) requiring recuperation away from work beyond the day of the incident.
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 result in death, loss of consciousness, days away from work, restricted work, or medical treatment beyond first aid. They are only required to report the detailed case characteristics (e.g. nature, body part, event) when the injury or illness results in at least one day away from work. 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 health care providers, and conditions that have long latencies and are diagnosed long after an employee leaves their employment. With respect to injuries/illnesses involving days away from work, employers vary in their use of restricted work activity to reduce lost workdays among their employees with work-related conditions, thereby avoiding cases with days away from work.
Data Resources:	Annual BLS Survey of Occupational Injuries and Illnesses (SOII)
Limitations of Data Resources:	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. The sample sizes in some states are insufficient to generate State-specific estimates. Numbers and rates may not be published/released by BLS due to the reliability of the estimates.
HP2010 Objectives:	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

Two methods to obtain the data are offered - both methods will yield the same numbers. The first method uses the Bureau of Labor Statistics (BLS) website to access the data. The second method uses a CD-ROM, provided by BLS, to access the data. Because the BLS CD-ROM is needed for some of the other indicators, states may elect to use the CD-ROM for this indicator as well. The CD-ROMS can be obtained annually from state SOII programs or BLS regional offices. Contact information is provided at <http://www.bls.gov/iif/home.htm>

1.1 **Estimated Annual Total Number of Work-Related Injuries and Illnesses (numerator)**

Method 1:

- Go to the BLS web site: <http://www.bls.gov/iif/home.htm#tables>.
- Scroll down to “Regional Resources” on the right side of the page.
- Select your state and click ‘Go’.
- Select “Case counts” under SOII for the specific year data is needed.
- From resulting table, read across ‘Private Industry’ row and major column ‘Injuries and Illnesses’ and sub-column ‘Total cases’.
- Multiply the value of this cell by 1,000 to get the **‘Estimated annual total number of work-related injuries and illnesses’**.

Method 2:

- Use OSH Profile CD-ROM (CD-ROM is available from BLS).
- Install the profile onto your computer following the instructions that come with the CD-ROM. Queries for specific states will necessitate the use of Disk 1 or Disk 2 depending upon region.
- Insert the CD-ROM and double-click on your desktop shortcut ‘OSH_Profiles’.
- Double-click on ‘OSH_Profiles’ again. Click on ‘Enable Macros’. You will see a spreadsheet that says ‘Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System’ with a blue background.
- Double-click on ‘Click here!!!’. Click on ‘CDs’ button and select the drive for your CD-ROM. Then click ‘OK’. Click ‘OK’ again.
- Select ‘Annual Survey Summary Tables’ from ‘Publication Type’.
- Select State and Year.
- Click on ‘Create Profiles/Tables’.
- Select Table 7 - ‘Counts of injuries and illnesses’. Click ‘OK’.
- Click ‘Close’, then ‘Yes’, and then ‘OK’.
- From resulting table, read ‘Private Industry’ row and major column ‘Injuries and Illnesses’ and sub-column ‘Total Cases’.
- Multiply the value of this cell by 1,000 to get the **‘Estimated annual total number of work-related injuries and illnesses’** for your state.
- Click on the ‘X’ sign on the top of the right hand side of the spreadsheet to close it. Click ‘NO’.

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

Method 1:

- Go to the BLS web site: <http://www.bls.gov/iif/home.htm#tables>.
- Scroll down to “Regional Resources” on the right hand side of the page.
- Select your state and click ‘Go’.
- Select ‘Incidence Rates’ under SOII for the specific year data is needed.
- From resulting table, read across ‘Private Industry’ row and major column ‘Injuries and Illnesses’ and sub-column ‘Total Cases’ (rate is provided per 100 FTEs).
- 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’**.

Method 2:

- Use OSH Profile CD-ROM (CD-ROM is available from BLS). Insert the CD-ROM and double-click on your desktop shortcut ‘OSH_Profiles’. Double-click on ‘OSH_Profiles’ again. Click on ‘Enable Macros’. You will see a spreadsheet that says ‘Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System’ with a blue background.
- Double-click on ‘Click here!!!’. Click on ‘CDs’ button and select the drive for your CD-ROM. Then click ‘OK’. Click ‘OK’ again.
- Select ‘Annual Survey Summary Tables’ from ‘Publication Type’.
- Select State and Year.
- Click on ‘Create Profiles/Tables’.
- Select Table 6 - ‘Incidence rate of injuries and illnesses by industry’. Click ‘OK’.
- Click ‘Close’, then ‘Yes’, and then ‘OK’.
- From resulting table, read ‘Private Industry’ row and major column ‘Injuries and Illnesses’ with sub-column ‘Total cases’.
- 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’**.
- Click on the ‘X’ sign on the top of the right hand side of the spreadsheet to close it. Click ‘NO’.

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

Method 1:

- Go to the BLS web site: <http://www.bls.gov/iif/home.htm#tables>.
- Scroll down to “Regional Resources” on the right hand side of the page.
- Select your state and click ‘Go’.
- Select “Case counts” under SOII for the specific year data is needed.
- From resulting table, read across ‘Private Industry’ row and major column ‘Injuries and Illnesses’ and sub-column ‘Lost workday cases’ with another sub-column ‘With days away from work’.
- Multiply the value of this cell by 1,000 to get the **‘Estimated annual total number of cases involving days away from work’**.

Method 2:

- Use OSH Profile CD-ROM (CD-ROM is available from BLS). Insert the CD-ROM and double-click on your desktop shortcut 'OSH_Profiles'. Double-click on 'OSH_Profiles' again. Click on 'Enable Macros'. You will see a spreadsheet that says 'Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System' with a blue background.
- Double-click on 'Click here!!!'. Click on 'CDs' button and select the drive for your CD-ROM. Then click 'OK'. Click 'OK' again.
- Select 'Annual Survey Summary Tables' from 'Publication Type'.
- Select State and Year.
- Click on 'Create Profiles/Tables'.
- Select Table 7 - 'Counts of injuries and illnesses by industry'. Click 'OK'.
- Click 'Close', then 'Yes', and then 'OK'.
- From resulting table, read 'Private Industry' row and sub-column of 'Lost workday cases' with another sub column 'With days away from work'.
- Multiply the value of this cell by 1,000 to get the **'Estimated annual total number of cases involving days away from work'**.
- Click on the 'X' sign on the top of the right hand side of the spreadsheet to close it. Click 'NO'.

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

Method 1:

- Go to the BLS web site: <http://www.bls.gov/iif/home.htm#tables>.
- Scroll down to "Regional Resources" on the right hand side of the page
- Select your state and click 'Go'.
- Select 'Incidence Rates' under SOII for the specific year data is needed.
- From resulting table, read across 'Private Industry' row and major column 'Injuries and Illnesses' and sub-column 'Lost work day cases' and another sub-column 'With days away from work'.
- 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'**.

Method 2:

- Use OSH Profile CD-ROM (CD-ROM is available from BLS). Insert the CD-ROM and double-click on your desktop shortcut 'OSH_Profiles'. Double-click on 'OSH_Profiles' again. Click on 'Enable Macros'. You will see a spreadsheet that says 'Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System' with a blue background.
- Double-click on 'Click here!!!'. Click on 'CDs' button and select the drive for your CD-ROM. Then click 'OK'. Click 'OK' again.
- Select 'Annual Survey Summary Tables' from 'Publication Type'.
- Select State and Year.
- Click on 'Create Profiles/Tables'.
- Select Table 6 - 'Incidence rate of injuries and illnesses by industry'. Click 'OK'.

- Click 'Close', then 'Yes', and then 'OK'.
- From resulting table, read 'Private Industry' row and sub-column of 'Total cases' under column of 'Injuries and Illnesses'.
- 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'**.
- Click on the 'X' sign on the top of the right hand side of the spreadsheet to close it. Click 'NO'.

Data Tips: Regional BLS offices can provide revised/updated counts and rates for any year. Numbers and rates may not be available from the CD-ROM or web-site 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 HOSPITALIZATION	
Demographic Group:	Employed persons
Numerator:	Hospital discharges with primary payor coded as workers' compensation
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of hospitalizations for persons age 16 years or older (numerator) Annual crude rate of hospitalization per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	In 1999, there were 5.7 million work-related injuries and illnesses reported in private industry of which 1.7 million required lost work time beyond the day of the incident. Workers' compensation costs in the United States total more than \$100 billion dollars per year.
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:	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 payor in hospital discharge may not be accurate. Data between states may not be comparable due to differences in states' workers' compensation programs.
Data Resources:	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. 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 of questionable validity in others.
HP2010 Objectives:	None
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 #2:

WORK-RELATED HOSPITALIZATIONS

2.1 **Annual number of hospitalizations for persons age 16 years or older (numerator)**

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

- Primary payor = Workers' Compensation
- Limit age to those 16 years and older
- Select for state of residence='your state'
- Exclude:
 - age unknown
 - out-of-state residents and unknown residence
 - out-of-state hospitalizations
- Use unduplicated data (i.e. no exclusions for deaths, and use data where multiple instances of the same event by a single individual have not been removed).
- Use discharge during calendar year, not fiscal year.

2.2 **Annual crude rate of hospitalization per 100,000 employed persons age 16 years or older**

a) To obtain the denominator for the rate:

- Go to Current Population Statistics: <http://www.bls.gov/opub/gp/laugp.htm>.
- Select 'Section II: Estimate for States'.
- Select 'Table 12. Employment status of the civilian noninstitutional population by sex, age, race and Hispanic origin'.
- Find your state from the first column.
- Read the 'Total' row for your state and the 4th column – "Employment Number". This is the '**Number of Employed Persons 16 years of age or older**' (in thousands). Multiply by 1000.

b) To calculate the rate:

- Divide the numerator (2.1) by the denominator (2.2a).
- Multiply this result by 100,000 to get the '**Annual crude rate of hospitalization 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:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of fatal work-related injuries (numerator) Annual crude fatality rate per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	Each year, nearly 6,000 cases of work-related fatalities are reported to the Census of Fatal Occupational Injuries (CFOI) Program administered by the Bureau of Labor Statistics (BLS). On an average day, 16 workers die as a result of injuries sustained at work.
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 data used for calculating rates is an estimate of the civilian employed population who live in the state, 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.
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 International Classification of Disease (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.
HP2010 Objectives:	20-1 and 20-5
CSTE Positions:	None
Other Available Data	Industry and occupation, age, gender, race/ethnicity, nature, source of injury and event

HOW-TO GUIDE FOR INDICATOR #3:

FATAL WORK-RELATED INJURIES

Two methods to obtain the data are offered - both methods will yield the same numbers. The first method uses the Bureau of Labor Statistics (BLS) website to access the data, and is recommended. The alternate method uses a CD-ROM, provided by BLS, to access the data. Because the BLS CD-ROM is needed for some of the other indicators, states may elect to use the CD-ROM for this indicator as well. The CD-ROMS can be obtained annually from state CFOI programs or BLS regional offices. Contact information is provided at <http://www.bls.gov/iif/home.htm>

3.1 **Annual number of work-related traumatic fatalities (numerator)**

Method 1:

- Go to the BLS web site: <http://www.bls.gov/iif/home.htm#tables>.
- Scroll down to “Regional Resources” on the right hand side of the page.
- Select your state and click ‘Go’.
- Select ‘pdf’ file under CFOI for entire state.
- From resulting table (table 1), read across ‘Total’ row and ‘Number’ column. This is the ‘**Annual number of work-related fatal injuries**’.

Method 2:

- Use the CFOI Profile CD-ROM (CD-ROM is available from BLS). Install the profile onto your computer following the instructions that come with the CFOI Profiles CD-ROM.
- Insert the CD-ROM and double-click on your desktop shortcut ‘CFOI_Profiles’.
- Double-click on ‘CFOI_Profiles’ again. Click on ‘Enable Macros’. You will see a spreadsheet that says ‘Bureau of Labor Statistics Census of Fatal Occupational Injuries’ with a blue background.
- Double-click on ‘Click here!!!’. Click on ‘CDs’ button and select the drive for your CD-ROM. Then click ‘OK’. Again click ‘OK’. You will see the profile system with many buttons and pull-down menus and with a title ‘Census of Fatal Occupational Injuries Profiles and Tables’.
- Select ‘CFOI Numbers profile (Table 1)’.
- Select state and Year.
- From ‘Characteristic type’, select ‘Major Industry Division’.
- From ‘Characteristic code’, select ‘T Total’.
- Click on ‘Create Profiles/Tables’.
- Click ‘Close’, then ‘Yes’, and then ‘OK’.
- From resulting table, read the 1st row ‘Total’ and 2nd column ‘All industries’. This is the ‘**Annual number of work-related fatal injuries**’ for your state.
- Click on the ‘X’ sign on the top of the right hand side of the blank spreadsheet. Click ‘NO’.

3.2 Annual crude fatality rate per 100,000 employed persons age 16 years or older

a) To obtain the denominator for the rate:

- Go to Current Population Statistics: <http://www.bls.gov/opub/gp/laugp.htm>.
- Select 'Section II: Estimate for States'.
- Select 'Table 12. Employment status of the civilian noninstitutional population by sex, age, race and Hispanic origin'.
- Find your state from the first column.
- Read the 'Total' row for your state and the 4th column – "Employment Number". This is the '**Number of Employed Persons 16 years of age or older**' (in thousands). Multiply by 1000.

b) To calculate the rate (annual crude fatality rate per 100,000 employed persons age 16 years or older):

- Divide the numerator (3.1) by the denominator (3.2a). 'Multiply the result by 100,000 to get the '**Annual crude fatality rate per 100,000 employed persons age 16 years and older**'.

Data Tips: CFOI publishes preliminary data approximately nine months after the close of the calendar year. A year later, CFOI publishes final, updated counts. The indicator should be based on the final counts. The preliminary data are available on the BLS website and updated after the final data become available. The CD-ROM contains the final counts. State CFOI programs and regional BLS offices can provide revised/updated count and fatality rates for any year. Numbers may not be available from the CD-ROM or the web-site if the estimate does not meet the publishable criteria of BLS. This is more likely for small states.

Topic: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES	
INDICATOR #4: WORK-RELATED AMPUTATIONS REPORTED BY EMPLOYERS	
Demographic Group:	Employed persons in the private sector
Numerator:	Estimated cases of work-related amputation with days away from work (OIIC nature code 031)
Denominator:	Estimated total full-time equivalents (FTEs) worked for the same calendar year
Measures of Frequency:	Estimated annual number of incident cases (numerator) Estimated annual incidence rate per 100,000 FTEs
Time Period:	Calendar year
Significance and Background:	Each year, it is estimated that between 16,000 and 21,000 workers will experience a work-related amputation. About 90% of work-related amputations are to the fingers. Results of one study indicated that 22% of all employees who experienced finger amputations had to give up their original employment. These injuries may greatly affect a worker's job skills and reduce earnings.
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 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 result in death, loss of consciousness, days away from work, restricted work, or medical treatment beyond first aid. They are only required to report the detailed nature of injury when the injury results in at least one day away from work. Employers do not always record all relevant events. Employers vary in their use of restricted work activity to reduce lost workdays among their employees with work-related conditions, thereby avoiding cases with days away from work.
Data Resources:	Annual Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII)
Limitations of Data Resources:	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. There is a potential for additional sampling error if an employer has more than 30 cases with days away from work as an employer is only required to report on 30 such cases. 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. The sample sizes in some states are insufficient to generate State-specific estimates. Numbers and rates may not be published/released by BLS due to the reliability of the estimates.
HP2010 Objectives:	20-2
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 REPORTED BY EMPLOYERS

Data for this indicator are available on CD-ROMs provided by the Bureau of Labor Statistics (BLS). These CD-ROMs can be obtained annually from state SOII programs or BLS regional offices. Contact information is provided at <http://www.bls.gov/iif/home.htm>

4.1 **Estimated Annual Number of Incident cases (numerator)**

- Install the OSH Profiles CD-ROM onto your computer following the instructions that come with the CD-ROM. Queries for specific states will necessitate use of Disk 1 or Disk 2 depending upon region.
- Double-click on your desktop shortcut 'OSH_Profiles'. Double-click on 'OSH_Profiles' again. Click on 'Enable Macros'. Now you should find a spreadsheet that says 'Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System' with a blue background.
- Double-click on 'Click here!!!'. Click on 'CDs' button and select the drive for your CD-ROM. Then click 'OK'. Again click 'OK'.
- From the 'Profile Type', select 'Case and Demo Numbers (Table 1)'.
- Select State and Year.
- From 'Characteristic Type', select 'Nature'.
- From 'Characteristic Code', select nature code '031 Amputations'.
- Click on 'Create Profiles/Tables'.
- When tables are completed, click on 'Close', then 'Yes', and then 'OK'.
- Read 1st row 'Total' and 3rd column 'Amputations (Code 031)' from resulting table. The value of this cell is the **'Estimated annual number of incident cases'**.
- Click on the 'X' sign on the top of the right hand side of the spreadsheet to close it. Click 'NO'.

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

- Use the OSH Profile CD-ROM (CD-ROM is available from BLS). Insert the CD-ROM and double-click on your desktop shortcut 'OSH_Profiles'. Double-click on 'OSH_Profiles' again. Click on 'Enable Macros'. Now you should find a spreadsheet that says 'Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses Profiles System' with a blue background.
- Double-click on 'Click here!!!'. Click on 'CDs' button and select the drive for your CD-ROM. Then click 'OK'. Again click 'OK'.
- From the 'Profile Type', select 'Case and Demo Incidence Rates (Table 2)'.
- Select State and Year.
- From 'Characteristic Type', select 'Nature'.
- From 'Characteristic Code', select nature code '031 Amputations'.
- Click on 'Create Profiles/Tables'.
- When tables are completed, click on 'Close', then 'Yes', and then 'OK'.

- Read 1st row 'Total' and 3rd column 'Amputations (Code 031)' from resulting table. Multiply the value of this cell by 10 to get the '**Estimated annual incidence rate of amputations per 100,000 FTEs**'.
- Click on the 'X' sign on the top of the right hand side of the spreadsheet to close it. Click 'NO'.

Data Tips: Numbers and rates are not available on the CD-ROM when the estimates are not reliable and do not meet BLS publication criteria. This is more likely for small states.

Topic: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES	
INDICATOR #5: AMPUTATIONS FILED WITH THE STATE WORKERS' COMPENSATION SYSTEM	
Demographic Group:	Workers covered by State workers' compensation system
Numerator:	Amputation cases 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 incident cases (numerator) Annual incidence rate per 100,000 workers covered by State workers' compensation system
Time Period:	Calendar year
Significance and Background:	It is estimated that between 16,000 and 21,000 workers each year experience a work-related amputation. About 90% of work-related amputations involve the fingers. Results of one study indicated that 22% of all employees who experienced finger amputations had to give up their original employment. These injuries may greatly affect a worker's job skills and reduce earnings.
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.
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 is 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. 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.
HP2010 Objectives:	20-2
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:

AMPUTATIONS FILED WITH STATE WORKERS' COMPENSATION SYSTEM

5.1 **Annual number of incident cases**

Variability in the coding systems used by State workers' compensation (WC) systems precludes a universal method for identifying amputation injuries. Data 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. The following are tips for constructing the database for analysis:

- Identify cases by date of injury.
- Include all accepted cases - 'open' and 'closed' claims.
- Include claimants of all ages and those with age unknown.
- Include out of state residents.
- Use only 'lost time' claims.
- Identify coding system used for State workers' compensation amputation cases.
Common coding systems encountered by the pilot states:
 - 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';
 - International Association of Industrial Accident Boards and Commissions Electronic Data Interchange Nature of Injury Code = 237028 'Amputation'.
- Exclude claims that involve the following body parts/regions: eye, back, chest, abdomen, body systems (e.g. respiratory system).
- Recognize state to state variability with regard to workers' compensation laws
 - o Number of lost workdays for claim to be considered 'lost time'
 - o Statute of limitations for work-related injury claim filing
 - o Criteria for acceptance of a work-related injury WC claim
 - o Physician choice by employee
 - o Industries poorly represented in state's workers' compensation data, e.g. agriculture
 - o Inclusion or exclusion of claims originating from self-insured employers
 - o Occupations excluded from workers compensation coverage
 - o Exclusions by employer size (e.g. compulsory workers' compensation insurance coverage for employers of 4 or more workers)

5.2 **Annual incidence rate per 100,000 workers covered by State workers' compensation system**

a) To obtain the denominator for the rate (estimated number of workers covered by State workers' compensation system for the same calendar year):

- Go to <http://www.nasi.org>.
- Click on menu 'Publications'.

- Click on 'Reports'.
- Click on report entitled: "Workers' Compensation: Benefits, Coverage, and Costs, 2000, New Estimates."
- Click on 'Download' (must have Adobe Acrobat).
- Go to Table 4 "Number of Workers Covered by Workers' Compensation and Total Covered Wages, by State, 1998 - 2000". Located on page 6-7 of report.
- Identify state and read column for 'Covered Workers (in thousands)' for year 2000. Multiply number by 1,000.

b) To calculate the rate (annual incidence rate per 100,000 workers covered by State workers' compensation system)

- Divide the numerator (5.1) by the denominator (5.2a).
- Multiply the result by 100,000 to get the '**Annual incidence rate per 100,000 workers covered by State workers' compensation system**'.

Topic: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES	
INDICATOR #6: HOSPITALIZATION FOR WORK-RELATED BURNS	
Demographic Group:	Employed persons
Numerator:	Hospital discharges with primary diagnosis of ICD-9-CM code 940 - 949 and with primary payor coded as workers' compensation
Denominator:	Employed population 16 years or older for the same calendar year
Measures of Frequency:	Annual number of burn hospitalizations for persons age 16 years and older (numerator) Annual rate of hospitalization per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	NIOSH has estimated that there are 150,000 work-related burns treated in emergency rooms each year in the U.S. An estimated 30-40 percent of burns are work-related, with a peak incidence among younger workers, and with males affected more frequently than females. According to data from the New England Regional Burn Program, 55 percent of all burns among adults are work-related.
Rationale:	Work-related burns are some of the most devastating injuries affecting workers. 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 payor in hospital discharge may not be accurate. Data between states may not be comparable due to differences in states' workers' compensation programs.
Data Resources:	Hospital discharge data (numerator) Bureau of Labor Statistics (BLS) Current Population Survey Data (denominator)
Limitations of Data Resources:	Work-related burn injuries are experienced by employed individuals less than 16 years old, but corresponding denominator data is not readily available. The number of diagnoses listed on discharge summaries may vary by regional practice pattern and by the person completing the summary. Practice patterns and payment mechanisms may affect decisions by health care providers to hospitalize patients. 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 of questionable validity in others.
HP2010 Objectives:	20-2
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

6.1 Annual number of hospitalizations for work-related burns, age 16 years and over (numerator)

Obtain from State Health Department the following information from the hospital discharge file:

- Use primary diagnosis between 940 and 949 (ICD-9-CM).
- Use only primary payor = Workers' Compensation.
- Limit age to those 16 years and older.
- Select for state of residence = 'your state'.
- Exclude:
 - age unknown
 - out-of-state residents and unknown residence
 - out-of-state hospitalizations.
- Use unduplicated , data (i.e. no exclusions for deaths, and use data where multiple instances of the same event by a single individual have not been removed.)
- Use discharge during calendar year, not fiscal year.

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

a) To obtain the denominator for the rate:

- Go to Current Population Statistics: <http://www.bls.gov/opub/gp/laugp.htm>.
- Select 'Section II: Estimate for States'.
- Select 'Table 12. Employment status of the civilian noninstitutional population by sex, age, race and Hispanic origin'.
- Find your state from the first column.
- Read the 'Total' row for your state and the 4th column – "Employment Number". This is the '**Number of Employed Persons 16 years of age or older**' (in thousands). Multiply by 1000.

b) To calculate the rate:

- Divide the numerator (6.1) by the denominator (6.2a).
- Multiply this result by 100,000 to get the '**Annual crude rate of hospitalization per 100,000 employed persons age 16 years or older**'.

Topic: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES	
INDICATOR # 7: WORK-RELATED MUSCULOSKELETAL DISORDERS REPORTED BY EMPLOYERS	
Demographic Group:	Employed persons
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:	The 1999 Annual BLS Survey identified 582,340 cases of musculoskeletal disorders that resulted in days away from work. Over half of these cases involved the back. Estimates of the costs of back injuries alone are \$50-100 billion per year. About 4% (27,832) of these injuries were carpal tunnel syndrome, 2% (11,945) involved the neck, 10% (56,834) involved the shoulder, and 15% (87,956) involved the upper extremities.
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 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 result in death, loss of consciousness, days away from work, restricted work, or medical treatment beyond first aid. They are only required to report the detailed case characteristics (e.g., nature, body part, event) when the injury or illness results in at least one day away from work. 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 health care providers, and conditions that have long latencies and are diagnosed long after an employee leaves their employment. Regarding injuries/illnesses involving days away from work, employers vary in their use of restricted work activity to reduce lost workdays among their employees with work-related conditions, thereby avoiding cases with days away from work.
Data Resources:	Annual Bureau of Labor Statistics (BLS) Survey of Occupational Injuries and Illnesses (SOII)
Limitations of Data Resources:	The annual 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. There is a potential for additional sampling error if an employer has more than 30 cases with days away from work as an employer is only required to report on 30 such cases. 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.
HP2010 Objectives:	20-3
CSTE Positions:	None
Other Available Data:	Age, gender, race/ethnicity, occupation, industry, 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 MSDs in the state. These may include industry specific counts and rates, and counts (not rates) by age, gender, race/ethnicity, and occupation, source of injury/illness.

HOW-TO GUIDE – INDICATOR #7:

WORK-RELATED MUSCULOSKELETAL DISORDERS REPORTED BY EMPLOYERS

As of the publication of this document (August 8, 2003), BLS is working to post the data from the Annual Survey of Occupational Injuries and Illnesses (SOII) needed to generate this indicator on the BLS website. (<http://www.bls.gov/iff/home.htm>). This "how-to guide" will be updated to provide additional details when the data are posted. Contact information for BLS is provided at <http://www.bls.gov/iif/home.htm>.

7.1 Total musculoskeletal disorders involving days away from work

Includes cases involving days away from work which meet the following criteria:

- OIIC Nature codes: 021 (sprains, strains, tears) **or**
0972 (back pain, hurt back) **or**
0973 (soreness, pain, hurt, except the back) **or**
1241 (carpal tunnel syndrome) **or**
153 (hernia) **or**
17* (musculoskeletal system and connective tissue diseases and disorders)

AND

- OIIC Event codes: 211 (bending, climbing, crawling, reaching, twisting) **or**
22 (overexertion) **or**
23 (repetitive motion)

*All nature codes that begin with 17

7.1.1 Estimated annual number

7.1.2 Estimated annual incidence rate per 100,000 FTEs

7.2 Musculoskeletal disorders of the upper extremities, neck and shoulder involving days away from work

Includes cases involving days away from work which meet all criteria from 7.1 AND have the following "Body Part" codes:

- OIIC Body Part codes: 3* (upper extremities) **or**
10 (neck) **or**
21 (shoulder)

*All Body Part codes that begin with 3

7.2.1 Estimated annual number

7.2.2 Estimated annual incidence rate per 100,000 FTEs

7.3 Carpal tunnel syndrome involving days away from work

Includes cases involving days away from work with the following "Nature of Injury/Illness" code:

- OIIC nature code: 1241 (carpal tunnel syndrome)

7.3.1 Estimated annual number

7.3.2 Estimated annual incidence rate per 100,000 FTEs

7.4 Overexertion and repetitive motion of the back involving days away from work

Includes cases involving days away from work which meet all criteria from 7.1 AND have the following "body part" codes:

- OIIC body part code: 23* (back)

*All body part codes that begin with 23

7.4.1 Estimated annual number

7.4.2 Estimated annual incidence rate per 100,000 FTEs

NOTE: The definition of musculoskeletal disorders involving days away from work used by BLS has changed over time. An earlier definition included all cases of overexertion and repetitive motion (OIIC Event codes 220-239). The definition used here, which restricts to certain "Nature of Injury or Illness codes but adds another Event code, is the most recent. Data for all MSDs included in the OSH profiles on CD-ROMS available as of Spring 2003 are based on the older definition. Tables soon to be posted on the BLS website will be based on the revised definition and can be used to generate the indicator. Note also that data for carpal tunnel syndrome can currently be obtained from the OSH Profiles CD-ROM.. Numbers and rates are not available on the CD-ROM when the estimates are not reliable and do not meet BLS publication criteria. This is more likely for small states.

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Topic: ACUTE AND CUMULATIVE OCCUPATIONAL INJURIES	
INDICATOR #8: CARPAL TUNNEL SYNDROME CASES FILED WITH THE STATE WORKERS' COMPENSATION SYSTEM	
Demographic Group:	Workers covered by State workers' compensation
Numerator:	Carpal tunnel syndrome cases filed with State workers' compensation system involving days away from work
Denominator:	Estimated number of workers covered by State workers' compensation system for the same calendar year
Measures of Frequency:	Annual number of incident cases (numerator) Annual incidence rate per 100,000 workers covered by State workers' compensation system
Time Period:	Calendar year
Significance and Background:	The 2000 Annual BLS Survey identified 27,697 cases of carpal tunnel syndrome that resulted in days away from work. The median number of days away from work was 27. The BLS estimated annual case incidence rate for carpal tunnel syndrome is 3.0 per 10,000 FTE. Estimates from State workers' compensation systems suggest the BLS annual survey underestimates the incidence rate of carpal tunnel syndrome.
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 is 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. 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 length of days away from work that is required before a case will be recorded in the workers' compensation system will vary by state)
HP2010 Objectives:	20-3
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:

CARPAL TUNNEL SYNDROME FILED WITH STATE WORKERS' COMPENSATION SYSTEM

8.1 Annual number of incident cases (numerator)

Variability in the coding systems used by State workers' compensation systems precludes a universal method for identifying amputation injuries. Data 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. The following are tips for constructing the database for analysis:

- Identify cases by date of injury.
- Include all accepted cases - 'open' and 'closed' claims.
- Include claimants of all ages and those with age unknown.
- Include out of state residents.
- Use only 'lost time' claims.
- Coding Systems used for State workers' compensation carpal tunnel syndrome cases:
 - 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';
 - 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';
 - International Association of Industrial Accident Boards and Commissions Electronic Data Interchange Nature of Injury Code = 2370762 combined with all upper extremity body part codes (236768-236778) and 'multiple body parts' code (236804)
- Recognize state to state variability with regard to workers' compensation laws
 - o Number of lost workdays for claim to be considered 'lost time'
 - o Statute of limitations for work-related disease claim filing
 - o Criteria for acceptance of a work-related disease WC claim
 - o Physician choice by employee
 - o Industries poorly represented in state's workers' compensation data e.g. agriculture
 - o Inclusion or exclusion of claims originating from self-insured employers
 - o Occupations excluded from workers compensation coverage
 - o Exclusions by employer size (e.g. compulsory workers' compensation insurance coverage for employers of 4 or more workers)

8.2 Annual incidence rate 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>.

- Click on menu 'Publications'.
- Click on 'Reports'.
- Click on report entitled: "Workers' Compensation: Benefits, Coverage, and Costs, 2000, New Estimates".
- Click on 'Download' (must have Adobe Acrobat).
- Go to Table 4 "Number of Workers Covered by Workers' Compensation and Total Covered Wages, by State, 1998 - 2000". Located on page 6-7 of report.
- Identify state and read column for 'Covered Workers (in thousands)' for year 2000. 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 per 100,000 workers covered by State workers' compensation system**'

Topic: OCCUPATIONAL ILLNESSES	
INDICATOR #9: HOSPITALIZATION FROM OR WITH PNEUMOCONIOSIS	
Demographic Group:	Resident persons age 15 years or older
Numerator:	1. Hospital discharges with a primary or contributing diagnosis of total pneumoconiosis 2. Hospital discharges with a primary or contributing diagnosis of coal workers' pneumoconiosis 3. Hospital discharges with a primary or contributing diagnosis of "asbestosis" 4. Hospital discharges with a primary or contributing diagnosis of "silicosis" 5. Hospital discharges with a primary or contributing diagnosis of other and unspecified pneumoconiosis
Denominator:	Midyear resident population age 15 years or older for the same calendar year
Measures of Frequency:	Annual number of hospitalizations for persons age 15 years or older (numerator) Annual rate of hospitalization per million residents Annual, age-standardized, rate of 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 systemic 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 the pneumoconioses are typically diseases of long latency, current incidence is not necessarily indicative of current exposures, and it may be many years before reductions in occupational exposures affect the number of hospitalizations.
Data Resources:	Hospital discharge data (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:	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 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.
HP2010 Objectives:	20-4
CSTE Positions:	1996-Env-02; 1999-Env-04
Other Available Data:	Age, gender, race/ethnicity, residence zip code, payor 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 payor can be used to provide insight on utilization of workers compensation benefits.

HOW-TO GUIDE – INDICATOR #9:

HOSPITALIZATIONS FROM OR WITH PNEUMOCONIOSIS

9.1 Hospital discharges with a primary or contributing diagnosis of ICD-9-CM code 500-505

(“total pneumoconiosis”)

9.1.1 Annual number of hospitalizations (numerator)

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

- Any diagnosis between 500 and 505 (ICD-9-CM).
- Limit age to those 15 years and older.
- Select for state of residence=‘*your state*’.
- Exclude:
 - age unknown
 - out-of-state residents
 - unknown state of residence
 - out-of-state hospitalizations
- Use unduplicated data (i.e. no exclusions for deaths, and use data where multiple instances of the same event by a single individual have not been removed.)
- Use discharge during calendar year, not fiscal year.
- For each of these categories, obtain the number of 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.

9.1.2 Annual rate of hospitalization per million residents

a) To obtain the denominator for the rate:

- Go to Quickfacts for the U.S. Census: <http://quickfacts.census.gov/>.
- Select your state for recent statistics.
- Select “Browse more datasets for *your state*”.
- Select “General Demographic Characteristics” under Census 2000 population, demographic, and housing information.
- Sum all age groups for ages 15 and above, or subtract ages 0-14 from total.

b) To calculate the crude hospitalization rate:

- Divide the numerator (9.1.1.) by the denominator (9.1.2.a).
- Multiply this result by 1,000,000.

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

- Use the US 2000 Standard population (5th column in table below) found at: <http://www.cdc.gov/nchs/datawh/nchsdefs/ageadjustment.htm>.
- Use below table for all pneumoconioses. A spreadsheet works well for these calculations.
- In Column C (2000 State Pop), enter state’s 2000 census population (9.1.2), by age groups.

- In Column B (# Hospitalizations), enter number of hospitalizations obtained in 9.1.1, by age groups for all pneumoconioses.
- Column D = Column B / Column C
(Hospitalizations/Pop) = (# Hospitalizations) / (2000 State Pop)
- Column F = Column D * Column E
(# Expected Hospitalizations) = (Hospitalizations/Pop) * (US 2000 Standard Pop)
- **Age-adjusted hospitalization rate = (F10 / E10) * 1,000,000**
(The sum (Σ) of all expected 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 Hospitalizations, ages 15 and older, 2000				
	Age Group	# Hospitalizations	2000 State Pop	Hospitalizations/Pop	US 2000 Std Pop	# Expected 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
10	Total				215,670,000	Σ(F2:F9)

9.2 Hospital discharges with a primary or contributing diagnosis of ICD-9 code 500 (“Coal Workers’ Pneumoconiosis”)

9.2.1 Annual number of hospital discharges (numerator)

Follow directions for 9.1.1 using any diagnosis = ‘500’.

9.2.2 Annual rate of hospitalization per million residents

a) To obtain the denominator for the rate:

Follow directions for 9.1.2a.

b) To calculate the crude hospitalization rate:

- Divide the numerator (9.2.1) by the denominator (9.2.2a).
- Multiply this result by 1,000,000.

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

Follow directions for 9.1.3 using hospitalizations from 9.2.1.

9.3 Hospital discharges with a primary or contributing diagnosis of ICD-9 code 501 (“Asbestosis”)

9.3.1 Annual number of hospital discharges (numerator)

Follow directions for 9.1.1 using any diagnosis = ‘501’.

9.3.2 Annual rate of hospitalization per million residents

a) To obtain the denominator for the rate:

Follow directions for 9.1.2a.

b) To calculate the crude hospitalization rate:

- Divide the numerator (9.3.1) by the denominator (9.3.2a).
- Multiply this result by 1,000,000.

9.3.3 Annual, age-standardized, rate of hospitalization per million residents

Follow directions for 9.1.3 using hospitalizations from 9.3.1.

9.4 Hospital discharges with a primary or contributing diagnosis of ICD-9 code 502 (“Silicosis”)

9.4.1 Annual number of hospital discharges (numerator)

Follow directions for 9.1.1 using any diagnosis = ‘502’.

9.4.2 Annual rate of hospitalization per million residents

a) To obtain the denominator for the rate:

Follow directions for 9.1.2a.

b) To calculate the crude hospitalization rate:

- Divide the numerator (9.4.1) by the denominator (9.4.2a).
- Multiply this result by 1,000,000.

9.4.3 Annual, age-standardized, rate of hospitalization per million residents

Follow directions for 9.1.3 using hospitalizations from 9.4.1.

9.5 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 hospital discharges (numerator)

Follow directions for 9.1.1 using any diagnosis = ‘503’, ‘504’ or ‘505’.

9.5.2 Annual rate of hospitalization per million residents

a) To obtain the denominator for the rate:

Follow directions for 9.1.2a.

b) To calculate the crude hospitalization rate:

- Divide the numerator (9.5.1) by the denominator (9.5.2a).
- Multiply this result by 1,000,000.

9.5.3 Annual, age-standardized, rate of hospitalization per million residents

Follow directions for 9.1.3 using hospitalizations from 9.5.1.

Topic: OCCUPATIONAL ILLNESSES	
INDICATOR #10: MORTALITY FROM OR WITH PNEUMOCONIOSIS	
Demographic Group:	Resident persons age 15 years or older
Numerator:	1. Deaths with the underlying or contributing cause of death of total pneumoconiosis 2. Deaths with the underlying or contributing cause of death of coal workers' pneumoconiosis 3. Deaths with the underlying or contributing cause of death of asbestosis 4. Deaths with the underlying or contributing cause of death of silicosis 5. Deaths with the underlying or contribution cause of death of other pneumoconiosis, unspecified pneumoconiosis, or pneumoconiosis with TB
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 per million residents Annual age-standardized death rate (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 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 the 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. In addition, people may not die in the state in which they were exposed.
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 death may not be the state of exposure.
HP2010 Objectives:	20-4
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 ICD-10 code of J60-J66 as the underlying or contributing cause of death (“Total Pneumoconiosis”)

10.1.1 Annual number of deaths (numerator)

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.
- Limit age to those 15 years and older.
- Select for state of residence=’*your state*’.
- Exclude:
 - age unknown
 - out-of-state residents or unknown 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.

10.1.2 Annual death rate per million residents

a) To obtain the denominator for the rate:

- Go to Quickfacts for the U.S. Census: <http://quickfacts.census.gov/>.
- Select your state for recent statistics.
- Select “Browse more datasets for *your state*”.
- Select “General Demographic Characteristics” under Census 2000 population, demographic, and housing information.
- Sum all age groups for ages 15 and above or subtract 0-14 from total.

b) To calculate annual death rate per million residents:

- Divide the numerator (10.1.1) by the denominator (10.1.2a).
- Multiply this result by 1,000,000.

10.1.3. Annual age-standardized death rate per million residents

- Use the US 2000 Standard population (5th column in table below) found at: <http://www.cdc.gov/nchs/datawh/nchsdefs/ageadjustment.htm>.
- Use below table for all pneumoconioses. A spreadsheet works well for these calculations.
- In Column C (2000 State Pop), enter state’s 2000 census population (10.1.2), by age groups.
- In Column B (# Deaths), enter number of deaths obtained in 10.1.1, by age groups for all pneumoconioses.
- Column D = Column B / Column C
(Deaths/Pop) = (# Deaths) / (2000 State Pop)
- Column F = Column D * Column E

(# Expected Deaths) = (Deaths/Pop) * (US 2000 Standard Pop)

- **Age-adjusted death rate = (F10 / E10) * 1,000,000**
(The sum (Σ) of all expected deaths) / (the sum of US 2000 Standard Pop)
multiplied by 1,000,000

		Column B	Column C	Column D	Column E	Column F
	Age Group	State Resident Deaths, ages 15 and older, 2000				
		# Deaths	2000 State Pop	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				215,670,000	$\Sigma(F2:F9)$

10.2 Deaths with a underlying or contributing cause of death with ICD-10 code J60 (“Coal Workers’ Pneumoconiosis”)

10.2.1 Annual number of deaths (numerator)

Follow directions for 10.1.1 using any cause of death = ‘J60’.

10.2.2 Annual death rate per million residents

a) To obtain the denominator for the rate:

Follow directions for 10.1.2a.

b) To calculate the crude death rate:

- Divide the numerator (10.2.1) by the denominator (10.2.2a).
- Multiply this result by 1,000,000.

10.2.3 Annual, age-standardized, death rate per million residents

Follow directions for 10.1.3 using deaths from 10.2.1.

10.3 Deaths with a underlying or contributing diagnosis of ICD-10 code J61 (“Asbestosis”)

10.3.1 Annual number of deaths (numerator)

Follow directions for 10.1.1 using any cause of death = ‘J61’.

10.3.2 Annual death rate per million residents

a) To obtain the denominator for the rate:

Follow directions for 10.1.2a.

b) To calculate the crude death rate:

- Divide the numerator (10.3.1) by the denominator (10.3.2a).
- Multiply this result by 1,000,000.

10.3.3 Annual, age-standardized, death rate per million residents

Follow directions for 10.1.3 using deaths from 10.3.1.

10.4 Deaths with a underlying or contributing diagnosis of ICD-10 code J62 (“Silicosis”)

10.4.1 Annual number of deaths (numerator)

Follow directions for 10.1.1 using any cause of death = ‘J62.0’ – ‘J62.8’.

10.4.2 Annual death rate per million residents

a) To obtain the denominator for the rate:

Follow directions for 10.1.2a.

b) To calculate the crude death rate:

- Divide the numerator (10.4.1) by the denominator (10.4.2a).
- Multiply this result by 1,000,000.

10.4.3 Annual, age-standardized death rate per million residents

Follow directions for 10.1.3 using deaths from 10.4.1.

10.5 Deaths with a underlying or contributing diagnosis of ICD-10 code J63, J64, J65, J66 (“Other and Unspecified Pneumoconiosis”)

10.5.1 Annual number of deaths (numerator)

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

10.5.2 Annual death rate per million residents

a) To obtain the denominator for the rate:

Follow directions for 10.1.2a.

b) To calculate the crude death rate:

- Divide the numerator (10.5.1) by the denominator (10.5.2a).
- Multiply this result by 1,000,000.

10.5.3 Annual, age-standardized death rate per million residents

Follow directions for 10.1.3 using deaths from 10.5.1.

Topic: OCCUPATIONAL ILLNESSES	
INDICATOR #11 ACUTE WORK-RELATED PESTICIDE-ASSOCIATED ILLNESS AND INJURY 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 incident cases (numerator) Annual incidence rate 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 US, approximately one billion pounds of pesticide active ingredient are used annually, and over 20,000 pesticide products are being marketed. The EPA estimates 20,000 - 40,000 work-related pesticide poisonings per year.
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.
HP2010 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 RELATED TO POISON CONTROL CENTERS

11.1 Annual number of incident cases (numerator)

Method 1:

- Go to NIOSH SENSOR pesticide website: <http://www.cdc.gov/niosh/pestsurv>
 - Go to the Poison Control Center data link
 - Look up the number of cases for your state
- Note:** These data are derived from the American Association of Poison Control Centers using the case definition listed below under Method 2, and provided to NIOSH.

Method 2:

Note: There may be a discrepancy between the number of incident cases provided by NIOSH/AAPCC and the number of cases derived from your local PCC using the method below. States are investigating the cause of the discrepancy.

- Contact your local Poison Control Center (PCC). Contact information can be obtained from American Association of Poison Control Centers <http://www.aapcc.org/director2.htm>. Some states have more than one PCC.
 - Include in-state residents and unknown residence
- Determine if the PCC uses the Toxicall data system. If so, ask the PCC to run Report 57 with reason for the call (**ExpReason**) = **3** (occupational) **OR** exposure site (**ExpSite**) = **3** (workplace). If the PCC cannot generate Report 57, request the following criteria (**variable names** in parenthesis):
 1. Exposure to an agent included in one of the pesticide generic categories (**SubGenericCode**) =
 - Disinfectants
 - 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:
 - Fungicides (non-medicinal)
 - 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

Fumigants

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 insecticide
0077569 unknown insecticide

Repellents

0201047 bird, dog, deer or other mammal repellent
0201048 insect repellent with deet
0201049 insect repellent without deet
0218000 *insect repellent: unknown (inactive)*
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

- AND** 2. Reason for the call (**ExpReason**) = 3 (occupational) **OR**
exposure site (**ExpSite**) = 3 (workplace) **AND**
3. 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

- If the poison control center will disseminate data, obtain the data set and query the data set using the following criteria:
 1. Exposure to an agent included in one of the pesticide generic categories (**SubGenericCode** in previous code list) **AND**
 2. Reason for the call (**ExpReason**) = 3 (occupational) **OR**
exposure site (**ExpSite**) = 3 (workplace) **AND**

3. 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

- Using the case number delete any duplicate cases.
- Tally total number of cases that match the numerator criteria.

11.2 **Annual incidence rate per 100,000 employed persons age 16 years or older**

a) To obtain the denominator for the rate:

- Go to Current Population Statistics: <http://www.bls.gov/opub/gp/laugp.htm>
- Select Section II: Estimate for States
- Select Table 12. Employment status of the civilian noninstitutional population by sex, age, race and Hispanic origin
- Find your state from the first column.
- Read the 'Total' row for your state and the 4th column – "Employment Number". This is the '**Number of Employer Persons 16 years of age or older**' (in thousands). Multiply by 1000.

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 crude rate of hospitalization per 100,000 employed persons age 16 years or older**'

Topic: OCCUPATIONAL ILLNESSES	
INDICATOR #12: INCIDENCE OF MALIGNANT MESOTHELIOMA	
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 cases (numerator) Annual incidence rate per million residents Annual, age-standardized, incidence rate (standardized by the direct method to the Year 2000 U.S. Standard population)
Time Period:	Calendar year
Significance and Background:	Approximately 2,500 deaths with malignant mesothelioma occur each year in the United States. 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.
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 is available in all states, aggregation of state data to produce nationwide estimates will be incomplete.
Other Available Data:	Age, gender, race/ethnicity, county, usual industry, and usual occupation
HP2010 Objectives:	None
CSTE Positions:	None
Recommendations:	Age, gender, race/ethnicity-specific, 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 (numerator)

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.
- Exclude:
 - age unknown
 - out-of-state residents and unknown residence
- 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.

12.2 Annual incidence rate per million residents

a) To obtain the denominator for the rate:

- Go to Quickfacts for the U.S. Census: <http://quickfacts.census.gov/>.
- Select your state for recent statistics.
- Select “Browse more datasets for *your state*”.
- Select “General Demographic Characteristics” under Census 2000 population, demographic, and housing information.
- Sum all age groups for ages 15 and above, or subtract ages 0-14 from total.

b) To calculate the annual incidence rate:

- Divide the numerator (12.1) by the denominator (12.2a).
- Multiply this result by 1,000,000 to get the ‘**Annual crude rate of mesothelioma per million residents 15 years and older**’

12.3 Annual, age-standardized incidence rate per million residents

- Use the US 2000 Standard population (5th column in table below) found at: <http://www.cdc.gov/nchs/datawh/nchsdefs/ageadjustment.htm>.
- Use below table to calculate the age-standardized incidence rate. A spreadsheet works well for these calculations.
- In Column C (2000 State Pop), enter state’s 2000 census population (12.1), by age groups.
- In Column B (# Mesothelioma Cases), enter number of mesothelioma cases obtained in 12.1, by age groups.
- Column D = Column B / Column C
(Mesotheliomas/Pop) = (# Mesotheliomas) / (2000 State Pop)
- Column F = Column D * Column E
(# Expected Mesotheliomas) = (Mesotheliomas/Pop) * (US 2000 Standard Pop)
- **Age-adjusted incidence rate for mesothelioma = (F10 / E10) * 1,000,000**

(The sum (Σ) of all expected mesotheliomas) / (the sum of US 2000 Standard Pop)
multiplied by 1,000,000

		Column B	Column C	Column D	Column E	Column F
	Age Group	State Resident Mesothelioma Cases, ages 15 and older, 2000				
		# Mesothelioma Cases	2000 State Pop	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	$\Sigma(F2:F9)$

Topic: OCCUPATIONAL EXPOSURES	
INDICATOR #13: ELEVATED BLOOD LEAD LEVELS AMONG ADULTS	
Demographic Group:	Employed persons
Numerators:	1 All reported state residents age 16 years or older, with a blood lead level of ≥ 25 $\mu\text{g/dL}$ 2. All reported state residents age 16 years or older, with a blood lead level of ≥ 40 $\mu\text{g/dL}$
Denominator:	Employed population age 16 years or older for the same calendar year
Measures of Frequency:	Annual number of cases at or above 25 $\mu\text{g/dL}$ and 40 $\mu\text{g/dL}$ (numerator) Annual prevalence rate per 100,000 employed persons age 16 years or older Annual number of incident cases at or above 25 $\mu\text{g/dL}$ and 40 $\mu\text{g/dL}$ Annual incidence rate per 100,000 employed persons age 16 years or older
Time Period:	Calendar year
Significance and Background:	In 2001, reporting systems operating in 23 states enumerated nearly 10,000 adults with blood lead levels (BLLs) greater than or equal to 25 $\mu\text{g/dL}$. About 20 percent had levels greater than or equal to 40 $\mu\text{g/dL}$. Lead adversely affects multiple organ systems and can cause permanent damage. Effects include anemia, nervous system dysfunction, kidney problems, hypertension, decreased fertility, and miscarriages. Children are more sensitive than adults to the effects of lead and about 24,000 U.S. children with BLLs of 10 $\mu\text{g/dL}$ or greater are estimated to be exposed from lead unintentionally brought home by a parent from the workplace. Pediatric effects include neurologic damage, learning disabilities, and behavior problems.
Rationale:	Among adults, lead poisoning is a persistent, mainly occupational, health problem that continues to be an important public health problem. The single best diagnostic test for exposure is the BLL. Federal Occupational Safety and Health Administration (OSHA) regulations to protect workers from lead-associated health effects include requirements for monitoring BLLs among employees who meet certain exposure criteria.
Limitations of Indicator:	BLLs are a good indicator of recent exposure over the 3 to 5 weeks preceding the test, but are not a valid indicator of body burden of lead resulting from long-term exposure. Therefore, an elevated body burden of lead may not be detected in an individual if the lead test is done more than several weeks after the most recent lead exposure.
Data Resources:	Reports of elevated BLLs from laboratories (numerator) BLS Current Population Survey Data (denominator)
Limitations of Data Resources:	Some states do not require laboratories to report elevated BLLs. Even with a reporting requirement, data from laboratories are frequently incomplete. Many workers with significant occupational lead exposure are not appropriately tested. An individual's lead exposure and BLL testing may be done in the same or in different states (which may not be the individual's state of residence). Approximately 10-15% 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. Not all states may be able to determine both state of employment/exposure and state of residence of their reported cases.
HP2010 Objectives:	20-7
CSTE Positions:	1990-Env-9; 1995-Env-14; 1999-Env-02; 2000-Occ-01; 2001-Occ-01
Other Available Data:	Age, gender, industry, occupation, individual BLL, and all lead test reports (i.e., not just those exceeding the specified criteria)
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. Obtaining reports on all BLLs can provide insight about the overall frequency of BLL testing. Follow-up of selected cases and/or clusters can help identify where/how individuals with high BLLs were exposed.

HOW-TO GUIDE – INDICATOR #13:

ELEVATED BLOOD LEAD LEVELS AMONG ADULTS

13.1 Persons age 16 years or older with a blood lead level of ≥ 25 $\mu\text{g}/\text{dL}$

13.1.1 Annual number of persons (numerator)

- Contact state Adult Blood Lead Epidemiology Surveillance (ABLES) program: www.cdc.gov/niosh/ables.html
- Request data according to the following criteria for the calendar year:
 - Blood lead level (BLL) ≥ 25 $\mu\text{g}/\text{dL}$
 - Age 16 years and older
 - Earliest date of either draw date, date laboratory received sample, or date laboratory analyzed sample
 - If a person is reported more than once during the time period, count that person one time only, at his/her highest BLL
 - Include all cases, both occupationally and non-occupationally exposed
 - Include all residents of state and unknown residence
 - Exclude out-of-state residents

13.1.2 Annual prevalence rate per 100,000 employed persons

a) To obtain the denominator for the rate:

- Go to Current Population Statistics: <http://www.bls.gov/opub/gp/laugp.htm>.
- Select 'Section II: Estimate for States'.
- Select 'Table 12. Employment status of the civilian noninstitutional population by sex, age, race and Hispanic origin'.
- Find your state from the first column.
- Read the 'Total' row for your state and the 4th column – "Employment Number". This is the '**Number of Employed Persons 16 years of age or older**' (in thousands). Multiply by 1000.

b) To calculate the rate:

- Divide the numerator (13.1.1) by the denominator (13.1.2a).
- Multiply this result by 100,000 to get the '**Annual prevalence rate per 100,000 employed persons age 16 years or older**'.

13.1.3 Annual number of incident cases (numerator)

Use the ABLES definition of an incident case: Case with a BLL of ≥ 25 $\mu\text{g}/\text{dL}$ reported in the calendar year, but was not reported in the immediately preceding year with a BLL of ≥ 25 $\mu\text{g}/\text{dL}$ (may appear in earlier years with a BLL of 25 $\mu\text{g}/\text{dL}$ or greater).

13.1.4 Annual incidence rate per 100,000 employed persons

a) To obtain the denominator for the rate:

Use denominator from 13.1.2.

b) To calculate the rate:

- Divide the numerator (13.1.3) by the denominator (13.1.2a)

- Multiply this result by 100,000 to get the ‘**Annual incidence rate per 100,000 employed persons age 16 years or older**’.

13.2 Persons age 16 years or older with a blood lead level of ≥ 40 $\mu\text{g/dL}$

13.2.1 Annual number of persons (numerator)

Follow data request from 13.1.1 for BLL ≥ 40 $\mu\text{g/dL}$

13.2.2 Annual prevalence rate per 100,000 employed persons

a) To obtain the denominator for the rate:

Use denominator from 13.1.2.

b) To calculate the rate:

- Divide the numerator (13.2.1) by the denominator (13.1.2a)
- Multiply this result by 100,000 to get the ‘**Annual prevalence rate per 100,000 employed persons age 16 years or older**’.

13.2.3 Annual number of incident cases (numerator)

Use the ABLES definition of an incident case: Case with a BLL of ≥ 40 $\mu\text{g/dL}$ reported in the calendar year, but was not reported in the immediately preceding year with a BLL of ≥ 40 $\mu\text{g/dL}$ (may appear in earlier years with a BLL of 40 $\mu\text{g/dL}$ or greater).

13.2.4 Annual incidence rate per 100,000 employed persons

a) To obtain the denominator for the rate:

Use denominator from 13.1.2.

b) To calculate the rate:

- Divide the numerator (13.2.3) by the denominator (13.1.2a).
- Multiply this result by 100,000 to get the ‘**Annual incidence rate per 100,000 employed persons age 16 years or older**’.

Topic: OCCUPATIONAL HAZARDS	
INDICATOR #14: PERCENTAGE OF WORKERS EMPLOYED IN INDUSTRIES AT HIGH RISK FOR OCCUPATIONAL MORBIDITY	
Demographic Group:	Employed persons
Numerator:	Employed persons age 16 years of age or older, in industries at high risk for occupational morbidity
Denominator:	Employed persons age 16 years of age or older for the same calendar year
Measures of Frequency:	Percentage of State workforce in the following high-risk Standard Industrial Classifications (SIC): 201, 242, 244, 253, 254, 321, 326, 327, 332, 333, 334, 336, 342, 344, 346, 353, 358, 371, 373, 375, 379, 451, 505, 805, and 842. The selected industrial codes need to be reviewed every 5 years to update possible changes in the high risk industries.
Time Period:	Calendar year
Significance and Background:	In 1999, the U.S. Bureau of Labor Statistics (BLS) reported an estimated total of 5.7 million injury and illness cases within the private sector workforce, an estimated incidence rate of 6.3 cases per 100 full-time-equivalent workers. There are several industries that have significantly higher injury and illness rates than this national average. Twenty-five industries have occupational injury and illness rates higher than 13 cases per 100 full-time workers, more than twice the overall rate. These industries employ approximately 6.5 million workers in the United States.
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.
Data Resources:	Bureau of the Census County Business Patterns (CBP) (numerator and denominator)
Limitations of Data Resources:	The annual BLS 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 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 SIC may not be provided within a State because of confidentiality issues.
HP2010 Objectives:	None
CSTE Positions:	None
Other Available Data:	The BLS SOII and the CBP provide data at the 4-digit SIC for some States.
Recommendations:	States could additionally identify their own State-specific high-risk industries and assess associated employment patterns.

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 high risk 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:	Percentage of State workforce in the following high-risk 1990 Bureau of the Census Occupations: 235, 444, 463, 496, 527, 576, 596, 597, 706, 709, 727, 755, 766, 768, 804, 806, 853, 859, 866, 869, 874, 883, and 889. The selected occupational codes need to be reviewed every 5 years to update possible changes in the high risk occupations.
Time Period:	Calendar year
Significance and Background:	In 1999, the Bureau of Labor Statistics (BLS) reported an estimated 1.7 million injuries and illnesses that resulted in “days away from work”, and a rate of 1.9 “days away from work” cases per 100 workers. The risk of these injuries and illnesses are significantly higher in certain occupations. Twenty-three occupations have “days away from work” injury and illness rates higher than 5 cases per 100 workers. These occupations account for approximately 7.2 million workers in the United States.
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.
Data Resources:	Bureau of Labor Statistics Current Population Survey (CPS) (numerator and denominator)
Limitations of Data Resources:	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 United States, excluding the self-employed, but may not match perfectly those workers covered in the SOII.
HP2010 Objectives:	None
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.

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:	Percentage of State workforce in the following high-risk 1990 Bureau of the Census Industries: 010, 011, 020, 030, 031, 032, 040, 041, 042, 050, 060, 201, 230, 251, 360, 402, 410, 420, 471, 500, 531, 551, 552, 590, 622, 650, and 752. The selected industrial codes need to be reviewed every 5 years to update possible changes in the high risk industries. Percentage of State workforce in the following high-risk 1990 Bureau of the Census Occupations: 226, 461, 473, 475, 477, 479, 496, 498, 576, 577, 595, 597, 599, 613, 616, 804, 806, 809, 829, 853, 855, 859, 869, and 875. The selected occupational codes need to be reviewed every 5 years to update possible changes in the high risk industries.
Time Period:	Calendar year
Significance and Background:	Each year, over 6,000 cases of work-related fatalities are reported to the Census of Fatal Occupational injuries (CFOI) Program administered by the Bureau of Labor Statistics (BLS). On an average day, 16 workers die as a result of injuries sustained at work. The risks for these occupational fatalities are significantly higher in certain industries and occupations. Twenty-seven industries have fatality rates higher than 10 deaths per 100,000 workers, and employ approximately 17.2 million workers. There are also 24 occupations that have fatality rates higher than 20 deaths per 100,000 workers. These occupations account for approximately 7.6 million workers in the United States.
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 occupations and industries for fatalities helps prioritize limited resources.
Limitations of Indicator:	Differences in regional industrial practices may cause the ranking of high-risk occupations and industries within a specific State to differ from those identified from national data.
Data Resources:	BLS Current Population Survey (CPS) (numerator and denominator)
Limitations of Data Resources:	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.
HP2010 Objectives:	None
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 specific high-risk industries and occupations and associated employment patterns.

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 physicians who are members of the American College of Occupational and Environmental Medicine (ACOEM) 3. Number of board-certified occupational health nurses 4. Number of nurses who are members of the American Association of Occupational Health (AAOH) 5. Number of board-certified industrial hygienists 6. Number of industrial hygienists who are members of the American Industrial Hygiene Association (AIHA) 7. Number of safety engineers who are members of American Society of Safety Engineers (ASSE)
Denominator:	Employed persons age 16 years or older for the same calendar year
Measures of Frequency:	1. Rate of board-certified occupational physicians per 10,000 employees. 2. Rate of occupational physicians who are members of the ACOEM per 10,000 employees. 3. Rate of board-certified occupational health registered nurses per 10,000 employees. 4. Rate of occupational nurses who are members of the AAOH per 10,000 employees. 5. Rate of board-certified industrial hygienists per 10,000 employees. 6. Rate of industrial hygienists who are members of the AIHA per 10,000 employees. 7. Rate of safety engineers who are members of the ASSE per 10,000 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) diplomats database (www.abprevmed.org). (numerator #1) Annual roster of members of the ACOEM (numerator #2) American Board of Occupational Health Nurses Directory. (numerator #3) Annual roster of members of the AAOH member directory (www.aaohn.org). (numerator #4) American Board of Industrial Hygiene. (numerator #5) AIHA member directory (www.aiha.org). (numerator #6) ASSE member directory (www.asse.org). (numerator #7) Bureau of Labor Statistics Current Population Survey Data (denominator)
Limitations of Data Resources:	The numerator data resources 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.
HP2010 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.

Topic: INTERVENTION RESOURCES FOR OCCUPATIONAL HEALTH	
INDICATOR #18: OSHA ENFORCEMENT ACTIVITIES	
Demographic Group:	Employed persons.
Numerator:	Employed persons covered by OSHA inspections Total number of OSHA inspections
Denominator:	Total number of employees covered by OSHA for the same calendar year
Measures of Frequency:	Number of employees whose work areas were inspected by OSHA Percentage of all OSHA covered employees whose work areas were inspected Number of establishments inspected by OSHA Percentage of all OSHA covered establishments inspected by OSHA
Time Period:	Calendar year
Significance and Background:	In 1970, Congress established the Occupational Safety and Health Administration (OSHA). The OSHA mission is to "assure so far as possible every working man and woman in the nation safe and healthful working conditions." This mandate involves the application of a set of tools by OSHA (e.g., standards development, enforcement, compliance assistance). OSHA conducts both referral and non referral inspections on work-sites. Work-sites are selected into an emphasis program for non referred inspections, randomly and on the basis of industry incidence rates of injuries. Investigations are inspections that are triggered by three events: fatality, catastrophe, or referral (including outside health/safety agency or media). All of the above on-site activities are called inspections for the statistical databases. Comprehensive information about inspections is found in the OSHA Field Inspection Reference Manual CPL 2.103, available on the OSHA web-site (http://www.osha.gov/Firm_osh_toc/Firm_toc_by_sect.html).
Rationale:	The measures of frequency for this indicator provide indications of the number and proportions of workers and worksites potentially benefiting directly from OSHA inspection activity.
Limitations of Indicator:	This indicator only measures enforcement activity and not other measures of OSHA activity such as education and compliance assistance. OSHA may inadvertently overestimate the number of workers covered by its inspections by including all workers at a work site but only inspect a particular section of a worksite. This indicator does not include farm workers in any State and excludes public sector workers in 24 States.
Data Resources:	State or Regional OSHA Office for an annual report of total inspection conducted and the number of workers covered by these inspections (numerator). Bureau of the Census County Business Patterns (CBP) for the numbers of workers employed and establishments in the private sector (denominator). Use total employment number, public and private if State Plan State.
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. Public sectors in 24 States, and farms in all States are not covered by OSHA inspections. The CBP is based on mid-March payrolls of all employers in the United States, but does not cover farms, public administration, and the self-employed. Exact employment counts for a particular SIC may not be provided within a State because of confidentiality issues. It is possible to double count if inspections occur in the same year at the same location within the same work-site.
HP2010 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 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 information on the above.

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 amount of wages covered by workers' compensation for the same calendar year
Measures of Frequency:	Total amount of workers' compensation benefits paid Average amount of workers' compensation paid per covered worker Workers' compensation benefits as a percentage of covered wages
Time Period:	Calendar year
Significance and Background:	In 2000, \$45.9 billion in workers' compensation benefits were paid to workers with occupational injuries or illnesses. The benefits include payments for medical care and wage-replacement to workers or their surviving dependents. The number of workers covered by workers' compensation insurance has increased and while the frequency of claims has declined, the medical and wage-replacement costs per worker have increased, assuring continued economic impact of work-related injuries and illnesses on workers and employers.
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:	It does not include human, non-economic costs nor all the economic costs associated with occupational injuries and illnesses. This is a gross indicator of the burden of occupational injury and illness. 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 (NASI report: Workers' Compensation: Benefits, Coverage, and Costs (www.nasi.org)).
Limitations of Data Resources:	Workers' compensation data is not complete, as many individuals with work-related illnesses do not file for workers' compensation. Self-employed individuals (e.g. farmers, independent contractors and small business owners), corporate executives, domestic and agricultural workers may be exempt from coverage. Additionally, federal employees, railroad, long shore and maritime workers are not 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.
HP2010 Objectives:	20-2
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 by State. 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.

Topic: SOCIOECONOMIC IMPACT OF OCCUPATIONAL INJURIES AND ILLNESSES	
INDICATOR #20: LOST WORK-TIME DUE TO WORK-RELATED INJURIES AND ILLNESSES REPORTED BY EMPLOYERS	
Demographic Group:	Employed persons 16 years
Numerator:	1. Estimated total days away from work due to work-related injuries and illnesses 2. Estimated total days of restricted work activity or job transfer due to work-related injuries and illnesses 3. Estimated total lost work-time (i.e., the sum of numerators 1 and 2)
Denominator:	Estimated total hours worked for the same calendar year
Measures of Frequency:	Estimated annual number of days (based on each numerator) Estimated rate (based on each numerator) per 100,000 full-time-equivalents (FTEs)
Time Period:	Calendar year
Significance and Background:	For 2000, the U.S. Bureau of Labor Statistics (BLS) reported an estimated national total of 1.75 million cases of work-related injury and illness associated with lost work-time within the private sector workforce, with a median of 6 days away from work per injury/illness.
Rationale:	Work-related injuries and illnesses are preventable and result in a substantial societal burden. One way to measure and track a component of this burden is to estimate the lost work-time (days away from work and days with restricted work activity or job transfer) due to occupational injuries and illnesses.
Limitations of Indicator:	Much work-related morbidity associated lost work-time is not measured by this indicator. Employers do not always record all relevant events. They often do not recognize diseases that are work-related, or are not aware of occupational diseases with long latencies that are not diagnosed until after an employee leaves employment with the relevant employer. In addition, days away from work do not accrue even when disability continues if an affected employee is otherwise discharged from employment.
Data Resources:	Annual BLS Survey of Occupational Injuries and Illnesses (SOII)
Limitations of Data Resources:	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. There is the potential for additional sampling error if an employer has more than 30 cases with days away from work as an employer is only required to report on 30 such cases. 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. 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. Finally, due to the reporting rules for the SOII, injuries or illnesses involving less than a full day of lost work-time are not included in this indicator.
HP2010 Objectives:	None
CSTE Positions:	None
Other Available Data:	Industry, occupation, age, gender, race/ethnicity, nature of injury, body part, type of event, and source of event
Recommendations:	SOII has many data elements that can be used to better define the pattern of days away from work due to work-related injuries and illnesses. They include, for example, industry, specific rates of cases involving days away from work.

Topic: DEMOGRAPHICS	
INDICATOR #21: EMPLOYMENT DEMOGRAPHICS	
Demographic Group:	Employed persons.
Numerator:	Employed persons 16 years or older by specific demographic characteristics. Employed persons 16 years or older covered by workers' compensation.
Denominator:	Employed population 16 years or older for the same calendar year.
Measures of Frequency:	Percentage of workforce unemployed. Percentage of population employed. Percentage of workforce self-employed. Percentage distribution of workforce by sex. Percentage distribution of workforce by race. Percentage distribution of workforce by Hispanic origin. Percentage distribution of workforce in full-time or part-time jobs. Percentage distribution of workforce by number of hours worked. Percentage distribution of workforce covered by workers' compensation.
Time Period:	Calendar year
Significance and Background:	There are an estimated 133 million civil, non-institutional workers in the United States of which 46% are female, 16% are of a racial minority, and 10% are of Hispanic origin. In addition, 17% of these are part-time workers. The makeup of the workforce differs between States and may be important in understanding the occupational health status between and within States.
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:	These indicators are not direct measures of occupational risk for a State's workforce or for individual workers.
Data Resources:	BLS Geographic Profiles of Employment and Unemployment (www.bls.gov/opub/qp/qpsec2.htm) (numerator for all measures of frequency, except workers' compensation). National Academy of Social Insurance: (http://www.nasi.org/publications2763/publications.htm). (numerator for workers' compensation coverage) BLS Geographic Profiles of Employment and Unemployment (denominator)
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 inmates in institutions. These data may underestimate the percentage of certain racial or ethnic worker populations that do not have permanent residences, or are migratory in nature. Additional information is available at http://www.bls.gov/opub/gp/gpsec2.htm . The National Academy of Social Insurance provides data for workers' compensation coverage in all States, but does not include workers who should be covered by workers' compensation, but are not because employers are not providing coverage. Additional information is available at http://www.nasi.org/usr_doc/NASI_WC_5_22_02_FINAL.pdf .
HP2010 Objectives:	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 distributions by age, educational, unionization, and income are available from the CPS micro-data, which States may be able to utilize.
Recommendations:	States could report the available cross tabulations of demographic indicators provided within the Geographic Profiles reports.

APPENDIX A: 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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CORE OCCUPATIONAL HEALTH SURVEILLANCE PILOT PROJECT

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