



*A NIOSH Education and Research Center for  
Occupational & Environmental Health & Safety*

## **Occupational Health Indicators in Colorado:**

A Baseline Health Assessment (2001-2005)

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## **Executive Summary**

The Mountain and Plains Education and Research Center (MAP ERC), in collaboration with the Colorado Department of Public Health and Environment (CDPHE) and the National Institute of Occupational Safety and Health (NIOSH), has prepared this report to describe the baseline health status of workers in Colorado (CO). The overall purpose of this assessment is to provide the state of CO with the data and information needed to examine the merits of conducting state-wide occupational health surveillance, and to determine priorities for workplace prevention of work-related injuries and illnesses.

The greatest gap in data and need for workplace health surveillance in CO is non-fatal work-related injuries and illness. CO is one of seven states that does not participate in the Survey of Occupational Injuries and Illnesses (SOII). The SOII collects data on work-related injuries and illnesses reported by employers. These data are helpful in describing the burden of injuries and illnesses that occur in the workplace.

Priorities and future directions for prevention and intervention should focus on industries and occupations experiencing a disproportional rate of fatal work-related injuries and illnesses. For the years 2001 to 2005, rates of work-related fatalities in CO were higher than overall US rates. The percent of workers employed in industries and occupations at high risk for occupational mortality was higher than national rates.

A supplemental report may be forthcoming upon receipt and analysis of data sets that were not yet received at the time of this report (e.g. hospital discharge data).

Copies of the report can be obtained by contacting the MAP ERC at [maperc@uchsc.edu](mailto:maperc@uchsc.edu).

## Introduction

Each year, thousands of workers in Colorado (CO) are exposed to workplace conditions that result in occupational illnesses and injuries. At present, there is no comprehensive tracking system in CO to provide timely data on such work-related health effects. The development of a comprehensive occupational health system is essential for prevention. Such data are necessary to assure that workplaces are safe and healthy.

In recognition of the need for state-based occupational health surveillance programs nationwide, the National Institute for Occupational Safety and Health (NIOSH) Council of Territorial and State Epidemiologists (CSTE) developed a list of occupational health indicators for the purpose of describing worker demographics, measures of work-related health and of factors that influence worker health. The goal is to guide state priorities in workplace prevention and intervention. Of the 19 health indicators established, 12 report injury and illness resulting from occupational hazards; 3 describe potential workplace health and safety hazards; 2 examine intervention activities; 1 measures harmful exposure in the workplace; and 1 describes the socio-economic impacts of work-related injuries and illnesses.

The purpose of this project was to describe the baseline health status of workers in CO using the Occupational Health Indicators with the target goal of building capacity for occupational health surveillance in CO. Specifically, the goals of this report are to:

- Identify state and national data sets describing occupational health pertinent to CO
- Develop a systematic approach to collect available data

- Collect and compile available data from 2001 to the most recent year for which data are available
- Describe the status of worker health in CO
- Determine gaps in data
- Define the greatest needs for workplace health surveillance
- Determine priorities for prevention and workplace intervention efforts
- Recommend future directions

The indicators presented in this report describe core data to guide the development of programs to prevent work-related injuries and illnesses. It is a product of the Mountain and Plains Education and Research Center (MAP ERC), a center to improve occupational and environmental health and safety through education, research, and community partnership, funded by the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH), grant #5T42OH009229-02. This report represents the views of the authors and should not be considered the official views of the sponsoring agency or any other institution.

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### Methods

Using the CSTE *Occupational Health Indicators: A Guide for Tracking Occupational Health Conditions and Their Determinants*, found at [www.cste.org](http://www.cste.org) (March 2008 update) a core set of data was abstracted from multiple existing CO and national datasets for the years 2001-2005 (when available). Exceptions for years are noted in the methods section of each indicator. When appropriate, state and national data are compared.

Detailed methods are described in the CSTE guidelines. As of the date of this report, 14 indicators are complete, 3 are pending data acquisition (Indicator 2: work-related hospitalizations, Indicator 6: hospitalizations for work-related burns, Indicator 13: elevated blood lead levels among adults) and 2 are not completed because the data are not available (Indicator 4: amputations reported by employers, Indicator 7: musculoskeletal disorders reported by employers). Each indicator presented in the following pages is described including the significance of the indicator, specific methods, results, limitations, and recommendations.

### Occupational Health Indicators

- Employment and Demographic Profile
- 1-Non-Fatal Injuries and Illnesses
- 2-Work-Related Hospitalizations
- 3-Fatal Work-Related Injuries
- 4-Amputations Reported by Employers
- 5-Amputations Identified in State Workers' Compensation
- 6-Hospitalizations for Work-Related Burns
- 7-Musculoskeletal Disorders Reported by Employers
- 8-Carpal Tunnel Syndrome Cases Identified in State Workers' Compensation
- 9-Pneumoconiosis Hospitalizations
- 10-Pneumoconiosis Mortality
- 11-Acute Work-Related Pesticide Poisonings Reported to Poison Control Centers
- 12-Incidence of Malignant Mesothelioma
- 13-Elevated Blood Lead Levels Among Adults
- 14-Workers Employed in Industries with High Risk for Occupational Morbidity
- 15-Workers Employed in Occupations with High Risk for Occupational Morbidity
- 16-Workers in Occupations and Industries with High Risk for Occupational Mortality
- 17-Occupational Health and Safety Professionals
- 18-OSHA Enforcement Activities
- 19-Workers' Compensation Awards

## Colorado Employment Demographic Profile

### Significance

Understanding the diversity of workers and the characteristics of working populations is essential in the assessment of occupational health and work-related injury and illness prevention. It allows for more detailed analysis of worker subgroups who may be experiencing higher than expected rates of work-related injuries or illnesses.

### Methods

The demographic and employment characteristics for CO and US civilian workers were obtained using data from the Bureau of Labor Statistics (BLS) Current Population Survey and BLS Geographic Profiles of Employment and Unemployment. Age, gender, race/ethnicity, and employment characteristics are described for the years 2001 to 2005 for both CO and the US. The percent of civilian workers employed by occupational and industry categories is only reported for 2003 to 2005 because of changes in category definitions in 2003.

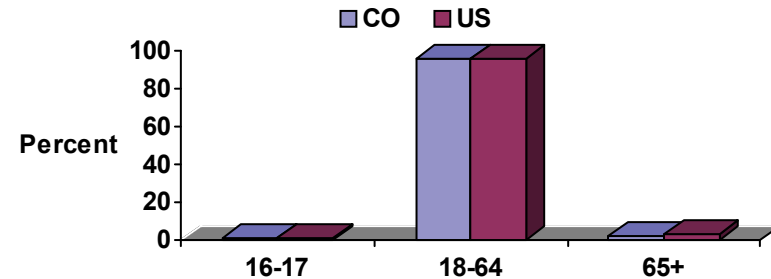
### Results

#### Demographics

##### Age

- The majority of civilian workers employed in CO and the US from 2001 to 2005 were between the ages of 18 and 64 years. Figure P.1 shows the distribution of civilian workers in CO and the US by age.

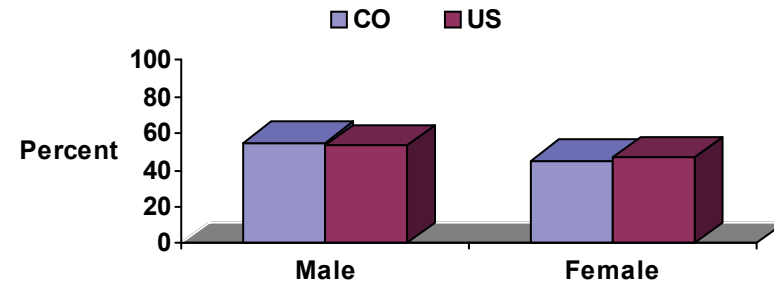
Figure P.1 Employed CO and US civilian workers by age, 2001-2005



##### Sex

- The distribution of sex for CO and the US civilian workers from 2001 to 2005 was similar. Overall, there were more male workers than female workers. Figure P.2 shows the distribution of CO and US civilian workers by sex.

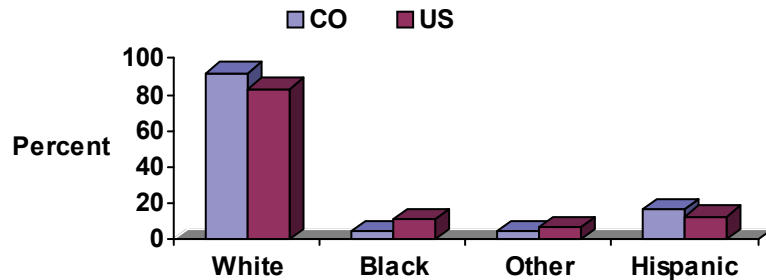
Figure P.2 Employed CO and US civilian workers by sex, 2001-2005



### Race/Ethnicity

- The majority of civilian workers in CO and the US from 2001 to 2005 were White.
- Compared to the US from 2001 to 2005, CO employed fewer Black workers and a higher percentage of employees of Hispanic origin. Figure P.3 shows the distribution of CO and US civilian workers by self-reported race (White, Black, Other) and ethnicity (Hispanic origin).

**Figure P.3 Employed CO and US civilian workers by race and ethnicity, 2001-2005**



### Limitations

- Demographic and workforce characteristics are helpful to describe the workforce, but do not directly measure occupational risks or hazards.
- Data come from the Current Population Survey, a monthly probability sample of households in the United States. As such, the data are an estimate.
- Workers under the age of 16, active-duty military and inmates are not included in the estimates.
- The percentage of racial or ethnic workers may be underestimated

if they do not have permanent residences, or are migratory. Thus, in states that experience high rates of seasonal employment, the demographic data are likely to underestimate the size of the population at risk for work-related injuries and illnesses.

### Recommendations

- Determine how workforce demographics and characteristics impact work-related injuries and illnesses in CO.
- Develop methods for tracking migratory worker populations in order to assess the impact of work-related injuries and illnesses in CO.

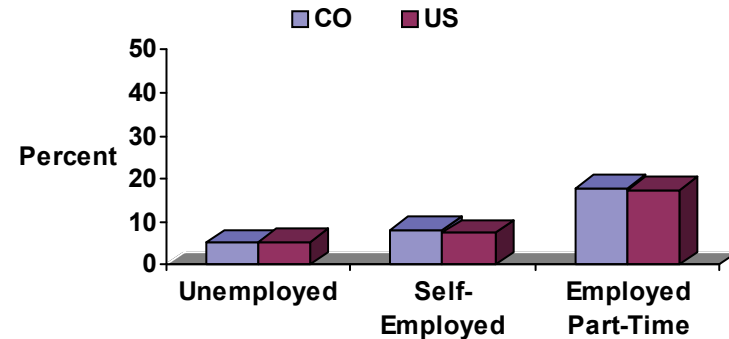
## Employment Characteristics

- More than 2.2 million civilian workers per year were employed in CO for the years 2001 to 2005. Table P.1 shows the number of civilian workers in CO and the US by year.

| Table P.1 Number of Civilian Workers<br>Employed, CO and US, 2001-2005 |           |               |
|------------------------------------------------------------------------|-----------|---------------|
| Year                                                                   | Colorado  | United States |
| 2001                                                                   | 2,218,452 | 136,933,000   |
| 2002                                                                   | 2,210,598 | 136,485,000   |
| 2003                                                                   | 2,332,158 | 137,736,000   |
| 2004                                                                   | 2,421,926 | 139,252,000   |
| 2005                                                                   | 2,423,511 | 141,730,000   |

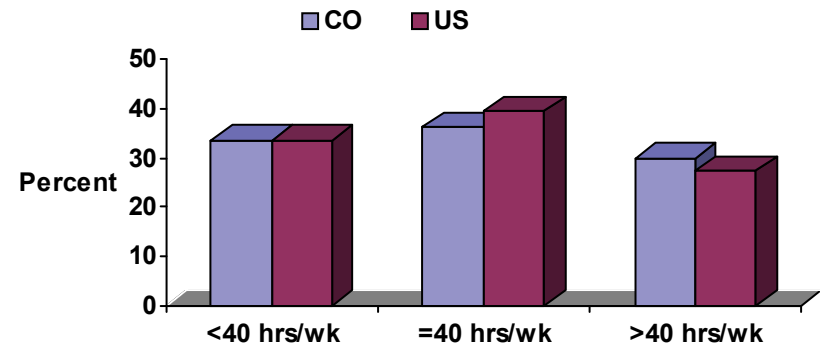
- In CO, the unemployment rate ranged from 3.7 in 2001 to 4.9 in 2005, with a rate as high as 6.0 in 2003. Average unemployment rates in CO and the US were similar. Figure P.4. show the employment status of CO and US civilian workers.
- Approximately 8% of civilian workers in CO were self-employed, similar to the US (Figure P.4)
- Fewer than 20% of civilian workers in CO and the US were employed part-time. (Figure P.4)

Figure P.4 Employed CO and US civilian workers by employment status, 2001-2005



- The majority of civilian workers employed in CO and the US from 2001 to 2005 were employed full time and worked at least a standard work week of 40 hours or greater. (Figure P.5)

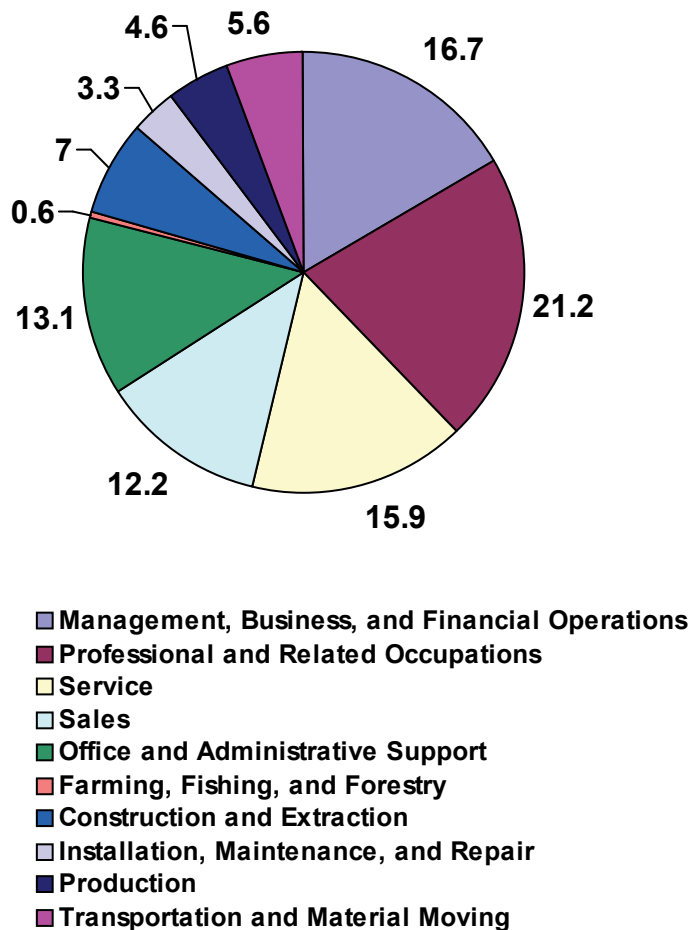
Figure P.5 Employed CO and US civilian workers by hours worked, 2001-2005



### Industries and Occupations

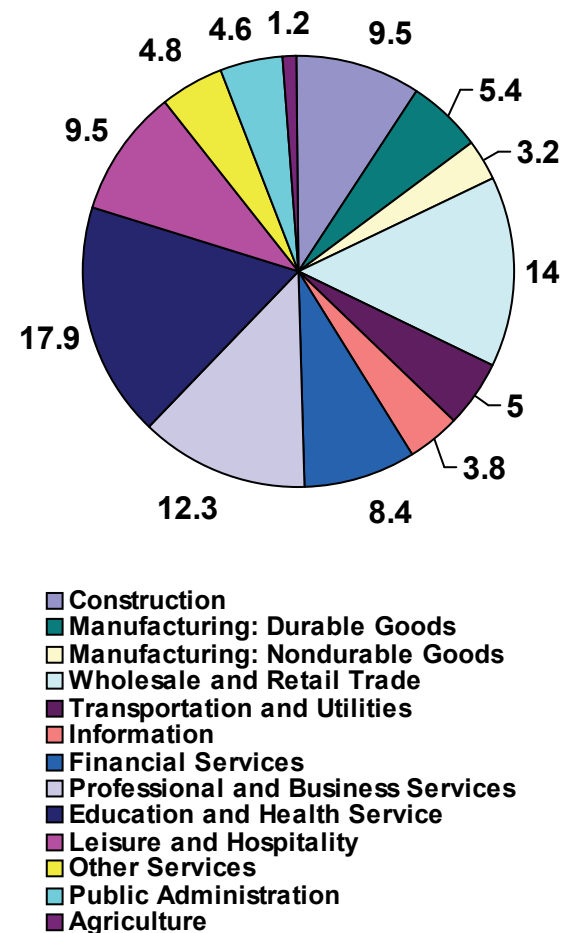
- Industries that employed the most civilian workers in CO and the US from 2003 to 2005 were Education and Health Services (18% and 20%, respectively), Wholesale and Retail Trade (14% and 15%), and Professional and Business Services (12% and 10%). The following graph distribution represents CO workers.

**Figure P.6 Employed CO civilian workers by industry**



- Occupational groups that employed the most civilian workers in CO and the US from 2003 to 2005 were Professional and Related Occupations (21% and 20%, respectively), Management, Business and Financial Operations (16.7% and 18.5%) and Service (15.9% and 16.2%). The following graph distribution represents CO workers.

**Figure P.7 Employed CO civilian workers by occupation**



## Indicator 1: Non-Fatal Injuries and Illnesses

### Significance

The identification of non-fatal work-related injuries and illnesses and associated factors, risks, and exposures is useful for intervention, education, prevention, and regulatory efforts.

### Methods

Work-related **injuries** are typically one-time events and include burns, falls, strains, sprains or fractures, electric shocks, being struck by a falling object, or getting caught in machinery and associated amputation. Work-related **illnesses** are usually a result of cumulative exposure to hazardous materials or repetitive motions. Examples include occupational asthma, asbestosis, pneumoconiosis (dust-induced lung disease), mesothelioma, and carpal tunnel syndrome, among others.

The CSTE method to calculate indicator 1 is based on data from the Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses (SOII). In CO, non-fatal work-related injuries and illnesses reported by employers are not available because CO does not participate in the SOII. As an alternative method, data was collected by the CO State Department of Labor, Division of Workers' Compensation on the number of non-fatal work-related injury and illness claims filed (lost time, denied and settled) with a date of injury or illness in the calendar year (2001 to 2005), including the percent of cases with more than 10 days of temporary disability benefits for each fiscal year. Percentages are calculated using the numbers of workers covered by workers' compensation insurance provided by the National Academy of Social Insurance (NASI).

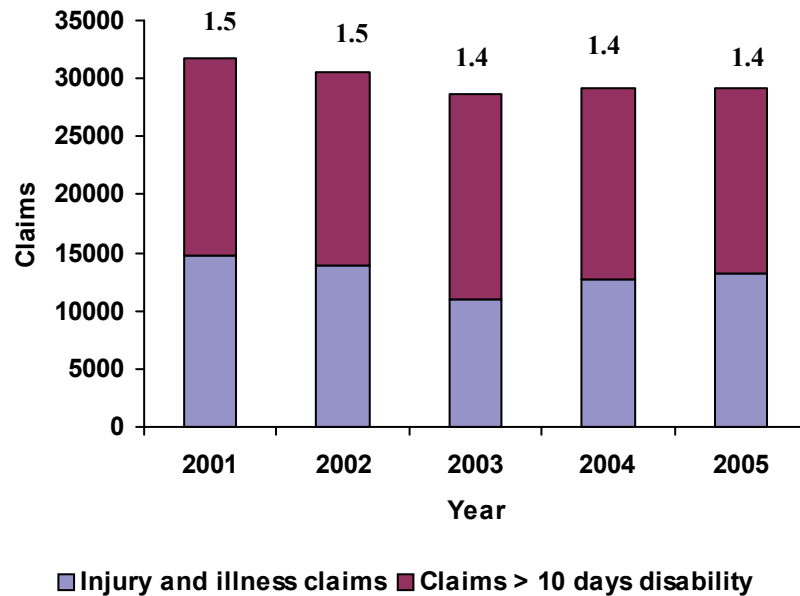
### Results

- The majority of workers in CO are covered by CO workers' compensation insurance. (Table 1.1)
- On average, 1.4% of workers covered by CO worker' compensation filed a non-fatal work-related injury and illness claim for the years 2001 to 2005. (Table 1.1 and Figure 1.1)
- Of claims filed, over half involved more than 10 days of temporary disability benefits. (Table 1.1 and Figure 1.1)
- Non-fatal work-related injuries and illnesses were severe enough to result in significant lost time at work. (Table 1.1 and Figure 1.1)

**Table 1.1 Nonfatal Work-Related Injury and Illness  
Claims Filed, CO, 2001-2005**

| <b>Year</b> | <b>Workers covered by Workers' Compensation # (%)</b> | <b>Non-fatal work-related injury and illness claims, # (%)</b> | <b>Claims with &gt; 10 days of temporary disability benefits, # (%)</b> |
|-------------|-------------------------------------------------------|----------------------------------------------------------------|-------------------------------------------------------------------------|
| <b>2001</b> | 2,148,000 (97)                                        | 31,785 (1.5)                                                   | 17,052 (53.6)                                                           |
| <b>2002</b> | 2,101,000 (95)                                        | 30,492 (1.5)                                                   | 16,621 (54.5)                                                           |
| <b>2003</b> | 2,064,000 (89)                                        | 28,659 (1.4)                                                   | 17,691 (61.7)                                                           |
| <b>2004</b> | 2,074,000 (86)                                        | 29,120 (1.4)                                                   | 16,384 (56.2)                                                           |
| <b>2005</b> | 2,120,000 (87)                                        | 29,173 (1.4)                                                   | 15,915 (54.5)                                                           |

**Figure 1.1 Non-fatal work-related injury and illness claims filed, CO, 2001-2005**



workers' compensations programs limit this data from being compared with other states or overall US data.

### Recommendations

- CO should participate in the Survey of Occupational Injuries and Illnesses (SOII). The SOII collects data on work-related injuries and illnesses reported by employers. These data are helpful in describing the burden of injuries and illnesses that occur in the workplace.
- Describe non-fatal work-related injuries and illnesses in CO by industry, occupation, age, gender, race/ethnicity, injury/illness characteristics including type of injury/illness, part of the body affected, and source of injury/illness for the purpose of intervention, education prevention and regulatory efforts.

### Limitations

- The number of claims filed for workers' compensation may underestimate the number of non-fatal injuries and illnesses, because not all individuals with work-related injuries and illnesses file for workers' compensation.
- Those workers who are self-employed (farmers, independent contractors), who work in small businesses or who are Federal employees may not be covered by state workers' compensation insurers and therefore are not included in these estimates.
- Differences in eligibility criteria and availability of data of



## Indicator 2: Work-Related Hospitalizations

### **Significance**

Describing and tracking work-related hospitalizations is useful for identifying high risk occupations and targeting prevention.

### **Methods**

Data have been requested from the Colorado Hospital Association.

### Indicator 3: Fatal-Work Related Injuries

#### Significance

Fatal work-related injuries are defined as injuries that occur at work and result in death. Fatalities resulting from **unintentional** injuries include falls, electrocutions, acute poisonings, and motor vehicle crashes occurring during work travel. **Intentional** injuries include homicides and suicides that occur at work. The identification of factors, risks, and exposures through surveillance of work-related fatalities is useful for intervention, education, prevention and regulatory efforts.

#### Methods

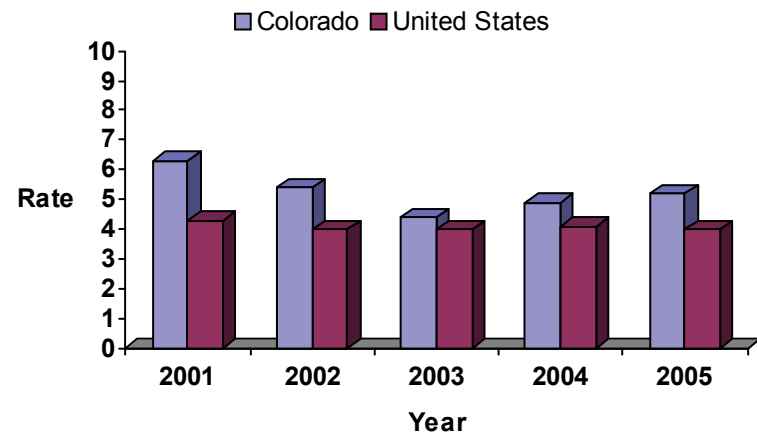
The rate of fatal work-related injuries are reported for the years 2001 to 2005 for both CO and the US. Data were obtained from the Census of Fatal Occupational Injuries (CFOI) and rates were calculated using the Bureau of Labor Statistics Current Population Survey.

#### Results

- On average for the years 2001 to 2005, a worker in CO died from a work-related injury every 3 days.
- The average annual rate of fatal work-related injuries in CO was 5.2 per 100,000 workers. (Table 3.1 and Figure 3.1))
- Work-related injury fatality rates in CO were higher then overall US rates. (Table 3.1 and Figure 3.1)

| Table 3.1 Fatal Work-Related Injuries,<br>CO and US, 2001-2005 |                                                                                                              |               |
|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------|
|                                                                | Number and fatality rate of work-<br>related injuries per 100,000 employed<br>persons age 16 years and older |               |
| Year                                                           | Colorado                                                                                                     | United States |
| 2001                                                           | 139 (6.3)                                                                                                    | 5,915 (4.3)   |
| 2002                                                           | 123 (5.4)                                                                                                    | 5,534 (4.0)   |
| 2003                                                           | 102 (4.4)                                                                                                    | 5,575 (4.0)   |
| 2004                                                           | 117 (4.9)                                                                                                    | 5,764 (4.1)   |
| 2005                                                           | 125 (5.2)                                                                                                    | 5,734 (4.0)   |

Figure 3.1 Rate of fatal work-related injuries per 100,000 workers, CO and US, 2001-2005



**Limitations**

- Workers under the age of 16 who experience work-related fatalities may be included in the numerator but not in the denominator.
- Rates may be overestimated since work-related fatalities are reported by the state in which the fatality occurred and not the state of the worker's residence. Likewise, rates may be underestimated if fatalities occurred in other states.
- Deaths in the military are included in the number of fatalities but not the rates.

**Recommendations**

- Report fatal work-related injuries and illnesses in CO by industry, occupation, age, gender, race/ethnicity, and injury/illness characteristics.
- Determine the risk factors that contribute to work-related fatalities to guide intervention, education, prevention and regulatory efforts.



## Indicator 4: Amputations Reported By Employers

### **Significance**

Most work-related amputations involve full or partial loss of fingers. Less common amputations involve the arm, leg, foot, toe, nose or ear. Work-related amputations can be prevented through the identification and control of occupational hazards and the implementation of safety procedures and regulations.

### **Methods**

In CO, amputations reported by employers are not available because CO is 1 of 7 states that does not participate in the Survey of Occupational Injuries and Illnesses (SOII).

### **Recommendations**

- CO should participate in the Survey of Occupational Injuries and Illnesses (SOII).

## Indicator 5: Amputations Identified in Workers' Compensation System

### Significance

Most work-related amputations involve full or partial loss of fingers. Less common amputations involve the arm, leg, foot, toe, nose or ear. Work-related amputations can be prevented through the identification and control of occupational hazards and the implementation of safety procedures and regulations.

### Methods

The CO Department of Labor, Division of Workers' Compensation reports the number of compensation claims filed for amputations with lost work time (> 10 days) for 2001 to 2005. Percentages are calculated using the numbers of workers covered by workers' compensations provided by the NASI.

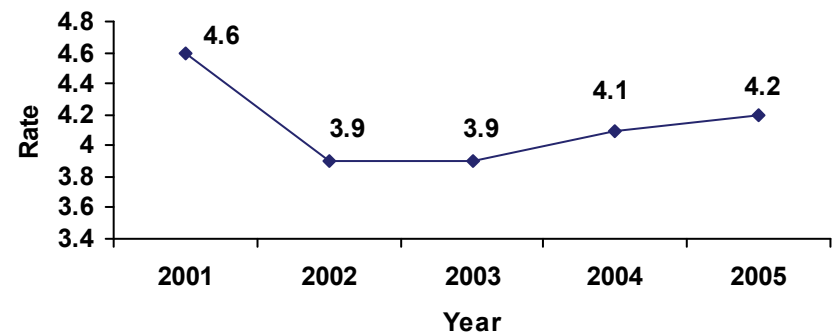
### Results

- Annually, an estimated 4 per 100,000 workers in CO claimed an amputation on the job with lost work-time for the years 2001 to 2005. (Table 5.1 and Figure 5.1)
- The annual incidence rate of amputations filed with the Division of Workers' Compensation per 100,000 workers covered ranged from 3.9 to 4.6 for the years 2001 to 2005. (Table 5.1 and Figure 5.1)
- The incidence of work-related amputations in CO has declined since 2001.

**Table 5.1 State Workers' Compensation Claims for Amputations with Lost Work-Time, CO, 2001-2005**

| Year | Number of amputations filed | Annual incidence rate of amputations filed per 100,000 workers covered |
|------|-----------------------------|------------------------------------------------------------------------|
| 2001 | 98                          | 4.6                                                                    |
| 2002 | 82                          | 3.9                                                                    |
| 2003 | 81                          | 3.9                                                                    |
| 2004 | 86                          | 4.1                                                                    |
| 2005 | 89                          | 4.2                                                                    |

**Figure 5.1 Annual incidence rate of amputations filed with workers' compensation per 100,000 workers covered, CO, 2001-2005**



**Limitations**

- The number of claims filed at workers' compensation may be underestimated because not all individuals with work-related injuries and illnesses file for workers' compensation.
- Those workers who are self-employed (farmers, independent contractors), who work in small businesses or who are Federal employees may not be covered by state workers' compensation insurers and therefore are not included in these estimates.
- Differences in eligibility criteria and availability of data of workers' compensations programs limit these data from being compared with other states or overall US data.

**Recommendations**

- Report amputations by industry, occupation, age, gender, race/ethnicity, and characteristics to determine important causes and patterns.



## Indicator 6: Hospitalizations From Work-Related Burns

### **Significance**

Describing and tracking hospitalizations from work-related burns is useful for identifying high risk occupations and targeting prevention.

### **Methods**

Data have been requested from the Colorado Hospital Association.



## Indicator 7: Musculoskeletal Disorders Reported by Employers

### Significance

Work-related musculoskeletal disorders and injuries effect the muscles, tendons, nerves, ligaments, joints and spinal discs and significantly impact the ability of workers to perform their jobs. Contributing work activities include repetitive motion, placing hands or limbs in awkward positions, using equipment that vibrates, and handling heavy objects. Work-related musculoskeletal disorders can be prevented through the identification and control of occupational hazards and the implementation of safety procedures and regulations.

### Methods

In CO, musculoskeletal disorders reported by employers are not available because CO is 1 of 7 states that does not participate in the Survey of Occupational Injuries and Illnesses (SOII).

### Recommendations

- CO should participate in the Survey of Occupational Injuries and Illnesses (SOII).

## Indicator 8: Carpal Tunnel Syndrome Cases Identified in Workers' Compensation Systems

### Significance

Carpal tunnel syndrome (CTS) may be caused by repetitive motions, placing hands or limbs in awkward positions or using equipment that vibrates. Symptoms include the burning, tingling, and numbness of fingers and can lead to difficulty in gripping and holding objects. Work-related carpal tunnel syndrome can be prevented through the identification and control of occupational hazards and the implementation of safety procedures and regulations.

### Methods

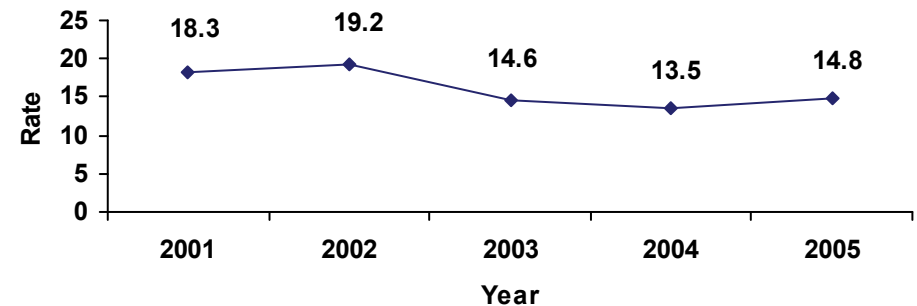
The CO Department of Labor, Division of Workers' Compensation reports the number of compensation claims filed for carpal tunnel syndrome for 2001 to 2005. Percentages are calculated using the numbers of workers covered by workers' compensations provided by the NASI.

### Results

- Annually, an estimated 16 per 100,000 CO workers reported work-related carpal tunnel syndrome for the years 2001 to 2005. (Table 8.1 and Figure 8.1) Rates of reported cases have declined over this time period.
- The annual incidence rate of carpal tunnel filed with the CO Division of Workers' Compensation per 100,000 workers covered ranged from 13.5 to 19.2 for the years 2001 to 2005. (Table 8.1 and Figure 8.1)

| Table 8.1 Carpal Tunnel Syndrome Filed with State Workers' Compensation, CO, 2001-2005 |                                        |                                                                          |
|----------------------------------------------------------------------------------------|----------------------------------------|--------------------------------------------------------------------------|
| Year                                                                                   | Number of carpal tunnel syndrome filed | Annual incidence rate of carpal tunnel filed per 100,000 workers covered |
| 2001                                                                                   | 393                                    | 18.3                                                                     |
| 2002                                                                                   | 404                                    | 19.2                                                                     |
| 2003                                                                                   | 302                                    | 14.6                                                                     |
| 2004                                                                                   | 279                                    | 13.5                                                                     |
| 2005                                                                                   | 313                                    | 14.8                                                                     |

Figure 8.1 Annual incidence rate of carpal tunnel syndrome cases filed with workers' compensation per 100,000 workers covered, CO, 2001-2005



**Limitations**

- The number of claims filed at workers' compensation may be underestimated because not all individuals with work-related injuries and illnesses file for workers' compensation.
- The number of claims filed at workers' compensation may be underestimated due to the fact that the treating physician may or may not recognize the condition as work-related.
- Those workers who are self-employed (farmers, independent contractors), who work in small businesses or who are Federal employees may not be covered by state workers' compensation insurers and therefore are not included in these estimates.
- Differences in eligibility criteria and availability of data of workers' compensations programs limit this data from being compared with other states or overall US data.

**Recommendations**

- Report the incidence of carpal tunnel syndrome by industry, occupation, age, gender, race/ethnicity, and characteristics.
- Identify factors that contribute to carpal tunnel to target prevention efforts.
- Identify and track other forms of repetitive motion injury.
- Educate primary care physicians and workers on the relationship between work-place exposure and risks and the development of CTS.

## Indicator 9: Pneumoconiosis Hospitalizations

### Significance

Pneumoconioses are lung diseases caused by dust exposure in the workplace. Pneumoconiosis includes silicosis, asbestosis, coal workers' pneumoconiosis, and pneumoconiosis due to a variety of other mineral dusts including talc, aluminum, bauxite, and graphite. Complications of pneumoconiosis that may cause hospitalizations include respiratory infections, tuberculosis, chronic bronchitis, emphysema, lung cancer, pleuritis, progressive systemic sclerosis, renal disease, and respiratory failure. Controlling and monitoring exposure to dust and ongoing medical surveillance is important in preventing pneumoconiosis.

### Methods

The Healthcare Cost and Utilization Project (H-CUP) provides information on hospital discharges with a primary or contributing diagnosis of pneumoconiosis (ICD-9-CM codes 500, 501, 502, 503, 504, 505). Hospitalizations are reported for 2001 to 2005 for CO and US residents. Rates are calculated using the state population estimates from the US Bureau of the Census.

### Results

- The average rate of hospitalizations for the years 2001 to 2005 from pneumoconiosis was 114 per 1 million residents in CO and 172 per 1 million residents in the US. (Figure 9.1)
- The majority of hospitalizations from pneumoconiosis in CO and the US were attributable to asbestosis and coal workers' pneumoconiosis.
- The crude annual total pneumoconiosis hospitalization rate per 1

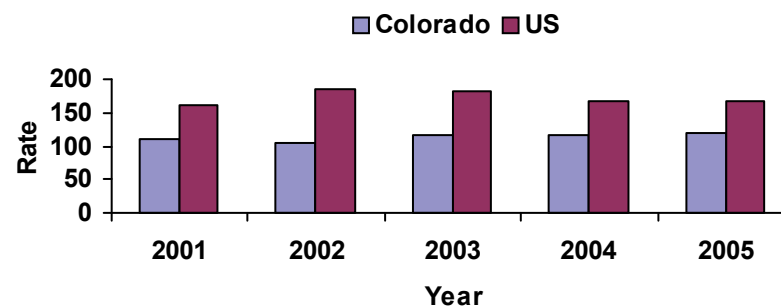
**Table 9.1 Annual Hospitalizations From or With Pneumoconiosis, CO and US, 2001-2005**

| Number and rate of annual hospitalizations per 1,000,000 residents |             |                |
|--------------------------------------------------------------------|-------------|----------------|
| Year                                                               | Colorado    | United States  |
| 2001                                                               | 386 (110.6) | 35,939 (160.0) |
| 2002                                                               | 375 (105.5) | 41,692 (184.3) |
| 2003                                                               | 416 (115.7) | 41,639 (181.3) |
| 2004                                                               | 427 (117.2) | 38,700 (166.5) |
| 2005                                                               | 442 (119.4) | 39,668 (168.6) |

million CO residents has ranged as low as 105.5 in 2002 to as high as 119.4 in 2005. In the US, rates have ranged from 160.0 in 2001 to as high as 184.3 in 2002. (Figure 9.1)

- Overall, the US had higher rates of hospitalization from or with pneumoconiosis than does CO.

**Figure 9.1 Rate of age-standardized hospitalizations per 1,000,000 residents from or with Pneumoconiosis, CO and US, 2001-2005**



**Limitations**

- The estimated incidence of hospitalizations does not necessarily represent current exposures.
- Discharge summaries may vary including the number of diagnoses listed and who completed the summary but may not include pneumoconiosis as the contributing cause of hospitalizations.
- Not all cases of pneumoconiosis may be hospitalized for pneumoconiosis-related complications because of insurance coverage and how a physician practices medicine. Typically, only the small number of most severe cases are hospitalized. Therefore, hospitalization rates underestimate the true burden of pneumoconiosis among workers.
- Pneumoconioses occur many years after a worker's first exposure to hazardous dust. The latency from time of exposure to detection of disease averages 20 to 40 years. Therefore, rates in 2001 to 2005 may reflect past exposures from the 1960s to present.

**Recommendations**

- Further characterize hospitalizations from or with pneumoconiosis including age, gender, race/ethnicity, and zip code.
- Define hospitalization patterns to guide prevention efforts.
- Identify data sources that estimate the rate of outpatient (non-hospitalized) cases of pneumoconioses.

## Indicator 10: Pneumoconiosis Mortality

### Significance

Pneumoconioses are lung diseases caused by dust exposure in the workplace. Pneumoconiosis includes silicosis, asbestosis, coal workers' pneumoconiosis, and pneumoconiosis due to a variety of other mineral dusts including talc, aluminum, bauxite, and graphite. Pneumoconiosis can be prevented by controlling occupational exposure through monitoring, surveillance and prevention programs.

### Methods

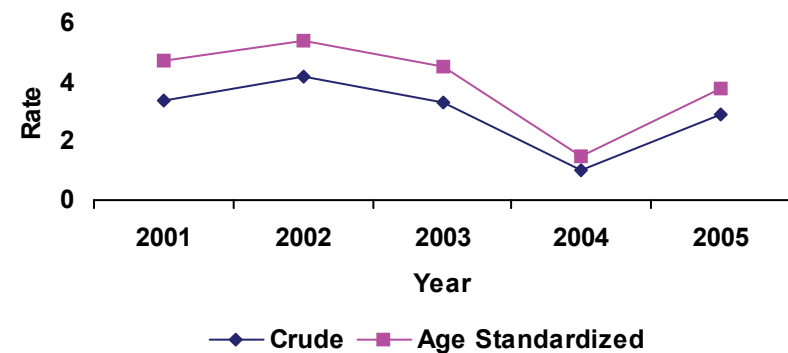
The CO Department of Public Health and Environment records death certificate data. The cause of death is most often reported by medical personnel or coroners. All causes of death are recorded and coded on the death certificate. The underlying cause of death is defined as 'the disease or injury that initiated the sequence of events leading directly to the death, or the circumstance of the accident or violence that caused the injury'. Specific age-standardized rates were not calculated due to the small number of cases in multiple age groups. The underlying cause of death was defined as 'Pneumoconiosis and Chemical Effects'. Rates were calculated using the U.S. Bureau of the Census. Because each state maintains death certificate data, the overall US rate of mortality from pneumoconiosis was not determined. Mortality from or with pneumoconiosis is reported for CO for the years 2001 to 2005.

### Results

- Annually for the years 2001 to 2005, approximately 4 workers per 1 million residents in CO died from pneumoconiosis. (Table 10.1 and Figure 10.1)

| <b>Year</b> | <b>Crude annual total pneumoconiosis death rate per million residents</b> | <b>Age standardized annual total pneumoconiosis death rate per million residents</b> |
|-------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>2001</b> | 3.4                                                                       | 4.7                                                                                  |
| <b>2002</b> | 4.2                                                                       | 5.4                                                                                  |
| <b>2003</b> | 3.3                                                                       | 4.5                                                                                  |
| <b>2004</b> | 1.0                                                                       | 1.5                                                                                  |
| <b>2005</b> | 2.9                                                                       | 3.8                                                                                  |

**Figure 10.1 Age-standardized rates of mortality from or with pneumoconiosis per 1,00,000 residents, CO 2001-2005**



- Rates of mortality from or with pneumoconiosis in CO peaked in 2002 and dropped in 2004. (Table 10.1 and Figure 10.1)

### **Limitations**

- The estimated incidence of mortality from pneumoconiosis does not necessarily represent current exposures, especially because of the long latency between a person's first dust exposure and development of disease.
- Mapping the geographic location of workers who die from pneumoconiosis may be problematic if the death and exposure do not occur in the same location.
- The causes of death listed on death certificates and coding of those causes may be inaccurate and may vary depending on who completes the certificate.
- Death certificates identify only a small percentage of those who develop pneumoconiosis.

### **Recommendations**

- Report mortality by type of pneumoconiosis, age, gender, race/ethnicity.

## Indicator 11: Acute Work-Related Pesticide Poisonings Reported to Poison Control Centers

### Significance

An estimated 1 billion pounds of pesticides are used each year in the United States to protect food and control disease. Agricultural workers and those applying pesticides have the highest risk of over-exposure to potentially harmful pesticides. The EPA estimates that 20,000 to 40,000 work-related pesticide poisonings occur each year.

### Methods

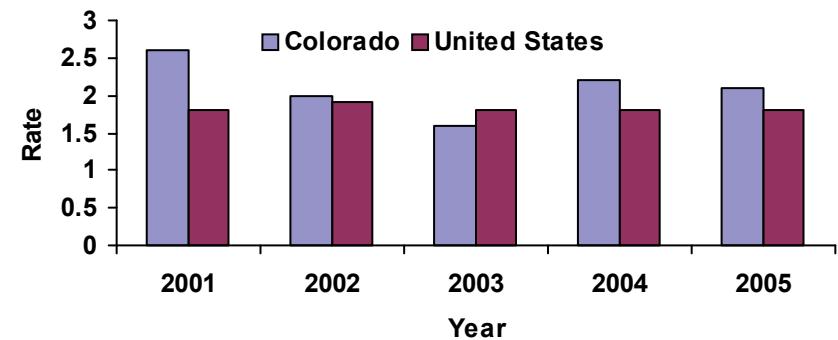
The American Association of Poison Control Centers collects information on reported cases of work-related pesticide poisoning resulting in acute illness. Pesticide poisonings reported included those exposed to disinfectants, fungicides, fumigants, herbicides, insecticides, repellents, and rodenticides. The incidence or reported work-related pesticide poisonings per 100,000 employed persons age 16 years and older is reported for CO and the US for the years 2001 to 2005 using the BLS Current Population Survey.

### Results

- An estimated 2 per 100,000 CO and US workers per year experienced work-related pesticide poisoning from 2001 to 2005. (Table 11.1 and Figure 11.1)
- The rate of work-related pesticide poisonings in CO has ranged from 1.6 to 2.6 per 100,000 workers per year for the years 2001 to 2005. (Table 11.1 and Figure 11.1)
- On average, rates in CO were higher compared to overall US rates which have remained stable at 1.8 from 2001 to 2005. (Table 11.1 and Figure 11.1)

| Table 11.1 Work-Related Pesticide Poisonings Reported to Poison Control Centers, CO and US, 2001-2005 |                                                  |               |
|-------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------|
|                                                                                                       | Number and rate per 100,000 employed Over Age 16 |               |
| Year                                                                                                  | Colorado                                         | United States |
| 2001                                                                                                  | 58 (2.6)                                         | 2,492 (1.8)   |
| 2002                                                                                                  | 46 (2.0)                                         | 2,528 (1.9)   |
| 2003                                                                                                  | 36 (1.6)                                         | 2,503 (1.8)   |
| 2004                                                                                                  | 53 (2.2)                                         | 2,476 (1.8)   |
| 2005                                                                                                  | 51 (2.1)                                         | 2,593 (1.8)   |

Figure 11.1 Rate of work-related pesticide poisonings reported to poison control centers per 100,000 employed over age 16, CO and US, 2001-2005



**Limitations**

- Not all work-related pesticide exposures resulting in illness are reported to poison control centers.

**Recommendations**

- Report work-related pesticide poisonings by age, gender, race/ethnicity, industry, occupation, severity and illness for prevention efforts.

## Indicator 12: Incidence of Malignant Mesothelioma

### Significance

Mesothelioma is a rare, fatal cancer of the lining that surrounds the chest and abdominal cavities. Primarily attributable to asbestos exposure, onset of the disease can take 20 to 40 years after exposure. The incidence of mesothelioma has just recently begun to decline, reflecting asbestos regulations enacted in the 1970s. However, occupational and environmental exposure to asbestos continues to occur. Mesothelioma can be prevented by controlling occupational exposure through monitoring, surveillance and prevention programs.

### Methods

The CO Central Cancer Registry is mandated by the law to collect information on the incidence, treatment, survival, and deaths due to cancer. Data are collected from physicians, clinics, pathology labs, hospitals, and death certificates. Age-standardized incidence of mesothelioma are calculated using the registry (ICD-O histology codes 9050, 9051, 9052, 9053). State population estimates from the US Bureau of the Census are described for 2001 to 2005. Nationwide estimates are not available because not all states meet current reporting standards.

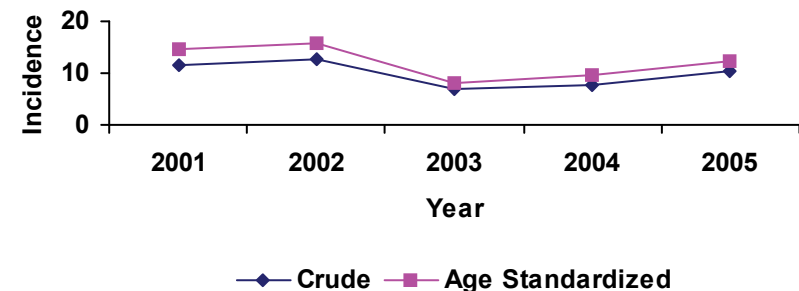
### Results

- Annually, an estimated 12 per 1 million CO workers were diagnosed with mesothelioma from 2001 to 2005. (Table 12.1 and Figure 12.1)
- Mesothelioma is primarily attributable to asbestos exposure. Rates have ranged from as low as 8.0 to as high as 15.8 per 1

million CO workers. (Table 12.1 and Figure 12.1)

| <b>Year</b> | <b>Crude annual incidence rate per million residents</b> | <b>Age standardized annual incidence rate per million residents</b> |
|-------------|----------------------------------------------------------|---------------------------------------------------------------------|
| <b>2001</b> | 11.7                                                     | 14.6                                                                |
| <b>2002</b> | 12.7                                                     | 15.8                                                                |
| <b>2003</b> | 7.0                                                      | 8.0                                                                 |
| <b>2004</b> | 7.7                                                      | 9.6                                                                 |
| <b>2005</b> | 10.5                                                     | 12.2                                                                |

**Figure 12.1 Incidence of malignant mesothelioma in CO, 2001-2005**



**Limitations**

- The estimated incidence does not necessarily represent current exposures, especially because of the long latency associated with the disease.

**Recommendations**

- Report the incidence of mesothelioma by age, gender, race/ethnicity, occupation, industry, exposure history for prevention efforts.



## Indicator 13: Elevated Blood Levels Among Adults

### Significance

Exposure to elevated levels of lead in the workplace can cause anemia, hypertension, cause nerve and kidney damage, and lead to fertility and pregnancy problems. Exposure to lead can be prevented.

### Methods

CO is 1 of 10 states that does not participate in the national Adult Blood Lead Epidemiology and Surveillance (ABLES) program. However, the Colorado Department of Public Health and Environment does collected data on elevated blood levels in adults. The data have been requested and are pending.

### Recommendations

- CO should participate in the Adult Blood Lead Epidemiology and Surveillance (ABLES) program.

## Indicator 14: Workers Employed in Industries with High Risk for Occupational Morbidity

### Significance

Workers in certain industries sustain a higher percentage of injuries and illnesses resulting in days away from work. Prevention efforts should focus on high risk industries.

### Methods

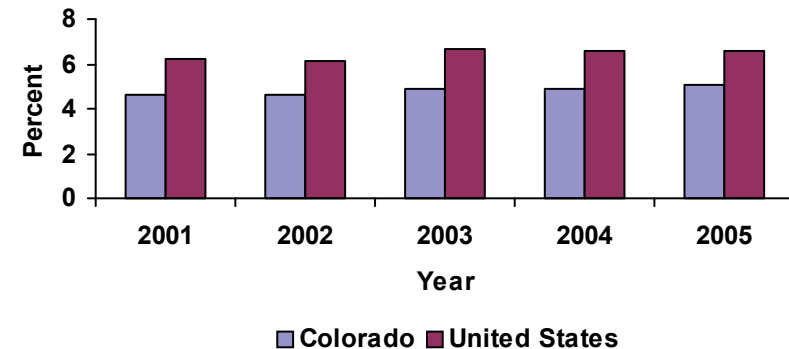
The Bureau of the Census County Business Patterns reports the percentage of workers employed in industries at high risk for occupational morbidity. High morbidity risk industries are identified based on annual injury and illness incidence rates for private sector workers. The percent of workers in CO and US employed industries with high risk for occupational morbidity is described for the years 2001 to 2005.

### Results

- Approximately 5% of the workforce in CO and 6% of the workforce in the U.S. from 2001 to 2005 were employed in industries with a disproportional risk for non-fatal injuries and illnesses. (Table 14.1 and Figure 14.1)

| Table 14.1 Percentage of Workers Employed in Industries with High Risk for Occupational Morbidity, CO and US, 2001-2005 |          |               |
|-------------------------------------------------------------------------------------------------------------------------|----------|---------------|
| Year                                                                                                                    | Colorado | United States |
| 2001                                                                                                                    | 4.6      | 6.2           |
| 2002                                                                                                                    | 4.6      | 6.1           |
| 2003                                                                                                                    | 4.9      | 6.7           |
| 2004                                                                                                                    | 4.9      | 6.6           |
| 2005                                                                                                                    | 5.1      | 6.6           |

Figure 14.1 Workers employed in industries with high risk for morbidity, CO and US, 2001-2005



**Limitations**

- Since the County Business Patterns estimates are calculated in March of each year, new employees for that year may not be counted.
- The ranking of high-risk industries may differ by region.
- Estimates are based on a probability sample of private sector employers and does not include all employers.
- Estimates are based on injury and illness data maintained by employers and are subject to sampling error.
- Estimates do not include the military, small farms and Federal agencies.

**Recommendations**

- Identify regionally important high risk industries in CO for prevention.



## Indicator 15: Workers Employed in Occupations with High Risk for Occupational Morbidity

### Significance

Workers in certain occupations sustain a higher percentage of injuries and illnesses resulting in days away from work. Prevention efforts should be focused on these occupations.

### Methods

The Bureau of Labor Statistics Population Survey collects information on workplace injuries and illnesses. High risk occupations are reported for 2003 to 2005 based on 2000 census codes.

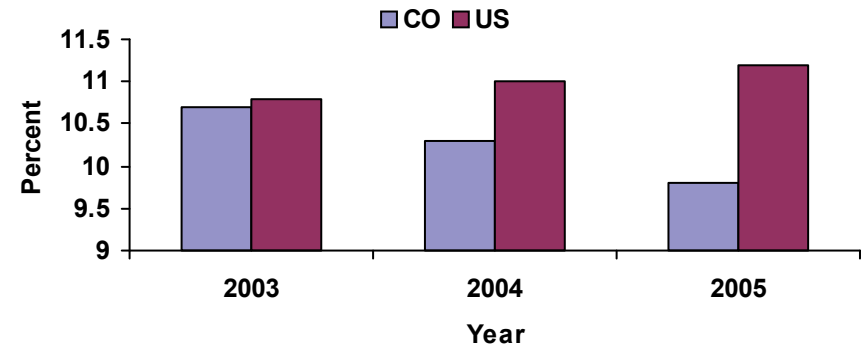
### Results

- Approximately 10% of the workforce in CO from 2003-2005 were employed in occupations with high risk for occupational morbidity. (Table 15.1 and Figure 15.1)
- Approximately 11% of the workforce in the US from 2003-2005 were employed in occupations with high risk for occupational morbidity. (Table 15.1 and Figure 15.1)

**Table 14.1 Percentage of Workers Employed in Occupations with High Risk for Occupational Morbidity, CO and US, 2001-2005**

| Year | Colorado | United States |
|------|----------|---------------|
| 2003 | 10.7     | 10.8          |
| 2004 | 10.3     | 11.0          |
| 2005 | 9.8      | 11.2          |

**Figure 15.1 Workers employed in occupations with high risk for occupational morbidity, CO and US, 2003-2005**



### Limitations

- The ranking of high-risk occupations may differ by state and/or industry.
- Estimates do not include the military, small farms and Federal agencies.

### Recommendations

- Identify occupations in CO for prevention.

## Indicator 16: Workers Employed in Occupations and Industries with High Risk for Occupational Mortality

### Significance

A number of industries and occupations have significantly higher rates of work-related fatalities. Prevention efforts should target these industries and occupations.

### Methods

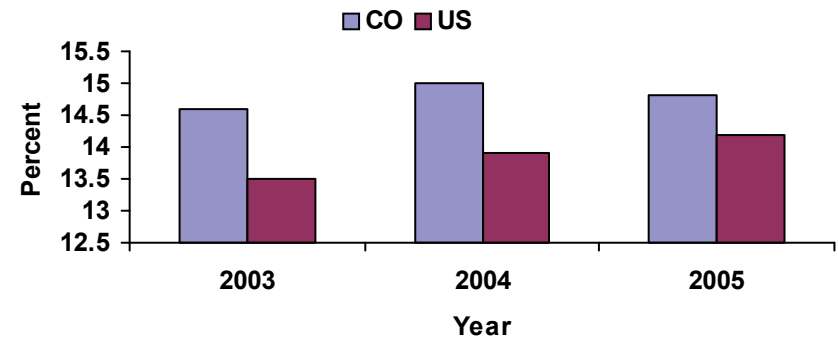
The Bureau of Labor Statistics collects information on the percentage of workers employed in industries and occupations at high risk for occupational mortality. The percent of workers in CO and US employed in industries and occupations with high risk for occupational mortality is reported for the years 2003 to 2005.

### Results

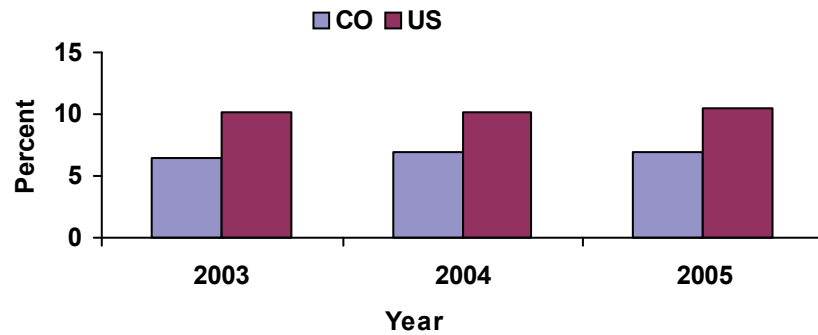
- Approximately 15% of workers in CO and 14% in the US were employed in industries at high risk for mortality from 2003 to 2005. (Table 16.1 and Figure 16.1)
- Approximately 7% of workers in CO and 10% in the US were employed in occupations at high risk for mortality from 2003 to 2005. (Table 16.2 and Figure 16.1)

| Table 16.1 Workers Employed in Industries and Occupations at High Risk for Occupational Mortality, CO and US, 2001-2005 |                                            |      |                                             |      |
|-------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|------|---------------------------------------------|------|
|                                                                                                                         | % of workers employed in <u>industries</u> |      | % of workers employed in <u>occupations</u> |      |
| Year                                                                                                                    | CO                                         | US   | CO                                          | US   |
| 2003                                                                                                                    | 14.6                                       | 13.5 | 6.5                                         | 10.1 |
| 2004                                                                                                                    | 15.0                                       | 13.9 | 6.9                                         | 10.2 |
| 2005                                                                                                                    | 14.8                                       | 14.2 | 7.0                                         | 10.5 |

Figure 16.1 Workers employed in industries at high risk for mortality, CO and US, 2003-2005



**Figure 16.2 Workers employed in occupations at high risk for mortality, CO and US, 2003-2005**



### **Limitations**

- The ranking of high-risk occupations and industries may differ by state and/or industry.
- Suicides that take place at the workplace are considered work-related fatalities even though these deaths may not be necessarily caused by work-related factors.
- Deaths reported are for the private sector only and excluded military deaths.

### **Recommendations**

- Identify the risk factors that contribute to high risk industries and occupations.



## Indicator 17: Occupational Health and Safety Professionals

### Significance

The goal of occupational safety and health professionals is to prevent workplace injuries and illnesses through exposure and hazard identification and prevention. An adequate number of these professionals are needed to ensure safe workplaces, including the fields of occupational medicine, occupational health nursing, industrial hygiene, and safety.

### Methods

The number of professionals and rate per 100,000 employees in CO for 2003 to 2005 is reported using data from the American College of Occupational and Environmental Medicine (ACOEM), American Association of Occupational Health Nurses (AAOHN), American Industrial Hygiene Association (AIHA), American Society of Safety Engineers (ASSE), and Bureau of Labor Statistics Current Population Survey.

### Results

- For every 100,000 employees in CO for the years 2003 to 2005, there were 3 occupational medicine physicians and occupational health nurses. (Table 17.1)
- For every 100,000 employees in CO, there is an average of 3 occupational medicine physicians, 3 occupational health nurses, 9 industrial hygienists and 11 safety professionals. (Table 17.1)

**Table 17.1 Number of Occupational Safety and Health Professionals**

|                                                                               | 2003                     | 2004                     | 2005                     |
|-------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| <b>Occupational medicine physicians, # (%)</b><br><b>ACOEM members, # (%)</b> | 61 (2.6)<br>123 (5.3)    | 64 (2.7)<br>134 (5.6)    | 68 (2.8)<br>123 (5.1)    |
| <b>Occupational health nurses, # (%)</b><br><b>AAOHN members, # (%)</b>       | 65 (2.8)<br>83 (3.6)     | 66 (2.8)<br>90 (3.8)     | 70 (2.9)<br>77 (3.2)     |
| <b>Industrial hygienists, # (%)</b><br><b>AIHA members, # (%)</b>             | 209 (9.0)<br>277 (11.9)  | 198 (8.3)<br>281 (11.8)  | 220 (9.2)<br>277 (11.5)  |
| <b>Safety professionals, # (%)</b><br><b>ASSE members, # (%)</b>              | 263 (11.3)<br>640 (27.5) | 266 (11.1)<br>697 (29.2) | 272 (11.3)<br>745 (31.0) |

### Limitations

- Other occupational safety and health fields are not included, such as health physics, ergonomics, or occupational health psychology.
- Member lists include retired and part-time professionals and therefore may overestimate the number of active occupational and safety professionals.

### Recommendations

- Recruit occupational health and safety professionals to work in CO.

## Indicator 18: OSHA Enforcement Activities

### Significance

The US Department of Labor Occupational Safety and Health Administration (OSHA) conducts investigations and inspections at worksites to ensure employee safety and health compliance. Investigations and inspections typically occur at worksites in the event of work-related fatal and non-fatal injuries, hospitalizations, employee complaints, and outside referrals. Random inspections are also conducted at high-risk worksites. OSHA jurisdiction in CO includes private and federal employers and employees.

### Methods

Enforcement activities by OSHA covered establishments under OSHA jurisdiction in CO (excluding mines and farms) for the years 2001 through 2005 are reported. Data sources were OSHA annual reports on inspections covered and the number of workers covered by these inspections and the BLS on Covered Employers and Wages (ES-202/CEW).

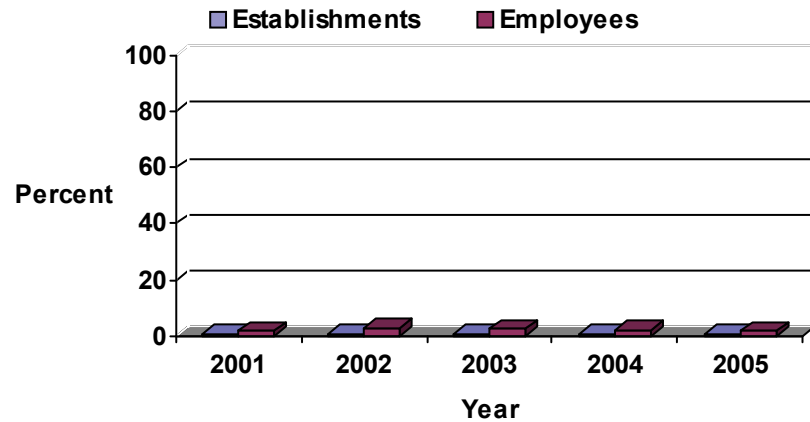
### Results

- Approximately 1% of worksites in CO were inspected by OSHA each year between 2001 and 2005. (Table 18.1 and Figure 18.1)
- The percent of OSHA covered employees whose work areas were inspected ranged from 1.8 to 2.8. (Table 18.1 and Figure 18.1)

**Table 18.1 Percent of Establishments Under OSHA Jurisdiction Inspected and Employees Whose Work Areas Were Inspected by OSHA, CO, 2001-2005**

| <b>Year</b> | <b>Establishments under jurisdiction</b> | <b>Establishments inspected, # (%)</b> | <b>Covered employees eligible for inspection</b> | <b>Covered employees inspected, # (%)</b> |
|-------------|------------------------------------------|----------------------------------------|--------------------------------------------------|-------------------------------------------|
| <b>2001</b> | 150,319                                  | 1,200 <b>(0.8)</b>                     | 1,904,182                                        | 33,561 <b>(1.8)</b>                       |
| <b>2002</b> | 153,099                                  | 1,420 <b>(0.9)</b>                     | 1,846,285                                        | 52,301 <b>(2.8)</b>                       |
| <b>2003</b> | 156,264                                  | 1,486 <b>(1.0)</b>                     | 1,809,416                                        | 48,046 <b>(2.7)</b>                       |
| <b>2004</b> | 159,344                                  | 1,537 <b>(1.0)</b>                     | 1,831,325                                        | 39,811 <b>(2.2)</b>                       |
| <b>2005</b> | 165,704                                  | 1,345 <b>(0.8)</b>                     | 1,818,887                                        | 36,215 <b>(2.0)</b>                       |

**Figure 18.1 Percent of establishments under OSHA jurisdiction inspected and employees whose work areas were inspected by OSHA, CO, 2001-2005**



### **Limitations**

- The percent of worksites inspected may be overestimated since multiple inspections may occur at the same worksite in the same year.
- The number of employees covered by worksite inspections may be overestimated.
- Only enforcement activities are measured.

### **Recommendations**

- Report details of enforcement activities.

## Indicator 19: Workers' Compensation Benefits

### Significance

Workers' compensation is a state based social insurance program that covers work-related injuries and illnesses. Benefits include lost wages, related medical expenses and survivor benefits. Amounts of paid benefits represent the direct financial burden of work-related injuries and illnesses. A 'covered worker' is defined as a worker who is eligible for workers' compensation benefits in the event of a work-related injury or illness. Workers who may not be covered by workers' compensation included those who are self-employed, corporate executives, federal employees, small business owners, farmers and agricultural workers.

### Methods

The National Academy of Social Insurance (NASI) collects and reports estimated annual benefits, coverage and costs associated with workers' compensation programs. The average benefit paid per covered worker in CO and the US is reported for 2001 to 2005.

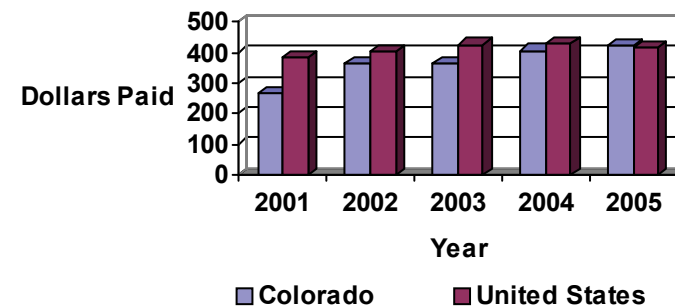
### Results

- The average benefit paid to CO workers per year from 2001 to 2005 ranged from \$264 to \$423 and \$384 to \$429 nationwide. (Table 19.1 and Figure 19.1)
- The estimated total amount of benefits paid in CO from 2001 through 2005 ranged from \$566.3 million to \$896.4 million. (Table 19.1 and Figure 19.1)
- Nationwide, the estimated total amount of benefits paid ranged from \$44.7 billion to 52.8 billion. (Table 19.1 and Figure 19.1)

**Table 19.1 Average Workers' Compensation Benefit Paid per Covered Worker, CO and US, 2001-2005**

| Year        | Total benefits paid in thousands, \$ |            | Benefit paid per covered worker, \$ |     |
|-------------|--------------------------------------|------------|-------------------------------------|-----|
|             | CO                                   | US         | CO                                  | US  |
| <b>2001</b> | 566,354                              | 47,757,688 | 264                                 | 384 |
| <b>2002</b> | 760,958                              | 49,262,314 | 362                                 | 402 |
| <b>2003</b> | 753,049                              | 51,881,754 | 365                                 | 426 |
| <b>2004</b> | 843,256                              | 52,818,090 | 407                                 | 429 |
| <b>2005</b> | 896,430                              | 52,049,021 | 423                                 | 415 |

**Figure 19.1 Average benefit paid per covered worker, CO and US, 2001-2005**



**Limitations**

- Not all individuals with work-related injuries and illnesses file a workers' compensation claim.
- There may be a lag time in reporting claims. In CO, an average of 80% of claims are filed in the year the injury or illness occurs.
- Since payments are made over time, annual awards may not reflect the full cost of injuries and illnesses for that year.
- Data does not describe the indirect burden of work-related injuries or illnesses.

**Recommendations**

- Report details of awards including industry, occupation, and cost to employer to target prevention efforts and further describe the economic costs of occupational injuries.

## **Conclusions**

Occupational injuries and illness remain a significant problem in the United States. The Bureau of Labor Statistics (BLS) reported that 5,488 workers in private industry died as a result of work related injuries in 2007, a rate of 4.0 per 100,000 workers. In 2006, there were 4.1 million cases of on-the-job injuries and illnesses reported to the BLS with 1.2 million of those cases requiring days away from work. The National Safety Council estimated that on-the-job injuries (both fatal and non-fatal) cost society \$142.2 billion in lost wages, productivity, administrative expenses, health care and other costs in 2004.

Occupational health surveillance, the systematic monitoring of health events and exposures among working populations in order to prevent occupational hazards and the associated diseases and injuries, uses the methods of collection of data on cases and exposures, distills and analyzes the data, disseminates the findings and plans interventions for prevention based on the data.

A significant gap in data and need for workplace health surveillance in CO is non-fatal work-related injuries and illness. CO is one of seven states that does not participate in the Survey of Occupational Injuries and Illnesses (SOII) and one of 10 states that does not participate in the Adult Blood Lead Epidemiology and Surveillance (ABLES) program. Both of these programs help to characterize the burden of work-related injury and illness and guide intervention programs for the reduction of occupational exposures and are areas in which intervention and prevention programs that have been successful in reducing the number of cases.

Of note, the rates of work-related fatalities in CO (2001-2005) that were higher than overall US rates (CO 5.2 vs. US 4.1). The percent of workers employed in industries and occupations at high risk for occupational mortality was higher than US rate but this may not totally explain why the CO rates remain high when the national rate has decreased over time. Occupationally related fatalities have a significant burden on individual CO families and the society as a whole and being able to accurately characterize the type of risks that are associated with these industries and occupations is a first step in planning intervention for prevention.

The rate of work-related pesticide poisonings in CO as reported to the Rocky Mountain Poison and Drug Center were higher compared to overall US rates. Agricultural workers are often a minority population or are members of a farm family with little resources for safety programs. Workers in rural areas often have limited access to healthcare and occupational health and safety professionals and need a better surveillance system to help characterize the problem accurately to guide intervention prevention measures. The OHI do not specifically address disparity issues but other data sources maybe able to be analyzed to characterize the health disparity issues in Colorado.

## **Recommendations**

The authors of this report believe that the collection of the Occupational Health Indicators, as developed by NIOSH and CSTE, is useful in improving specific data collection for Colorado and that the resultant characterization of occupational injury and illness is instrumental in setting priorities for prevention intervention. However, it is only a first step in developing a comprehensive occupational health surveillance program for Colorado. There are recommendations that can be accomplished with minimal resources and can be accomplished within a short time frame and include the first 4 recommendations. The other recommendations may take a longer period of time and expanded funding to complete the tasks. The following are the recommendations from the authors.

- State-based occupational health surveillance and reporting is warranted. Recognition of the importance of occupational health surveillance by Colorado state and county agencies and other entities involved in occupational health and safety is a first step in designing a comprehensive program. A meeting of state agencies and other stakeholders should be held to discuss how to implement OH surveillance in Colorado and what funding may be needed for this public health expansion.
- Examine key indicators presented in this report in greater depth to target future state-specific surveillance and intervention in occupations and industries of greatest concern.
- Commit to establishing minimum state based-activities in occupational safety and health as recommended by the CDC and NIOSH (see references) with plans to expand to comprehensive activities.
- Expand mandatory disease reporting in CO to include occupational and environmental disease and injury.
- Participate with other states and NIOSH who collect occupational health and safety data.
- Colorado should participate in the Survey of Occupational Injuries and Illnesses (SOII) and the Adult Blood Lead Epidemiology and Surveillance (ABLES) Program.
- Actively seek funding (state, federal and foundation) to support state-based occupational safety and health activities.
- Build a coalition of stakeholders to implement a comprehensive state-based occupational health surveillance program.
- Extend years of analysis and conduct trend analysis.

See individual indicators of this report for additional specific recommendations



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