numerals) varies from occupation to occupation, as do the degree of difficulty and responsibility.

[3] In the survey coding structure, the level designations among various occupations are not synonymous; for example, the first level of attorneys is comparable to the third level of engineers, accountants, and most other professional and administrative occupations. Classification of employees in the occupations and work levels surveyed is based on factors detailed in definitions, which are available upon request.

[4] See John D. Morton, "BLS prepared to broaden scope of its white-collar pay survey," *Monthly Labor Review*, March 1987, pp. 3–7.

Testing a census approach to compiling data on fatal work injuries

Janice Windau and
Donna Goodrich

Most researchers are aware of and agree on the general types of workplace events, such as motor vehicle accidents and falls, that can result in death in the workplace. Few agree, however, on the *total* number of job-related traumatic fatalities and the frequency of each type. Estimates of work-related deaths in the United States vary considerably, most recently (1988) ranging from about 3,500 to 11,000 a year.[1] This report summarizes the results of a recent test study by BLS and the State of Texas to improve information on fatal injuries in the workplace.

Background of the test

Most analysts would agree that complete, accurate, and timely data on traumatic, work-related fatalities are essential to an effective occupational safety and health program. They are also likely to agree that the occupational fatality data currently available lack these important qualities.

Janice Windau is an epidemiologist in the Division of Safety, Health and Program Analysis and Control, Bureau of Labor Statistics. At the time this article was written, Donna Goodrich was the administrator of the Occupational Safety and Health Statistics programs in the Texas Department of Health.

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

These inadequacies led two national study groups—the National Academy of Sciences and the Keystone Center—to recommend that multiple data sources be used to compile a census of fatal occupational injuries in the United States.[2] This summary reports on a test of such an approach. Besides compiling data from a variety of sources, the test included a followup with the employer or other knowledgeable source to evaluate the accuracy of the reported data. Because of the additional complexities involved, deaths resulting from work-related illnesses were excluded from the study.[3]

Test methods

During 1988, the Texas Department of Health, in conjunction with the U.S. Bureau of Labor Statistics, compiled data for fatal occupational injuries occurring in 1986 from four sources: death certificates, workers' compensation reports, Occupational Safety and Health Administration fatality reports, and survey forms submitted in the BLS Annual Survey of Occupational Injuries and Illnesses.[4]

Reports were matched to eliminate duplication and to build a file for each fatality. Matching was performed manually using the following identifying information: the deceased's name, company name, date of injury, date of death, and description of the injury.

Because each reporting system uses its own definition of work relationship, Texas reviewed each fatality for work relationship according to the *Recordkeeping Guidelines for Occupational Injuries and Illnesses*, developed by the Bureau of Labor Statistics for use in its Annual Survey. In general, the U.S. Department of Labor criteria presume work relationship if the injury occurred on the employer's premises. Injuries occurring in the company parking lot or in company-owned recreational facilities are considered work related only if the worker was engaged in a work-related activity. Injuries occurring off the employer's premises are considered work related if the employee was engaged in a work-related activity, was present at the location as a condition of employment, or was in travel status and engaged in work or travel functions. Injuries occurring while going to and from work are not considered work related.

Work relationship could not be determined for 32 fatalities, all of which were identified by a single source document. A followup was conducted to obtain additional information concerning the incident so that a decision on work relationship could be made.

An additional followup was conducted to evaluate the procedures used for determining work relationship and to assess the reliability of information obtained from the various source documents. This followup was conducted on two samples of cases: one sample was randomly selected from cases identified only by a death certificate; the other was

Table 1. **Industry in which worker was employed when fatally injured, Texas, 1986**

Industry	Number of fatalities	Percent
Total	715	100
Construction	152	21
Transportation and public utilities	107	15
Agriculture, forestry, and fishing	82	11
Manufacturing	73	10
Services	67	9
Mining	56	8
Retail trade	56	8
Public administration	51	7
Wholesale trade	42	6
Finance, insurance, and real estate	10	1
Unknown	19	3

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

SOURCE: Texas Department of Health.

selected randomly from cases identified by more than one source document.

Questionnaires were mailed to the employer or to the informant named on the death certificate requesting information to determine the work relationship of the incident, the industry of the employer, and occupation and employment status of the deceased. When the employer could not be identified from the source documents or questionnaires, letters requesting the employer's identity were sent to one or more of the following: the coroner or medical examiner, the hospital, or the funeral director.

Information concerning the fatality, such as industry of the employer; occupation, age, and gender of the injured worker; the date of injury and date of death; and the type of incident, was coded from available source documents and questionnaires. Counts of work-related injury fatalities occurring in 1986 were produced. Table 1 shows the industry categories in which the employees were working when they were fatally injured; table 2 shows the major types of accident or incident involved.

Findings

The study showed that collecting occupational injury fatality data from multiple sources for a prior year is feasible and necessary to obtain comprehensive data. The total fatal occupational injury count of 715, obtained using multiple sources, differs from counts compiled from single data sources. Death certificates identified approximately 80 percent of the fatal work-related injuries, while workers' compensation reports identified about 65 percent.[5] About half of the deaths were identified by both a workers' compensation report and a death certificate.

The study also showed that reports must be evaluated using a standard definition of work relationship. Of the initial 769 fatal injuries reviewed for work relationship, 54 were determined not to be work related from information available on the source documents and followup questionnaires. Of the 378 fatalities identified by more than one source, only 2 were determined to be unrelated to work. Obtaining occupational fatality data from multiple sources thus aids in validating the work relationship.

The study also suggests the need for a procedure to obtain additional information regarding the fatality for cases where work relationship or other key information cannot be determined from available source documents. This followup is particularly important for cases identified by only one source document. Work relationship was unclear for 12 cases identified by a death certificate alone. The followup questionnaire provided enough information for the State to determine that five were work related and four were not work related. Work relationship remained questionable for three cases due to nonresponse to the followup.

Of the 20 cases identified by only a workers' compensation report and for which work relationship was questionable, 4 were determined to be work related, 6 were determined not to be work related, and 7 remained unresolved. In addition, three fatalities were found to be due to a nontraumatic event, such as repeated exposures to a chemical.

The study further indicated the need to verify and reconcile differences in information provided by source documents. As a result of information obtained during the followup of the two samples of cases, which totalled 100, the industry of the employer was changed for 8 cases, while the worker's occupation was changed for 11 cases.

The delayed timing of the followup, which was conducted during 1989, was a major factor in the low response to it. Although the Texas followup of nonrespondents was extensive, only half of those receiving a questionnaire cooperated, with the result that work relationship for 10 cases could not be determined.

THE BUREAU HAS CONTRACTED with two States, Texas and Colorado, to further test the feasibility of a comprehensive national fatal occupational injury data system during 1990. A major feature of these pilot studies is the collection and processing of fatality data, again using multiple data sources, but on a current basis. Timely collection of these data should improve response to the followup as well as improve the usefulness of the data for preventing serious workplace accidents.

Additional data sources are being used in the 1990 pilot studies. Reports submitted to other Federal regulatory agencies and in the Federal workers' compensation system are used to identify fatal occupational injuries. Due to the timing of the BLS annual survey, however, reports obtained in that survey are not being collected in these pilots.

Lastly, there are tentative plans to expand the fatal occupational injury program to additional States during 1991. These test efforts may lead to an ongoing program that more accurately measures the number of traumatic fatalities occurring in U.S. workplaces, as well as providing valuable insights into circumstances surrounding these deaths. Such intelligence is essential in developing strategies that will result in a safer environment for working men and women in the United States. □

Table 2. **Type of accident or incident associated with fatal occupational injuries, Texas, 1986**

Type of accident or incident	Number of fatalities	Percent
Total	715	100
Motor vehicle accident[1]	186	26
Homicide	100	14
Struck by or struck against[1]	88	12
Fall	80	11
Electrocution	56	8
Struck by motor vehicle/equipment	56	8
Explosion	34	5
Caught in, under, or between	31	4
Airplane crash	24	3
Drowning	18	3
Suicide	11	2
All other[2]	31	4

[1] Excludes fatalities to pedestrians which are included in "struck by motor vehicle/equipment."

[2] All other includes asphyxiations, cave-ins, fires, cuts, and cases where the type of incident was undetermined.

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

SOURCE: Texas Department of Health.

Footnotes

[1] Fatality figures from three agencies are compared: the Bureau of Labor Statistics (BLS), the National Institute for Occupational Safety and Health (NIOSH), and the National Safety Council (NSC). The BLS Annual Survey of Occupational Injuries and Illnesses estimated that there were

3,300 work-related fatalities during 1988. The National Safety Council estimated 10,600 work-related fatalities for that year; while NIOSH's National Traumatic Occupational Fatality (NTOF) estimate was 6,400 for 1985, the latest year for which those data are available.

Beside estimates for 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 various exclusions from survey coverage: the self-employed, public sector employees, workers on farms with fewer than 11 employees, and employees of private households. BLS fatality estimates 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 may also play a part in the low figures. See Bureau of Labor Statistics, *Occupational Injuries and Illnesses in the United States by Industry, 1988*, Bulletin 2366.

National Safety Council estimates cover unintentional (homicides and suicides are excluded) injury deaths of persons in the civilian work force, 14 years and older, with the exception of private household workers. See National Safety Council, *Accident Facts: 1989 Edition*.

The NIOSH estimates cover traumatic injuries (intentional and unintentional) of persons 16 years and older identified on the death certificate as occurring "at work." See National Institute for Occupational Safety and Health, *National Traumatic Occupational Fatalities: 1980–1985*, March 1989.

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

See also the Keystone Center's final report, "Keystone National Policy Dialogue on Work-Related Illness and Injury Recordkeeping," January 1989.

[3] The study focuses on fatal occupational injuries. "Injury" was defined according to the *Recordkeeping Guidelines for Occupational Injuries and Illnesses* (Bureau of Labor Statistics, 1986), which provide interpretation of the recordkeeping requirements of the Occupational Safety and Health Act of 1970 and Title 29, Part 1904, of the Code of Federal Regulations. These guidelines define an occupational injury as "any injury such as a cut, fracture, sprain, amputation, etc., which results from a work accident or from a single instantaneous exposure in the work environment."

The guidelines define an occupational illness as any abnormal condition or disorder, other than one resulting from an occupational injury (that is, resulting from an instantaneous event), caused by exposure to environmental factors associated with employment. Illnesses are excluded from the study because their association with workplace exposures are more difficult to determine. See Harvey Hilaski, "Understanding statistics on occupational illnesses," *Monthly Labor Review*, March 1981.

[4] The study was conducted by the Texas Department of Health, Division of Occupational Safety and Health, under the direction of Donna Goodrich, administrator.

[5] State workers' compensation reports fail to capture a census of fatal occupational injuries occurring in the State because of incomplete coverage of workers. State workers' compensation programs generally exclude injuries and illnesses to the self-employed, employees of small farms, Federal Government employees, private household and seasonal employees, longshore and harbor workers, and railroad employees.

While death certificates cover all deaths occurring in the State, only those death certificates identifying a fatal injury as work related (that is, with the "injury at work" box marked "yes") were used in the study. Because there is not a standard definition of work relationship in the vital statistics program, some fatalities, particularly those resulting from motor vehicle accidents, may not be considered work related by persons completing the death certificate.