# Fatal work injuries: census for 31 States

*A new BLS program provides better data on work injuries, yielding detail needed to help in preventing future fatalities in the workplace*

Guy Toscano
and
Janice Windau

Fatal work injuries are tragic events that often can be traced to hazardous working conditions or unsafe work practices. Unfortunately, the safety and health community has lacked the basic information needed to assess the full scope of these events. To help fill this information gap, the Bureau of Labor Statistics has designed and is implementing a Census of Fatal Occupational Injuries (CFOI) that generates not only verified counts of fatal work injuries, but also information on how the injury occurred, as well as the age, occupation, and other demographic data concerning the fatally injured person.

This article summarizes the initial results for the 31 States that participated in the first implementation phase of the CFOI program, which covered calendar year 1991. The 31-State total used for this analysis does not represent the fatality profile for the Nation as a whole or for individual participating States. Each such State is expected to release its fatality count and fatality profile later this fall.

## Background for a complete census

The Bureau of Labor Statistics has a long history of compiling statistics on safety and health conditions for workers. As early as 1912, the Bureau started publishing its first series on industrial accidents in the iron and steel industry. It was not, however, until the passage of the Occupational Safety and Health (OSH) Act of 1970 that recordkeeping and reporting of data on occupational safety and health became mandatory. The OSH Act requires the Secretary of Labor to develop and maintain an effective program of occupational safety and health statistics. Since 1972, the Bureau, in cooperation with State agencies, has conducted an annual sample survey of about 280,000 private sector establishments and has used the survey results to compile injury, illness, and fatality statistics.

BLS staff and experts in the safety and health community, however, believe that such relatively rare incidents as fatal work injuries cannot be measured accurately through a sample survey. Studies have also shown that traumatic occupational fatalities are often underreported. In this regard, estimates by different organizations vary greatly— from 3,000 to 11,000 deaths nationally per year.[1] Differences in coverage, in definitions of what constitutes a work fatality, and in estimation methodologies contribute to the confusion. The widely varying estimates point to the need for a complete count of such fatalities, compiled using a thorough screening process of all deaths that might be work related.

Besides producing data that are inconsistent, current programs produce data lacking in the detail needed to contribute to the prevention of future workplace fatalities. Information describing the incident and its circumstances (for example, type of incident, location, and objects or machinery involved), characteristics of the deceased (for example, age, sex, and occupation), and characteristics of the employer (for example, industry and size of establishment) are often missing or inaccurate.

Guy Toscano is an economist and Janice Windau is an epidemiologist in the Office of Safety, Health, and Working Conditions, Bureau of Labor Statistics. Martin E. Personick, an economist in the same office, assisted in the preparation of this article.

Two expert groups charged with evaluating work injury and illness statistics in the United States stressed the need for a comprehensive count of fatal occupational injuries, including work-related deaths of the self-employed, those younger than 16 years, workers on small farms, and other groups commonly not reported in current statistical systems. In a 1987 report, a National Academy of Sciences panel "found it rather startling that an agreed upon method has not been devised to estimate a phenomenon as basic as traumatic death in the workplace."[2] The panel recommended that the Bureau of Labor Statistics work with State agencies to compile complete rosters of occupational fatalities from administrative sources such as death certificates and workers' compensation claims. Around the same time, the Keystone Dialogue Group—a nonprofit organization that facilitates consensus-building dialogues among business, labor, and government on public policy issues—emphasized the need to obtain detailed characteristics on fatal workplace injuries on a timely basis to develop and implement effective safety measures. In addition, this group recommended the "development of a consensus method for counting work-related fatalities," stating that the "development of an accepted count of workplace deaths should mute controversy on this issue stemming from the variety of estimates coming from different sources."[3]

Table 1. **Source documents used to compile information on fatal work injuries, 31 participating States, 1991**

| Source document | Number[1] | Percent of total cases |
|---|---|---|
| Fatal injuries, 31 States | 3,465 | 100 |
| Death certificates | 3,163 | 91 |
| State workers' compensation reports | 1,521 | 44 |
| State coroner reports | 1,396 | 40 |
| Occupational Safety and Health Administration (OSHA) reports | [2]1,267 | 37 |
| News media | 1,037 | 30 |
| Toxicology reports | 1,088 | 31 |
| Autopsy reports | 1,060 | 31 |
| Followup questionnaires[3] | 907 | 26 |
| State motor vehicle reports | 269 | 8 |
| Other Federal reports[4] | 194 | 6 |
| Other reports[5] | 785 | 23 |

[1] The total of source documents exceeds the total of verified cases because two or more source documents were used to substantiate each case. Note that some source documents were received only upon request. In general, these included toxicology and autopsy reports, followup questionnaires, State motor vehicle reports, State coroner reports, and death certificates in some States. The death certificates used to compile information were not all marked "at work."

[2] This figure is not a comprehensive count of fatalities reported to or investigated by OSHA, but represents the available OSHA reports used to identify or substantiate a work injury fatality in the CFOI program.

[3] Includes telephone followup for missing data and for clarification of inconsistent data.

[4] Includes reports received from the Mine Safety and Health Administration, the Employment Standards Administration, the National Institute for Occupational Safety and Health's Fatal Accident Circumstances and Epidemiology program, the Department of Justice, and the National Transportation Safety Board.

[5] Includes reports received from other organizations, such as State farm bureaus, local police departments, and emergency medical services.

SOURCE: Thirty-one participating States in the 1991 CFOI program.

In response to these and other recommendations, the Bureau began planning for a program to collect timely, detailed information on all fatal occupational injuries, as part of a broad redesign of its safety and health statistics program.[4] When fully implemented, the CFOI program will annually produce complete counts of occupational deaths for the Nation and for all States. Besides fatalities of private wage and salary workers, the counts will include fatalities of public sector employees—both civilian and military—and of the self-employed.

This census approach to compiling data on fatal work injuries was initially tested in a cooperative effort with the Texas Department of Health during 1988. The study, which collected fatality data *retrospectively* for 1986, showed that (1) multiple data sources, including, at times, a followup questionnaire, are needed to produce a comprehensive and accurate count of fatal occupational injuries; (2) matching individual fatalities across data sources is feasible; (3) for each incident, characteristics of the worker and the case are commonly available from various administrative reports; and (4) timeliness is important in maximizing respondents' recall for verificational purposes and in reducing the number of those who fail to respond because they have relocated.[5]

The census approach was tested again during 1990–91 to determine whether the same kind of data could be obtained from multiple data sources *on a current basis*. That study, which was conducted in cooperation with the Texas Workers' Compensation Commission and the Colorado Department of Health, was successfully concluded on June 1, 1991. The test also confirmed the importance of using multiple data sources, because no single system captures all fatal work injuries.[6]

## Program implementation

The CFOI program is a cooperative venture in which the operating costs are shared equally between the State and Federal Governments. States participating in the first year of the program's

implementation were trained in data collection methodology, followup procedures, and coding. About 30 required data elements, including the demographic characteristics of the decedent and circumstances of the fatal event, are coded according to standard instructions provided in an operating manual. Up to 20 additional data elements are coded, depending on the availability of the information on the source documents. Included in the information collected for each case are the industry of the employer, equipment or machines involved, activity the worker was performing at the time of the incident, and occupation of the worker.

Participating States collect information on fatal work injuries from death certificates, workers' compensation reports, and other reports provided by State administrative agencies. Additional information provided to States originates from Federal agencies, such as the Department of Labor's Occupational Safety and Health Administration, Employment Standards Administration, and Mine Safety and Health Administration. Source documents are matched using the decedent's name and other information to avoid duplicating worker fatalities in the counts.

To ensure an accurate count of fatal occupational injuries, the CFOI program requires that each case have its work relationship substantiated using two or more independent source documents or a source document and a followup questionnaire to the employer or other person having knowledge of the incident. (Table 1 lists the source documents used to compile the 1991 data.) The followup questionnaire is also used to collect information that is necessary but missing from the source documents. Nonresponse to the questionnaire or inconsistent data results in further followup by telephone.

For a fatality to be considered within the scope of the program, the decedent must have been employed (that is, working for pay, compensation, or profit) at the time of the event and engaged in a work activity[7] or present at the site of the incident as a requirement of his or her job. This definition is intended to include all injury-related[8] fatalities that occur while a person is in a work status; it is generally broader than the criteria used by Federal and State agencies administering specific laws or regulations.

Although the CFOI program was designed to produce an accurate count of fatal work injuries, partial information also is being compiled on fatal occupational illnesses (nontraumatic conditions such as asbestosis and occupational cancers), primarily from State workers' compensation reports. Because of the latency period of many occupational illnesses, it is difficult to compile a complete count of all fatal illnesses using the CFOI methodology. Thus, information on illness-related deaths are excluded from this article.[9]

Table 2. **Percent distribution of fatal work injuries by selected demographic characteristics, 31 participating States, 1991**

| Characteristic | Fatal occupational injuries |
|---|---|
| Total fatalities: | |
| Number | 3,465 |
| Percent | 100 |
| **Employment status** | |
| Wage and salary workers | 81 |
| Self-employed[1] | 19 |
| **Sex and age** | |
| Men | 92 |
| Women | 8 |
| Both sexes: | |
| Under 20 years | 5 |
| 20 to 24 years | 7 |
| 25 to 34 years | 26 |
| 35 to 44 years | 25 |
| 45 to 54 years | 17 |
| 55 to 64 years | 13 |
| 65 years and over | 7 |
| **Race** | |
| White | 84 |
| Black | 9 |
| Asian or Pacific Islander | 3 |
| Other or unknown | 4 |
| **Hispanic origin** | |
| Hispanic | 9 |

[1] May include unpaid family workers, owners of incorporated businesses, or members of partnerships.

NOTE: Percentages may not add to total due to rounding.

SOURCE: Thirty-one participating States in the 1991 CFOI program.

## Profile of fatalities

The 31 States that participated in the 1991 CFOI program verified and compiled data concerning a total of 3,465 fatal occupational injuries.[10] Of special note, many of these fatalities involved workers *not covered* under the jurisdiction of Federal or State agencies engaged in consultation-related, prevention-related, or regulatory activities in safety and health. Among these excluded workers are the self-employed, laborers on small farms, and certain government employees. Thus, CFOI data, which cover these workers, differ from data obtained through other administrative counts. Moreover, with 19 States not participating in the program in 1991, the overall findings may not be representative of the Nation as a whole.

California and Texas, two of the Nation's largest States, each accounted for about one-eighth of the 3,465 fatal occupational injuries. The remain-

Table 3. **Percent distribution of fatal occupational injuries by industry, 31 participating States, 1991**

| SIC code[1] | Industry | Fatal occupational injuries |
|---|---|---|
| | Total fatalities: | |
| | Number | 3,465 |
| | Percent | 100 |
| 01–02, 07–09 | **Agriculture, forestry, and fishing** | 14 |
| 01 | Agricultural production—crops | 7 |
| 02 | Agricultural production—livestock | 3 |
| 07 | Agricultural services | 2 |
| 10–14 | **Mining** | 3 |
| 13 | Oil and gas extraction | 2 |
| 15–17 | **Construction** | 16 |
| 15 | General building contractors | 3 |
| 16 | Heavy construction, except building | 5 |
| 17 | Special trades contractors | 8 |
| 20–39 | **Manufacturing** | 14 |
| 20 | Food and kindred products | 2 |
| 24 | Lumber and wood products | 4 |
| 40–42, 44–49 | **Transportation and public utilities** | 16 |
| 42 | Trucking and warehousing | 8 |
| 45 | Transportation by air | 2 |
| 49 | Public utilities | 2 |
| 50,51 | **Wholesale trade** | 5 |
| 52–59 | **Retail trade** | 11 |
| 54 | Food stores | 3 |
| 55 | Auto dealers and gas stations | 2 |
| 58 | Eating and drinking places | 3 |
| 60–67 | **Finance, insurance, and real estate** | 2 |
| 70–89 | **Services** | 13 |
| 73 | Detective, guard, and other business services | 3 |
| 79 | Amusement and recreation services | 2 |
| 82,83 | Educational and social services | 2 |
| 91–97 | **Public administration** | 6 |
| 92 | Justice, public order, and safety | 2 |
| 97 | National security and international affairs | 1 |

[1] From *Standard Industrial Classification Manual*, 1987 edition.

NOTE: Percentages may not add to total due to rounding. Totals for major categories may include subcategories not shown separately.

SOURCE: Thirty-one participating States in the 1991 CFOI program.

ing 29 participating States, none of which accounted for more than 5 percent of the fatality total, were Arizona, Colorado, Connecticut, Delaware, Georgia, Hawaii, Idaho, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nebraska, Nevada, New Hampshire, New Jersey, North Carolina, Oklahoma, Oregon, Tennessee, Utah, Washington, Wisconsin, and Wyoming.

*Employment status, age, sex, race, and Hispanic origin.* Based on the 31-State total, four-fifths of the workers who were fatally injured in 1991 worked for wages and salaries; the balance were self-employed and unpaid family members. More than nine-tenths of the fatalities were incurred by males. About seven-tenths of total fatalities were in the prime working-age group, 25 to 54 years, one-eighth were teenagers and young adults under 25, and one-fifth were 55 years and older. (See table 2.) Whites (including white Hispanics) accounted for slightly more than four-fifths of the fatally injured; blacks were one-tenth of the total. Other races, such as Asians and Pacific Islanders, made up the balance. Persons of Hispanic origin (white and black) were about one-tenth of the 31-State total.

*Industry.* Three-fourths of the 31-State fatality total were divided about evenly among five major industry divisions: agriculture, forestry, and fishing; construction; manufacturing; transportation and public utilities; and services. (See table 3.) Retail trade constituted another one-tenth of the fatality total, and wholesale trade and public administration were about 5 percent each. Individual States, it should be noted, differ in their industry mix, and those differences can influence the way fatal occupational injuries are distributed by State and industry.

*Occupation.* "Operators, fabricators, and laborers," covering such jobs as machine operators, motor vehicle operators, and construction laborers, was the leading job grouping of the fatally injured, accounting for about a third of the 3,465 worker deaths. The remaining major occupational groups each accounted for about one-tenth to one-fifth of the 31-State fatality total. (See table 4.)

*Event or exposure.* Transportation accidents, primarily those involving cars, trucks, and other highway motor vehicles, accounted for nearly a third of the work-related fatalities. (See table 5, page 8.) Incidents in which the worker was struck by or struck against an object, including those struck by falling objects and those struck by a vehicle, were another one-sixth of the total. Homicides and falls each were about one-eighth of the 31-State total. Other notable fatal events occurred through contact with electric currents and by being caught in machinery.

## Safety research

For calendar year 1992, 48 States and the District of Columbia have signed cooperative agreements

Table 4. **Percent distribution of fatal occupational injuries by occupation, 31 participating States, 1991**

| Occupation[1] | Fatal occupational injuries |
|---|---|
| Total fatalities: | |
| Number | 3,465 |
| Percent | 100 |
| **Managerial and professional specialty** | 12 |
| Executive, administrative, and managerial | 8 |
| Professional specialty | 4 |
| **Technical, sales, and administrative support** | 12 |
| Technicians and related support | 3 |
| Sales occupations | 7 |
| Administrative support occupations, including clerical | 2 |
| **Farming, forestry, and fishing** | 16 |
| Farming occupations | 12 |
| Forestry and logging occupations | 3 |
| **Service occupations** | 8 |
| Protective service | 4 |
| **Precision production, craft, and repair** | 19 |
| Mechanics and repairers | 5 |
| Construction trades | 10 |
| **Operators, fabricators, and laborers** | 32 |
| Machine operators, assemblers, and inspectors | 5 |
| Transportation and material moving occupations | 18 |
| Motor vehicle operators | 13 |
| Truckdrivers | 11 |
| Handlers, equipment cleaners, helpers, and laborers | 9 |
| Construction laborers | 4 |
| **Military occupations (Armed Forces)** | 1 |

[1] Based on the 1990 Occupational Classification System developed by the Bureau of the Census.

NOTE: Percentages may not add to total due to rounding. Totals for major categories may include subcategories not shown separately.

SOURCE: Thirty-one participating States in the 1991 CFOI program.

to participate in the CFOI program. The Bureau's objective is to expand the program to include data for all 50 States, but State budget constraints might delay full implementation of the program until 1993 or beyond.[11]

When the CFOI is fully implemented, a public-use data base (with safeguards for the protection of confidentiality) will be available for safety and health researchers, policy officials, and others involved in promoting safety in the workplace. This national data base will assist users in generating fatality profiles for specific industries and populations (for example, the self-employed or women workers) and in studying fatalities involving certain types of machinery or events (for example, work activities at the time of contact with an electric current). An important goal of research into safety in the workplace will be to transform the CFOI data into information that is useful in preventing fatal injuries at work. □

## Footnotes

ACKNOWLEDGMENTS: The authors thank the participating States for their effort in implementing this new program. In addition, the authors recognize the effort of all State and Federal agencies that submitted source documents used to identify fatal work injuries. Among these agencies are the Occupational Safety and Health Administration; the National Institute for Occupational Safety and Health; the Mine Safety and Health Administration; the Centers for Disease Control; the Employment Standards Administration, Federal Employees' Compensation and Longshore and Harbor Workers' divisions; the National Transportation Safety Board; the Department of Justice, Bureau of Justice Assistance; the State vital statistics registrars, coroners, and medical examiners; the State departments of labor and industries and workers' compensation agencies; the State highway departments; and the State farm bureaus.

[1] The BLS Annual Survey of Occupational Injuries and Illnesses estimated that there were 2,900 work-related fatalities during 1990. For the same year, the National Safety Council (NSC) estimated 10,500 work-related fatalities. The National Institute for Occupational Safety and Health's (NIOSH) National Traumatic Occupational Fatality program estimated 6,400 work-related deaths for 1985, the latest year for which data from that program are available.

Besides estimates of occupational fatalities, the BLS annual survey produces national estimates of nonfatal occupational injuries and illnesses from a sample of about 280,000 private sector establishments. Estimates of occupational fatalities derived from the annual survey data are lower than other estimates, due to the exclusion of various workers from survey coverage: the self-employed, public sector employees, and employees of private households. The estimates from the annual survey also exclude fatalities for workers in establishments with fewer than 11 employees. Deriving figures for occupational fatalities—a relatively rare event—from a sample survey is believed to play a part in the low figures. See *Occupational Injuries and Illnesses in the United States by Industry, 1990*, Bulletin 2399 (Bureau of Labor Statistics, April 1992).

National Safety Council estimates cover unintentional (homicides and suicides are excluded) injury-related deaths of persons in the civilian work force, 14 years and older, except for private household workers. See *Accident Facts: 1991 Edition* (National Safety Council, 1991).

The NIOSH estimates cover traumatic injuries (intentional and unintentional) of persons 16 years and older identified on the death certificate as occurring "at work." While death certificates cover all deaths occurring in the State, only those death certificates identifying a fatal injury as one that occurred at work are used to compile the number of fatal occupational injuries. Some fatal work injuries, particularly those resulting from motor vehicle accidents, may not be considered work related by persons completing the death certificate. See *National Traumatic Occupational Fatalities: 1980–1985* (National Institute for Occupational Safety and Health, March 1989).

State and Federal workers' compensation reports also fail to capture a census of fatal occupational injuries. The self-employed and employees of small farms, private households,

Table 5. **Percent distribution of fatal occupational injuries by event or exposure, 31 participating States, 1991**

| Event or exposure[1] | Fatal occupational injuries |
|---|---|
| Total fatalities: | |
| Number | 3,465 |
| Percent | 100 |
| Transportation accidents[2] | 30 |
| Highway motor vehicle[3] | 18 |
| Collision | 11 |
| Noncollision | 6 |
| Nonhighway (plant, industrial, farm) vehicle | 6 |
| Noncollision | 5 |
| Aircraft accident | 5 |
| Fall | 11 |
| Compression by equipment or objects | 7 |
| Contact with electric current | 6 |
| Homicide | 14 |
| Suicide | 2 |
| Explosion | 3 |
| Struck | 17 |
| By falling object | 6 |
| By vehicle | 6 |
| Drowning, suffocation, and other oxygen deficiency | 3 |
| Contact with toxic or caustic substances | 3 |
| Contact with temperature extremes | 2 |

[1] Based on the 1991 Revised Occupational Safety and Health classification structure.

[2] Includes accidents in which the injured worker was in or on the vehicle as an operator or passenger. Excludes falls from vehicles, as well as pedestrians killed by motor vehicles.

[3] Excludes bus and taxi accidents.

NOTE: Percentages may not add to total due to rounding. Totals for major categories may include subcategories not shown separately.

SOURCE: Thirty-one participating States in the 1991 CFOI program.

and railroads, as well as seasonal employees, are generally excluded from workers' compensation coverage. See Nancy Stout and Catherine Bell, "Effectiveness of Source Documents for Identifying Fatal Occupational Injuries: A Synthesis of Studies," *American Journal of Public Health*, June 1991, pp.725–28.

[2] National Research Council, *Counting Injuries and Illnesses in the Workplace: Proposals for a Better System* (Washington, National Academy Press, 1987), p. 6.

[3] Keystone Center, "Keystone National Policy Dialogue on Work-Related Illness and Injury Recordkeeping," final report, January 1989, p. 47.

[4] See Guy A. Toscano, "The BLS Census of Fatal Occupational Injuries," *Compensation and Working Conditions*, June 1991, pp. 1–2.

[5] See Janice Windau and Donna Goodrich, "Testing a census approach to compiling data on fatal work injuries," *Monthly Labor Review*, December 1990, pp. 47–49.

[6] See Guy Toscano and Janice Windau, "Further testing of a census approach to compiling data on fatal work injuries," *Monthly Labor Review*, October 1991, pp. 33–36.

[7] Work activities are defined as those duties or tasks that produce a product or result; that are done in exchange for money, goods, services, profit, or advantage; and that are legal activities in the United States.

[8] A traumatic injury is a wound or other condition usually caused by forces involving an abnormal energy exchange. The injury must be identifiable by time and location of occurrence and member or function of the body affected. It must be caused by a specific event or incident or series of events within a single workday or shift.

[9] For a more complete discussion of the difficulties involved in capturing information on occupational illnesses, both fatal and nonfatal, see Harvey J. Hilaski, "Understanding statistics on occupational illnesses," *Monthly Labor Review*, March 1981, pp. 25–29.

[10] This article presents preliminary data on fatal occupational injuries occurring during 1991 and processed by the participating States as of July 1, 1992. Methods for calculating fatality rates are still being studied. For a more complete discussion of occupational fatality rates, see John J. Kane and Blaine Derstine, "Fatal Occupational Injuries: Test Results from the BLS Census," *Compensation and Working Conditions*, April 1992, pp. 3–9.

[11] At the time this article went to press, Illinois and New York had not signed cooperative agreements.