

A Century-Long Quest for Meaningful and Accurate Occupational Injury and Illness Statistics

For over a century, the Bureau has collected and disseminated information on occupational injuries and illnesses. Data collection methods have evolved through trial-and-error. Recent program redesign takes ample consideration of past lessons and holds great promise for success. Immediate challenges still confront the occupational safety and health program, however, as the Bureau embarks on its second century of involvement with occupational injury and illness data.

BY DINO DRUDI

President Chester A. Arthur signed the bill creating the Bureau of Labor in the Department of the Interior on June 27, 1884. His signature culminated two decades of advocacy by labor organizations seeking government assistance in publicizing and improving the status of the growing industrial work force. Those two decades following the War between the States saw vast changes in the American economy and society. Those decades brought about a national economy symbolized by the transcontinental railroads. Rapidly growing industries attracted unprecedented numbers of unskilled workers recruited from among

immigrants, freed slaves, women, and even children.¹

Within a decade of the Bureau's establishment, from the mid-1890s on, it published extensively on new developments in State and foreign social legislation and practices, including accident prevention and workers' compensation.² This began a long and continuing commitment to the presentation of useful information on occupational safety and health.

In 1914, Royal Meeker, the Bureau's third Commissioner, asserted, "The Bureau should be in a position to furnish at any time advice as to the best methods of preventing industrial accidents and occupational

Dino Drudi is an economist in the Office of Safety, Health and Working Conditions, Bureau of Labor Statistics. Telephone (202) 606-6179.

diseases.”³ By 1976, under Janet Norwood, the Bureau’s tenth Commissioner, the Survey of Occupational Injuries and Illnesses was the largest annual sample survey conducted by the Bureau.⁴ Occupational injury and illness data have long been considered a staple among the Bureau’s traditional programs. These programs collect, tabulate, and publish data on employment, wages, prices, and other economic measures used in labor economics and general commerce.⁵

The Bureau, through virtually all its history, has relied on the cooperation of State agencies for occupational safety and health data collection. Carroll Wright, the Bureau’s first Commissioner, envisioned a network of collaborating State and Federal agents collecting and sharing data. He called this network a “powerful chain of investigators.”⁶

Starting with 3 States just before World War I, 14 States were participating in the Bureau’s safety and health statistics program by 1970, when the Occupational Safety and Health Act was passed. The Act authorized BLS to make matching grants to the States to cover part of the cost of providing occupational injury and illness data to BLS.⁷ BLS also offered to provide technical assistance and standardized data formats allowing States to compare their injury and illness experience with other States. Consequently, when the Census of Fatal Occupational Injuries program began in 1992, all 50 States and the District of Columbia were participating. In that same year, BLS introduced its redesigned annual Survey of Occupational Injuries and Illnesses. This survey, which covers nonfatal injuries and illness, had 42 States and several territories participating in the program.

Rudimentary beginnings

The primary problem with counting occupational injuries and illnesses was the difficulty associated with identifying comprehensive,

uniform data sources.

Before the 1890s, the chief barrier to occupational injury and illness data was the lack of any statutory obligation for employers to report workplace injuries to a State authority. Even thereafter, such duties were limited and poorly enforced. The subsequent introduction of State factory inspectors also had little impact, due to incomplete reports. Differences between individual State reporting requirements further precluded meaningful interstate comparisons.⁸ Even the oldest and most complete industrial injury data series – the statutory requirement for railroads to report injuries to the Interstate Commerce Commission – was not entirely trustworthy despite its enforceability by monetary penalties.⁹ These conditions in large part persisted until the passage of the Occupational Safety and Health Act in 1970.

In 1907, Arthur Reeves, a commentator of the times, proposed, to no avail, that States require all incidents be reported to their labor bureaus, and that BLS’s predecessor, the Bureau of Labor, prepare national tabulations.¹⁰ Ironically, while the wave of enactments of workers’ compensation laws in the 1910s provided a much broader and more accurate source of work-related fatality statistics, widely differing State workers’ compensation statutes proved an insurmountable obstacle to a nationally uniform, comprehensive reporting system.¹¹ The enactment of workers’ compensation statutes may actually have hindered development of national occupational injury and illness statistics because many policy makers believed that State workers’ compensation statutes had largely eliminated the problem.¹²

In the years preceding World War I, the Bureau began to give attention to industrial incidents and occupational diseases. In 1909, BLS conducted a study of phosphorous poisoning in the match-making industry.¹³ During this time, the Bureau

also reported on lead poisoning, railway incidents, mining fatalities, and other safety and health topics.¹⁴

In 1910, BLS began issuing an annual report on injury rates in the iron and steel industry. A few years later, the Bureau established cooperative arrangements with three important industrial States—Massachusetts, New York, and Ohio—for reporting industrial accidents.¹⁵ The Bureau, over the years, has also continued to conduct various special studies to supplement its regular data series, and focus on areas of particular interest.

Foundations of the present system

In 1926, BLS began an annual survey of the frequency and severity of industrial injuries for several manufacturing industries. The data from this survey were based on State records and reports from establishments in these industries.¹⁶

In the late 1920s, Ethelbert Stewart, the Bureau’s fourth Commissioner, sought congressional authorization for a safety division within the Bureau. This division was to act as a “clearing-house for the information the States are gathering.”¹⁷

While Stewart’s efforts ultimately were unsuccessful, by 1930, data covered a quarter of the workforce in some 30 manufacturing industries.¹⁸ In 1939, BLS added survey-based occupational fatality data, switching from the previous method of periodically aggregating State workers’ compensation figures to voluntary direct reporting by employers.¹⁹ Unfortunately, this kind of survey-based data collection methodology raised a serious potential for systematic bias in the data. More specifically, cases of underreporting by employers with the worst safety records, and consequent underestimation of the total number of cases, began to appear.²⁰ For example, fewer than a third of the construction firms sampled in 1948-49 provided usable

Table 1. Work injury fatalities and fatality rates, 1992-96

Year	Fatalities ¹	Employment (in thousands) ²	Fatality rate ³
1992	6,217	119,168	5.2
1993	6,331	120,778	5.2
1994	6,632	124,470	5.3
1995	6,275	126,248	4.9
1996	6,112	127,997	4.8

¹The fatality figures are from the Census of Fatal Occupational Injuries program, 1992-96. These figures include work injury fatalities for all age groups. The 1996 figure is preliminary; figures for all other years are final.

²The employment figures, except for military, are annual average estimates of employed civilians 16 years of age and older, from the Current Population Survey (CPS) 1992-96. The resident military figures, derived from resident and civilian population data from the Bureau of the

Census, were added to the CPS employment totals.

³The rate represents the number of fatal occupational injuries per 100,000 employed workers and was calculated as: $(N/W) \times 100,000$, where

N = the number of work injury fatalities to workers 16 years of age and older,
W = the number of employed workers,
100,000 = per 100,000 workers.

fatality data to BLS.²¹

In 1937, the Bureau adopted an injury classification system developed by the forerunners of the American National Standards Institute. At the request of Under Secretary of Labor J. D. Hodgson, the American National Standards Institute formed a study group to “review available reporting methods and standards of reporting injuries on a nationwide basis, and, if necessary, develop a simple method of reporting injuries.”²²

The study found the standard’s detailed severity descriptions for different kinds of injuries and special exceptions were too complex. The standard was also too insensitive to measure trends in injury experience and did not capture any occupational illness data. Moreover, it allowed employers to transfer injured workers to another job. As long as employees could carry out the duties associated with the job to which they were transferred, there was considered to be no time lost and, consequently, no recordable injury.²³

During World War II, the Bureau published monthly injury data for industries of particular wartime importance. Because industrial incidents could adversely affect wartime production, government agencies used these data to identify industries and establishments with

high injury rates. The Bureau also undertook special studies to examine the effects of long hours on industrial incidents. One study of operations at the Frankford Arsenal in Philadelphia showed that incidents happened more frequently during the extended hours than during the regular hours.²⁴ The Bureau also conducted detailed studies of incidents in the foundry, longshoring, and meatpacking industries.²⁵

After the war, BLS expanded its survey of injury frequency and severity to more manufacturing industries and began surveying nonmanufacturing industries as well. By 1966, data were published for over 650 industries.²⁶

From the late 1930s to the mid-1960s, BLS also collaborated with the National Safety Council (NSC), a congressionally-chartered private sector organization with formal ties to the American National Standards Institute, in an effort to improve the statistics. Together, NSC and BLS would go over the latest information from BLS surveys, Council estimates and reports from Council members, and special studies. They would also agree on the occupational fatality totals both agencies would publish and on the distribution of those fatalities among the major industry groups. Consequently, during those

years BLS and NSC published similar estimates.²⁷

Starting with data for 1965, BLS and NSC discontinued collaboration. BLS relied upon its survey-based occupational fatality data, while the NSC built its estimates on data gathered from a variety of sources. These sources included the Federal Government, private sector organizations, and its own members.²⁸

After BLS initiated the Census of Fatal Occupational Injuries (CFOI) program, the National Safety Council adopted the CFOI counts for 1992 and subsequent years. The National Safety Council adjusts the BLS counts to exclude fatal injuries resulting from “intentional acts” (homicides and suicides) included in the BLS fatality census.

Aside from this relatively minor methodological distinction, the National Safety Council recognizes that BLS’s new methodology “employs the most satisfactory approach to identification of and collection of information about fatal occupational injuries presently available.”²⁹ BLS occupational fatality data are sufficiently detailed to allow the National Safety Council to identify the homicides and suicides contained in the BLS data.

Table 1 presents data between 1992 and 1996 derived from the BLS occupational fatality census.

The table also contains Current Population Survey employment data and an overall fatality rate.³⁰

The Occupational Safety and Health Act of 1970 required the Labor Department, in consultation with the Department of Health, Education, and Welfare (now the Department of Health and Human Services), to “develop and maintain an effective program of collection, compilation, and analysis of occupational safety and health statistics.” The Act required the Department to “compile accurate statistics on work injuries and illnesses... [for] all disabling, serious, or significant injuries and illnesses, whether or not involving loss of time from work, other than minor injuries requiring only first aid treatment and which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.”³¹

Responsibility for implementing this provision was given to BLS. The Act required employers to maintain accurate records of work-related fatalities, and nonfatal injuries and illnesses. Employers had to report these incidents to BLS if selected for inclusion in a particular year’s annual survey. Initially, funding was provided as a pass-through from the Occupational Safety and Health Administration. However, in fiscal year 1992, the Congress included funds for the program as part of the Bureau’s budget.

The Bureau’s voluntary survey became mandatory, thereby solving the problem of nonsampling bias resulting from nonresponse, particularly from employers with the worst safety records.³² Private establishments subject to the Act selected for a given year’s survey were required to report fatalities and nonfatal cases involving lost workdays, transfer to another job, termination of employment, loss of consciousness, or restriction of work or motion. Consequently, it would no longer be possible to mask injuries by transfer-

ring injured workers to other jobs, or retiring or dismissing them.³³

Since 1973, occupational injury and illness numbers and incidence rates for the private sector collected under the Act have been published. They include data for both the private sector overall and for specific private sector industries. Table 2 presents overall private sector data from 1973 through 1995.

The Bureau simultaneously developed procedures to gather from State workers’ compensation records additional information on the worker and case characteristics associated with work-related injuries and illnesses. Introduced in 1976, this Supplementary Data System grew to 34 participating States by 1982. Data from State workers’ compensation systems met many data needs not fulfilled by the annual survey. However, state systems’ varying definitions of industries, workers, and cases covered made interstate comparisons difficult and national aggregation of State data even more problematic. By 1992, BLS—in response to a National Academy of Sciences recommendation—phased out the Supplementary Data System and expanded the annual survey. This expansion aimed to capture worker and case characteristic data for nonfatal cases.³⁴

In 1977, the Bureau initiated a series of direct studies of injured workers called Work Injury Reports (WIR).³⁵ These reports provided detailed information on the causes and effects of selected workplace injuries and illnesses. The reports used questionnaires mailed to injured or ill workers by States participating in the Supplementary Data System. From 1978 until 1990, the Bureau issued numerous studies on varied topics such as back injuries associated with lifting and eye injuries. WIR surveys were designed, often in cooperation with the Occupational Safety and Health Administration, to identify patterns of incident causes, the activities in which the worker was engaged at

the time of the incident, specifics about the equipment used, the personal protective equipment being worn, any training the employee received, etc. The *BLS Handbook of Methods for Surveys and Studies* explains the rationale behind Work Injury Reports further:

Because it would be difficult, if not impossible, for employers to provide some of the needed information, [BLS decided to] survey injured workers directly. For example, by surveying the worker directly, it is possible to expand the scope of questions on work being done... to include safety training, and prior experience, if any, provided by previous employers. Such information helps safety and health experts... zero in on... workers who lacked any safety training on the work activity they performed when injured.³⁶

The modern era of safety and health statistics

In 1984, the Congress appropriated funds to study BLS occupational injury and illness statistics. BLS turned to the National Academy of Sciences to conduct the study. After the study’s completion in October 1987, the Bureau totally redesigned its occupational injury and illness statistical program.³⁷ A panel from the Keystone Dialogue Group (a nonprofit private sector organization that facilitates consensus building discussions among business, labor, and government on public policy issues) also contributed recommendations for redesigning the statistical program.³⁸ The chief criticisms of the survey were that it shed little light on the demographics of injured and ill workers or the characteristics of the incident, such as the kind of injury or illness involved, how it happened, and the specific kind of job involved.

BLS redesigned the annual survey

Table 2. Nonfatal occupational injury and illness incidence rates and numbers for private sector industries, 1973-95

Year ¹	Injury and illness incidence rates ²				Number of injuries and illnesses (000's)			
	Total cases	Lost workday cases		Cases without lost workdays	Total cases	Lost workday cases		Cases without lost workdays
		Total ³	With days away from work ⁴			Total ³	With days away from work ⁴	
1973	11.0	3.4	-	7.5	6,078.7	1,908.0	-	4,165.0
1974	10.4	3.5	-	6.9	5,915.8	2,001.8	-	3,908.1
1975	9.1	3.3	3.2	5.8	4,983.1	1,825.2	1,730.5	3,152.6
1976	9.2	3.5	3.3	5.7	5,163.7	1,978.8	1,875.4	3,180.4
1977	9.3	3.8	3.6	5.5	5,460.3	2,203.6	2,092.1	3,250.6
1978 ⁵	9.4	4.1	3.8	5.3	5,799.4	2,492.0	2,327.5	3,302.0
1979 ⁵	9.5	4.3	4.0	5.2	6,105.7	2,757.7	2,553.5	3,342.3
1980	8.7	4.0	3.7	4.7	5,605.8	2,539.9	2,353.8	3,060.4
1981	8.3	3.8	3.5	4.5	5,404.4	2,457.5	2,269.2	2,941.8
1982 ⁵	7.7	3.5	3.2	4.2	4,856.4	2,182.4	2,016.2	2,668.6
1983 ⁵	7.6	3.4	3.2	4.2	4,854.1	2,182.7	2,014.2	2,667.6
1984	8.0	3.7	3.4	4.3	5,419.7	2,501.5	2,303.7	2,913.4
1985	7.9	3.6	3.3	4.3	5,507.2	2,537.0	2,319.2	2,965.9
1986	7.9	3.6	3.3	4.3	5,629.0	2,590.3	2,356.9	3,034.6
1987	8.3	3.8	3.4	4.4	6,035.9	2,801.6	2,483.9	3,230.6
1988	8.6	4.0	3.5	4.6	6,440.4	2,977.8	2,585.8	3,458.7
1989	8.6	4.0	3.4	4.6	6,576.3	3,073.9	2,624.2	3,497.9
1990	8.8	4.1	3.4	4.7	6,753.0	3,123.8	2,613.5	3,625.6
1991	8.4	3.9	3.2	4.5	6,345.7	2,944.2	2,398.4	3,398.3
1992 ⁶	8.9	3.9	3.0	5.0	6,799.4	2,953.4	2,331.1	3,846.0
1993 ⁶	8.5	3.8	2.9	4.8	6,737.4	2,967.4	2,252.5	3,770.0
1994 ⁶	8.4	3.8	2.8	4.6	6,766.9	3,061.0	2,236.6	3,705.9
1995 ⁶	8.1	3.6	2.5	4.4	6,575.4	2,972.1	2,040.9	3,603.2

¹ Data for 1973-1975 are based on the *Standard Industrial Classification Manual*, 1967 Edition; data for 1976-1987 are based on the *Standard Industrial Classification Manual*, 1972 Edition; and data for 1988-1995 are based on the *Standard Industrial Classification Manual*, 1987 Edition.

² The incidence rates represent the number of injuries and illnesses per 100 full-time workers and were calculated as: (N/EH) X 200,000, where:

N = number of injuries and illnesses,
 EH = total hours worked by all employees during the calendar year,
 200,000 = base for 100 full-time equivalent workers (working 40 hours per week, 50 weeks per year).

³ Total includes cases involving restricted work activity only, in addition to days-away-from-work cases with or without restricted work activity.

⁴ Days-away-from-work cases include those which result in days away from work with or without restricted work activity.

⁵ To maintain historical comparability with the rest of the series, data for small nonfarm employers in low-risk industries who were not surveyed were imputed and included in the survey estimates.

⁶ Data for 1992-1995 exclude fatal work-related injuries and illnesses.

NOTE: Because of rounding, components may not add to totals. Data for 1976-1995 exclude farms with fewer than 11 employees. Dashes denote data not available.

to add the collection of demographic data on workers whose injuries and illnesses required recuperation away from work. The new survey also collected detailed information about the circumstances of workers' injuries and illnesses. The demographic and economic information includes industry, occupation, age, gender, race or ethnic origin, and length of service with the employer. The case circumstance data include the physical characteristics of the injury or illness, what happened, how it happened, and what equipment, materials, tools, or substances

directly inflicted the injury or led to the exposure.

BLS scrapped the old American National Standards Institute (ANSI) Z16.2 rules of selection and codes, and devised an entirely new classification structure containing considerably more guidance and detail. In September 1995, ANSI adopted the Bureau's new coding structure as a national standard.³⁹

While BLS retained from the old ANSI Z16.2 rules the Nature of Injury or Illness, Part of Body Affected, and Source of Injury or Illness concepts, it retitled "Type of

Accident or Exposure" as "Event or Exposure" to emphasize that some events, such as assaults, are not "accidental." They also replaced the Supplementary Data System's Associated Object or Substance classification with an entirely new classification titled "Secondary Source." New definitions, rules of selection, and detailed codes were implemented for all five classifications. In the new scheme, source and secondary source use identical codes.⁴⁰ Associated object or substance, designed to identify the object, substance, or person with

Table 3. Source documents used to compile information on fatal work injuries, Census of Fatal Occupational Injuries, 1995

	Initiating source document	Total
Death certificates ¹	2,114	4,894
News media reports	1,699	2,616
State workers' compensation	945	2,304
State coroner/medical reports	125	2,070
OSHA reports	669	2,041
State-initiated follow-ups	-	1,555
State motor vehicle reports	93	598
Other Federal reports	60	238
Other	500	2,111

¹ Death certificates marked "at work."

respect to which measures could have been introduced to prevent the incident or mitigate the injury or illness, had proven unusable because it was too vague and subjective. By contrast, secondary source is designed to identify objects, substances, or persons generating the source of injury or illness or contributing to the event or exposure. It recognizes that many cases have no secondary source associated with them.

The new survey design balanced safety and health professionals' desire for expanded data with employer burden and survey expense considerations. For example, cases resulting in only restricted work or motion or medical treatment continued to be summarized, rather than studied in detail. Employers were permitted to submit supplementary forms containing the requisite information, such as workers' compensation reports, instead of completing corresponding parts of the questionnaire. Employers with relatively large numbers of days away from work cases were allowed to provide a randomly selected subset of their cases for the year.

The National Academy of Sciences also expressed concern with the high rate of sampling error for the survey estimates of work-related fatalities. Although there are a significant number of job-related fatalities each year, they are a very small proportion of all workplace injuries and illnesses. Thus, work-

related fatalities are statistically "rare events," which cannot be measured with high accuracy by a sample survey.

The National Academy of Sciences recommended that BLS compile a universe of fatalities, which only a census could provide. Consequently, BLS eschewed the notion of gathering fatality data through the annual survey. Simultaneous with expansion of the annual survey in 1992, BLS launched the Census of Fatal Occupational Injuries (CFOI) which assembles data on all work-related fatal injuries from a diverse array of sources. CFOI, which expanded the scope of data beyond those used by Federal and State agencies administering specific laws and regulations to include all industries and occupations, aims to include all workers who had died on the job and who had worked for pay, compensation, or profit at the time of the fatal event. They are included in the census only if, at the time of the fatality, they were engaged in a legal activity and were present at the site of the incident as a job requirement. CFOI also captures worker and case characteristics.⁴¹

CFOI is able to accomplish this by drawing information on fatal work injuries from as many as 25 different source documents – including death certificates, State workers' compensation reports, news media accounts, and State motor vehicle incident reports. Informa-

tion is also provided from such diverse sources as State farm bureaus, local police departments, emergency medical services, and the National Association of Chiefs of Police. In addition, other Federal agencies having jurisdiction over or compiling data about fatalities affecting specific groups of workers provide data to BLS. These agencies include the Occupational Safety and Health Administration, the Employment Standards Administration, the Mine Safety and Health Administration, the Department of Defense, the U.S. Coast Guard, the Department of Justice, and the National Transportation Safety Board.

As table 3 shows, no single source is completely adequate for identifying all occupational fatalities. However, when several sources are used, a fatality missed by one may be captured by another and will ultimately be included in the data. For 1995, over 18,000 source documents were used to identify and verify information on over 6,000 job-related fatal injuries. Using multiple sources also provides more detailed information about the circumstances surrounding fatal occupational injuries. Information collected from various source documents is used to code up to 30 data elements for each job-related fatality.

Data needs in the near future

The introduction of the CFOI program, and the redesign of the annual Survey of Occupational

Injuries and Illnesses, which occurred near the century mark of BLS's involvement in occupational safety and health research, raise occupational safety and health statistics to a new level of sophistication. These two statistical series open up new opportunities for understanding, and devising strategies to address, job-related hazards. But will they define the status quo for the foreseeable future, or will the state of the art further advance?

Summary statistics often point at areas where further detailed studies could focus. For example, the incidence of disorders associated with repeated trauma increased elevenfold between 1982 and 1994. Summary data provide a wealth of useful information about these conditions, such as: there were 332,100 repeated trauma cases in 1994, accounting for 41.1 cases per 10,000 full-time workers, and they tend to concentrate in industries such as meat packing and motor vehicle and car body manufacturing.⁴²

But, further research by safety and health professionals might show the extent to which carpal tunnel syndrome and other repetitive motion disorders underlie this 12-year change; the tools, machinery, or equipment involved; etc. Gaining further insight into how disorders associated with repeated trauma occur may lead to measures that could be taken to prevent them.

Bureau data highlight diverse areas needing such special attention, and point in directions further research might explore. For example, safety and health professionals could conduct studies to gain insights into the causes of serious injuries and illnesses. Studies of this kind would investigate such issues as how well equipment is designed, whether training on the use of tools or equipment sufficiently addresses safety and health considerations, or whether some hazards are inherent in the nature of certain kinds of work.

There is also a growing need for more detailed information on the costs associated with fatal and nonfatal injuries and illnesses, and the cost savings that would accrue from particular injury and illness reduction strategies. Both the costs incurred consequent to injuries and illnesses, and the benefits that would accrue from their prevention and mitigation, are of two kinds:

- *Internalized* costs borne directly by employers, injured employees, and insurers such as workers' compensation premiums and payouts, lost employee income if the injury or illness does not exceed the workers' compensation waiting period, and lost productivity; and
- *Externalized* social costs borne by society at large, such as increased welfare payments for disabled workers not covered by workers' compensation and their families.

Because employers keep records of their costs, it is generally easier to quantify costs borne directly by employers (internalized costs), than those borne by society at large (externalized costs).

A sentinel event is an incident whose occurrence is a warning signal that the quality of occupational injury and/or illness prevention efforts may need to be improved.⁴³

An example might be a hammer falling off a high girder on a construction site. The hammer could fall harmlessly to the ground; could fall on an expensive piece of equipment; could just barely miss a worker on the ground; could hit the worker in the shoulder, putting him out for a few days to recuperate; could glance harmlessly off the hard hat on his head; or could inflict a fatal skull fracture if he is not wearing his hard hat. If careless practices develop, such as leaving

tools unsecured high up in the structural steel frame of the building, the hammer that falls harmlessly to the ground today could fall fatally on a worker's head tomorrow. The hammer falling harmlessly to the ground is the sentinel event pointing to a hazardous condition that should be addressed to prevent a more serious injury.

One school of thought holds that only events that result in injury or illness should be measured and fall within the scope of desired prevention efforts. This school of thought also believes that the best hazard-indicators are incidents that actually produce work-related injuries or illnesses. This belief is increasingly predominant as agencies move to cut costs and employer recordkeeping burden. BLS currently collects occupational injury and illness data only for cases that result in actual injuries or illnesses.

However, another school of thought believes statistical systems should be designed to identify a broader range of sentinel events, so safety and health professionals will be aware of hazards before an injury or illness-producing event or exposure occurs, rather than after it has already occurred, where data about it can serve only to prevent some future event or exposure. An example of including such sentinel events in a safety program is the Federal Aviation Administration's tracking aircraft "near misses."

The efficacy of capturing data on sentinel events rests on an assumption that the fundamental characteristics of actual injuries and illnesses are similar to those of sentinel events resulting in no injury or illness. For example, the falling hammer might not have struck anyone because the worker who inadvertently dropped it may have looked over and shouted a warning to those on the ground, alerting them to the hazard in time for them to move safely out of the way.

Conclusion

Patricia C. Cohen observes that

“in the nineteenth century, what was counted was what counted”,⁴⁴ which labor economist Marc Linder suggests is every bit as true in the twentieth century as well.⁴⁵ And it may well be a universal truth.⁴⁶

Cohen notes that the political origins, design, collection, and uses of economic data are in part based on the insight that counting methods embody assumptions about the objects of enumeration.⁴⁷ And Linder, citing Arthur Reeves, reminds us that for a long time in American history such objects of enumeration as fatal and nonfatal occupational injuries and illnesses were not considered important enough to count.⁴⁸ Indeed, J.M. Clerc went so far as to state that, at certain junctures in American history, occupational injuries and diseases were considered the inevitable tribute to the progress of the American economy.⁴⁹

It remains ironic that both those like Linder, who decry on-the-job “casualties,” and those whom Clerc describes as considering these “casualties” to be a measure of economic progress, have a common interest in meaningful and accurate occupational injury and illness statistics. Moderates such as Carroll Wright, the Bureau’s first Commissioner, were called upon to keep track of what one of his contemporaries, C.H. Mark, characterized as the “stupendous loss” of life and

injury experience consequent to industrialization.⁵⁰

Despite the progress BLS has made over the past century, the Bureau, like other sources of occupational injury and illness data, found itself confined by legal strictures and lack of appropriate data sources. Until the advent of the BLS Census of Fatal Occupational Injuries program, for example, consensus on a fatal work injury count eluded BLS and other organizations attempting to quantify this phenomenon.⁵¹

Early attempts to develop accurate fatality data saw fruition only by 1992. It was then that BLS recognized that a diversity of data sources would be necessary to secure good data on fatal work-related injuries.

Similarly, BLS vacillated between collecting occupational injury and illness data by means of direct survey versus piggybacking on State workers’ compensation records. Neither method worked particularly well, due, respectively, to survey underreporting by the firms with the worst injury and illness records in the years preceding the Occupational Safety and Health Act,⁵² and interstate variations in waiting periods and other workers’ compensation requirements. But, by allowing employers to use workers’ compensation forms to the extent they provide information sufficient to fulfill the Occupational Safety and

Health Act’s requirements,⁵³ the Act created the practical framework to enable BLS to reconcile these two methods of data collection and take advantage of the best aspects of each. Consequently, in the 1992 redesign, BLS began accepting workers’ compensation forms as input to the survey of nonfatal occupational injuries and illnesses, to the extent workers’ compensation forms contain the requisite information.

Just as the present system of occupational safety and health statistics might not have been imaginable a century ago when the Bureau began publishing information on this topic, it is not clear whether budgetary conditions, public demand, or available information resources will enable organizations producing safety and health statistics to improve upon the usefulness of their data. Will there be sufficient resources to undertake special follow-up studies, improve cost data, or develop information on sentinel events in the proximate future?

What does the century-long effort to produce meaningful and accurate statistics tell us about occupational injury and illness statistics today, and the statistics needed for tomorrow’s demands? Will other issues suddenly appear that become more pressing? The future can be filled with surprises that mock today’s expectations.

—ENDNOTES—

¹ Joseph P. Goldberg and William T. Moye, *The First Hundred Years of the Bureau of Labor Statistics*, Bureau of Labor Statistics, Bulletin 2235, September 1995, p. 1.

² *Ibid.*, p. 26.

³ *Ibid.*, p. 100; Presidential Papers, Wilson Administration, Letter from Meeker to Presidential Secretary Joseph Tumulty, February 6, 1914.

⁴ Goldberg and Moye, *The First Hundred Years*, p. 252.

⁵ *Ibid.*, pp. 115, 259.

⁶ *Ibid.*, p. 14.

⁷ Joseph W. Hines and Gunnar Engen, “BLS Regional Offices: 50 Years of Federal-State Cooperation,” *Monthly Labor Review*, December 1992, p. 40.

⁸ Marc Linder, “Fatal Subtraction: Statistical MIAs on the Industrial Battlefield,” *Journal of*

Legislation, Notre Dame Law School, Vol. 20, No. 2, 1994, pp. 106-107.

⁹ *Industrial Accident Statistics*, Bureau of Labor Statistics, Bulletin 157, March 1915, p. 7.

¹⁰ Authur Reeves, “Our Industrial Juggernaut,” *Everybody’s Magazine*, 1907, p. 156.

¹¹ Linder, “Fatal Subtraction,” pp. 106-107.

¹² In the hearings on S. 3983, a bill to create a Division of Safety in the Department of Labor, before the Senate Committee on Education and Labor, 69th Congress, 1926, Connecticut Senator Hiram Bingham said:

[In] Connecticut... [w]e passed an employer’s liability compensation act, which requires all employers... to see to it that their employees should be protected at work. Now, this had the very natural effect of making the manufactur-

ers do what they should have done before, look into the causes of their own accidents and guard against them. [T]his is the proper theory of government, put on the individual the initiative of seeing to it that he corrects his own errors, rather than to have the Government to tell him what he must do in order to correct them, and that is the reason, I take it, why we do not find it necessary to collect accident statistics any more; it is because the workmen are protected, and the manufacturers themselves are seeing to it that they can and do establish the very latest form of safety devices, for their own protection, and for the saving in insurance, and for the safety of their workers.

¹³ John B. Andrews (Secretary, American Association for Labor Legislation), "Phosphorous Poisoning in the Match Industry in the United States," Bulletin 86, January 1910, pp. 31, 145-146; Hearings on Health Activities of the General Government before the House Committee on Interstate and Foreign Commerce, 61st Congress, 1910, pt. VI, p. 408.

¹⁴ Goldberg and Moye, *The First Hundred Years*, pp. 58, 60.

¹⁵ Hines and Engen, "BLS Regional Offices," p. 40.

¹⁶ Goldberg and Moye, *The First Hundred Years*, p. 133; Lyle R. Schauer and Thomas S. Ryder, "New Approaches to Occupational Safety and Health Statistics," *Monthly Labor Review*, April 1972, p. 14.

¹⁷ Hearings on Establishing a Division of Safety before the House Committee on Labor, 69th Congress, 1926, p. 16.

¹⁸ Goldberg and Moye, *The First Hundred Years*, p. 133.

¹⁹ Max Kossoris and Swen Kjaer, "Industrial Accidents in the United States During 1939," *Monthly Labor Review*, October 1940, pp. 86, 89.

²⁰ Linder, "Fatal Subtraction," p. 115; Schauer and Ryder, "New Approaches to Occupational Safety," pp. 14-19; Dino Drudi, "The Evolution of Occupational Fatality Statistics in the United States," *Compensation and Working Conditions*, Bureau of Labor Statistics, June 1995, p. 2.

²¹ *Work Injuries in Construction, 1948-49*, Bureau of Labor Statistics, Bulletin 1004, 1950, pp. 2-3.

²² *Proposed National System for Uniform Recording and Reporting of Occupational Injuries and Illnesses*, American National Standards Institute, 1970, p. 10.

²³ Schauer and Ryder, "New Approaches to Occupational Safety," pp. 14-19.

²⁴ Goldberg and Moye, *The First Hundred Years*, pp. 169-170.

²⁵ *Ibid.*, p. 170.

²⁶ *Ibid.*, p. 205.

²⁷ *Documentation of National Safety Council Statistics Department Estimating Procedures for Motor Vehicle, Work, Home, and Public Deaths and Death Rates*, National Safety Council, February 1982, pp. 7-8; *BLS Handbook of Methods for Surveys and Studies*, Bureau of Labor Statistics, Bulletin 1458, 1966, p. 205. In 1954, Commissioner of Labor Statistics Ewan Clague explained to the President's Conference on Occupational Safety that, because BLS cannot obtain a complete count of fatal work injuries, the BLS and National Safety Council technical staffs "assemble all these bits and pieces of work-injury data, fit them together like pieces in a jigsaw puzzle... match them up... and make adjustments so the figures will be comparable." (See *The President's Conference on Occupational Safety: Proceeding, May 4-6*, Bureau of Labor Statistics, Bulletin 175, 1954, pp. 7-8.)

²⁸ Hearings on the Occupational Safety and Health Act Review before the Subcommittee on Labor of the Senate Committee on Labor and Public Welfare, 93rd Congress, 1974, pp. 92-93.

²⁹ Correspondence from Alan F. Hoskin, Statistics Department Manager, National Safety Council, to Karin G. Kurz, BLS Clearance Officer, November 29, 1995.

³⁰ For further discussion of BLS's experimental fatality rate data, see *Fatal Workplace Injuries in 1992: A Collection of Data and Analysis*, Bureau of Labor Statistics, Report 870, April 1994, pp. 4-5.

³¹ Occupational Safety and Health Act, Public Law 91-596, 84 Stat. 1590, §24, 1970.

³² For further explanation, see Linder, "Fatal Subtraction," p. 115; Schauer and Ryder, "New Approaches to Occupational Safety," pp. 14-19; and Drudi, "The Evolution of Occupational Fatality Statistics," p. 2.

³³ Schauer and Ryder, "New Approaches to Occupational Safety," p. 14.

³⁴ Although the Supplementary Data System proved ill-suited to providing national statistics and was discontinued, BLS provided interested States with formats to enable them to continue using it for State-level administrative statistics. As recently as 1995, data similar to those provided to BLS under the Supplementary Data System were being actively used on the State level. OSHA, in cooperation with one such State, undertook a special project using workers' compensation claims to identify the 200 companies with the worst health and safety records. While these companies represented only 1 percent of the State's employers, they accounted for almost a third of the State's workers and almost half its compensable injuries and illnesses. OSHA later expanded the program to other States. See Frank Swoboda and Stephen Barr, "Guardian of Employee Safety Is About to Get a Work-Over: White House Promises New OSHA Mind-Set to Rely on Cooperation," *The Washington Post*, May 16, 1995, p. A15.

³⁵ Goldberg and Moye, *The First Hundred Years*, p. 252.

³⁶ *BLS Handbook of Methods for Surveys and Studies*, Bureau of Labor Statistics, Bulletin 2414, 1992, p. 117.

³⁷ *Counting Injuries and Illnesses in the Workplace: Proposals for a Better System*, National Academy of Sciences, National Research Council, Washington, DC, 1987.

³⁸ *Keystone National Policy Dialogue, on Work-Related Illness and Injury Recordkeeping*, The Keystone Dialogue Group, Keystone, Colorado, January 1989.

³⁹ Guy Toscano, Janice Windau, and Dino Drudi, "Using the BLS Occupational Injury and Illness Classification System as a Safety and Health Management Tool," *Compensation and Working Conditions*, Bureau of Labor Statistics, June 1996, pp. 19-23.

⁴⁰ *Occupational Injury and Illness Classification Manual*, Bureau of Labor Statistics, December 1992.

⁴¹ Guy Toscano and Janice Windau, "The Changing Character of Fatal Work Injuries," *Monthly Labor Review*, October 1994, p. 17.

⁴² *Occupational Injuries and Illnesses: Counts, Rates, and Characteristics, 1994*, Bureau of Labor Statistics, Bulletin 2485, April 1997, p. 7.

⁴³ Paul J. Seligman and Todd M. Frazier, "Surveillance: The Sentinel Health Event Approach," *Public Health Surveillance*, ed., by William Halperin and Edward L. Barker, Jr., Van Norstrand Reinhold, 1992, p. 16, derived from A.D. Langmuir, "William Farr, Founder of Modern Concepts of Surveillance," *International Journal of Epidemiology*, Vol. 5, No. 1, 1976.

⁴⁴ Patricia Cohen, *A Calculating People: The Spread of Numeracy in Early America*, 1982, p. 207.

⁴⁵ Linder, "Fatal Subtraction," p. 106.

⁴⁶ Drudi, "The Evolution of Occupational Fatality Statistics," p. 1.

⁴⁷ Cohen, *A Calculating People*, p. 211.

⁴⁸ Linder, "Fatal Subtraction," p. 106; Reeves, "Our Industrial Juggernaut," 1907, p. 147.

⁴⁹ J.M. Clerc, *Introduction to Working Conditions and Environment*, Vol. 29, 1985.

⁵⁰ C.H. Mark, "Our Murderous Industrialism," *World Today*, Vol. 12, 1907, p. 97.

⁵¹ The BLS 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 estimated 10,500 work-related fatalities. The National Institute for Occupational Safety and Health's National Traumatic Occupational Fatality program estimated 5,500 work-related fatalities in 1990 for the United States, except Connecticut and New York City.

National Safety Council estimates cover unintentional injury-related deaths involving persons in the civilian labor force, 14 years and older, except for private household workers. Homicides and suicides are excluded. See *Accident Facts: 1994 Edition*, National Safety Council, Itasca, Illinois, 1994, p. 39.

National Institute for Occupational Safety and Health 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 a State, only those death certificates identifying a fatal injury as one that occurred "at work" (i.e., the "at work" box on the death certificate is checked-off) are used to compile the number of fatal occupational injuries. Persons completing the death certificate might not recognize the work relationship of some injuries, such as automobile crashes. For further discussion of methodology, 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; employees of small farms, private households, and railroads; and seasonal employees are generally excluded from workers' compensation coverage.

⁵² For further explanation, see Linder, "Fatal Subtraction," p. 115; Schauer and Ryder, "New Approaches to Occupational Safety," pp. 14-19; and Drudi, "The Evolution of Occupational Fatality Statistics," p. 2.

⁵³ Schauer and Ryder, "New Approaches to Occupational Safety," p. 15.