Distr.
GENERAL

CES/SEM.48/8
22 May 2002

ENGLISH ONLY

STATISTICAL COMMISSION and ECONOMIC COMMISSION FOR EUROPE

CONFERENCE OF EUROPEAN STATISTICIANS

STATISTICAL OFFICE OF THE EUROPEAN COMMUNITIES (EUROSTAT)

INTERNATIONAL LABOUR ORGANIZATION

Joint UNECE-Eurostat-ILO Seminar
on Measurement of the Quality of Employment
(Geneva, 27-29 May 2002)

Measuring workplace safety and health: General considerations and the US case

Invited paper submitted by the US Bureau of Labor Statistics [1]

1. This paper consists of two parts. The first part will discuss some of the issues that must be addressed in measuring occupational safety and health and will describe how these issues are handled in the US statistical system. The second part summarizes some of the major findings of the US system. The first section has benefited greatly from the discussion contained in the Report of the Meeting of Experts on Labour Statistics: Occupational Injuries that was convened in Geneva in the Spring of 1998 (ILO 1998), as well as from the Resolution concerning statistics of occupational injuries adopted by the Sixteenth International Conference of Labour Statisticians (ICLS) in October 1998. The present paper will make frequent reference to the contents of that resolution.

1 Paper written by John W. Ruser. This paper represents the views of the author and does not necessarily represent the views of the US Bureau of Labor Statistics or any other agency of the US government.

I. Characteristics of occupational safety and health systems

Measurement objectives

2. Ultimately, the objective of measuring occupational safety and health is to improve the working conditions of workers and to reduce the social costs associated with workplace injury, illness and death. This is achieved by using occupational safety and health data to identify risky workplaces and work situations, so that prevention measures can be introduced either by government, employers, or labor. Occupational safety and health statistics help prioritize where prevention activities should be concentrated. These statistics can then be used to evaluate the success of these prevention activities and to monitor trends in safety. Finally, occupational safety and health statistics can be used to quantify the economic and social costs associated with these adverse health events.

Sources of injury and illness data

3. In nearly all countries, the source of workplace injury and illness data is administrative systems, either accident insurance (compensation) schemes or labor inspection or health and safety authorities (ILO, 1998). Using these data sources has the advantage that the information is generally already captured in computer systems. However, this information may not be comparable across countries both in coverage and in the way that information is classified. The data that are captured generally depends on rules and regulations that determine the scope of coverage, for example, whether an injured worker or a particular type of injury is eligible for compensation or whether a given firm is subject to inspection.

4. The US workers' compensation system provides an example of incomparabilities that can exist across geographical units. Each state has its own workers' compensation system, each state captures different kinds of injury cases in its data system and each state covers different groups of workers. For example, some states capture information on injury and illness cases for which either medical or income benefits are provided, regardless of how long a worker is out of work. Other states obtain this information only on cases that last more than 7 days away from work. States differ in how close the work relationship must be before an injury or illness case is compensated. States differ in whether small employers and state and local workers are covered by their compensation schemes. Finally, states differ in the way that they code information for each injury and illness case that is captured.

5. To address potential problems with incomparable data across states, the US Bureau of Labor Statistics (BLS) operates a national statistical system for measuring workplace injuries, illnesses and fatalities. It has two parts. The Survey of Occupational Injuries and Illnesses (SOII) collects data for nonfatal injuries and illnesses from 176,000 private industry establishments. The data are collected for injury and illness cases that employers are required to record on logs they fill out throughout the year (criteria for determining when to record a case are discussed below). The data in the BLS survey are drawn directly from the logs and from supplementary materials.

6. A potential shortcoming of relying on the employer as a source of data is that what the employer reports may in part reflect its understanding of which cases are recordable under current recordkeeping guidelines. Further, evidence suggests that reporting may in part reflect incentives on the part of employers and employees to either over- or under-report injuries. For example, Ruser and Smith (1988) showed that employers tended to under-record injuries and illnesses when logs were used to trigger inspections by the Occupational Safety and Health Administration. As another example, even though recordkeeping for the survey is technically separate from reporting for workers' compensation insurance, workers may still have greater incentives to report injuries when workers' compensation benefits are more generous (Ruser, 1991). Of course, other sources of workplace safety and health data, such as accident

compensation schemes and labor inspection programs, may also be subject to incentives that affect reporting.

7. While the Survey of Occupational Injuries and Illnesses collects nonfatal data from employers, the Census of Fatal Occupational Injuries (CFOI) obtains a complete count of workplace injury fatalities using multiple sources of information. These sources include death certificates that are marked injury at work, workers' compensation insurance reports, police and medical examiners reports, other reports provided by state and Federal government agencies--as well as news and other non-governmental reports. Diverse sources are used because studies have shown that no single source captures all job-related fatalities. Source documents are matched so that each fatality is counted only once. Over 22,000 source documents were collected for reference year 2000, or 3.7 documents per workplace fatality.[2]

Work-relatedness

8. Statistical systems should seek to collect information on injuries and illness that are work-related. These are health conditions that arise out of or in connection with work either on or off the employers' premises. They include acts of violence (both homicide and suicide), accidents while on work-related travel status and traffic accidents that occur while a worker is in employed status. The concept of work-relatedness is not a concept of fault. A truck driver might be injured in a crash caused by the driver of another vehicle. Regardless, such an injury should be counted as a workplace injury. This concept of work-relatedness is followed by the US nonfatal survey and fatality census.

9. Work-relatedness does have gray areas. For example, should injuries that arise while a worker is commuting to and from work be included? What about injuries that arise during meal and work breaks or injuries that occur on the employers' parking lot just before or after work? The resolution adopted by the 16th International Conference of Labour Statisticians (ICLS) in 1998 stated that "where it is practical and considered relevant to include injuries from commuting accidents, the information relating to them should be compiled and disseminated separately."

10. US statistics on workplace injuries, illnesses and fatalities do not include cases that result from commuting accidents. Current US recordkeeping guidelines also exclude injuries on parking lots before and after work, an injury or illness that is solely the result of an employee eating or drinking or preparing food or drink for personal consumption, and injuries that result from non-work-related recreational activities on the employers' premises.

11. Who establishes work-relatedness differs in the US nonfatal survey and in the fatality census. Since the nonfatal survey is based on employer reports, it is the employer who determines work-relatedness based on recordkeeping guidelines. In contrast, state and Federal data collectors determine work-relationship in the fatality census. The census methodology requires that work relationship be established with two or more independent source documents or one source document and a follow-up questionnaire. Because some state laws and regulations prohibit data collectors from contacting next of kin, it is not always possible to independently verify work relationship. In these cases, primarily affecting self-employed workers, a case is included in CFOI when it was determined that information in the initiating

2 The Census of Fatal Occupational Injuries (CFOI) has been conducted yearly since 1992. Prior to that year, estimates of fatalities were produced by the Survey of Occupational Injuries and Illnesses. There were two shortcomings of the fatality estimates from SOII: 1) they were underestimates of all workplace fatalities due to the limited scope of the survey and 2) they were noisy estimates due to small numbers of cases and the fact that the SOII is a sample survey. The current Census seeks to count all workplace fatalities, eliminating sample noise and having an all-worker scope.

source document was sufficient to determine that an incident was likely to be job-related.

Types of cases captured

12. The resolution adopted by the 16th ICLS pertaining to injuries recommends capturing data on all work-related fatalities and injuries causing an absence from work of at least one day excluding the day of the accident.

13. The current US system encompasses a far greater number of cases of injury and illness than is required by the ICLS resolution, including those resulting in death, days away from work, restricted work or transfer to another job, medical treatment beyond first aid, loss of consciousness, or a significant injury or illness diagnosed by a physician or other licensed health care professional.

14. In capturing and reporting data, the US system distinguishes between three types of nonfatal cases: cases with days away from work, cases with only restricted workdays, and all other recordable cases. A restricted-workday-only case involves some restriction on the amount of work that the employee can perform on the day or days following the injury or exposure, but where the employee returns to work on the day following the incident. In contrast, when an employee sustains a days-away-from-work injury, he does not return to work on the day or days following the injury or exposure. A worker sustaining a case with days away from work may eventually return to work but in a restricted capacity. Such a case is counted as a single case with days away from work. Finally, the nonfatal survey also identifies other recordable injury and illness cases where the worker returns to all of his/her duties by the day following the injury or exposure.

Occupational injuries versus illnesses

15. It is possible to distinguish between occupational injuries and occupational illness. The former is the result of a sudden, instantaneous event (such as a fall or a traffic accident), while the latter results from an exposure over a period of time. It is generally easier to identify occupational injuries, since these are more easily associated with the workplace and with a specific incident. In contrast, occupational illness may be difficult to relate to the workplace and, as in the case of cancer, may not appear for many years after exposure. Some occupational illnesses are presumed to arise in the workplace, as they are rare and known to arise from exposures to known chemicals. However, many illnesses may have multiple origins.

16. Both occupational injuries and illnesses should be measured. But the way that these are measured may be different. The US nonfatal Survey of Occupational Injuries and Illnesses is successful at collecting data from employers on occupational injuries and occupational illnesses that are both relatively easy to associate with the workplace and occur close to the time of exposure (e.g. contact dermatitis). But the US employer survey is not a good vehicle for collecting data on occupational illnesses that are not easily associated with the workplace. Finally, the US Census of Fatal Occupational Injuries restricts its scope to deaths that result from injury because of the latency period of many illnesses and the difficulty of linking illnesses to work.

17. Obtaining estimates of workplace illnesses in the US, particularly those that are long latent, requires special studies and/or inferences drawn from general health surveys. For example, reviewing over 90 academic papers, Leigh et al. (2000) estimated that in 1992 there were over 60,000 workplace illness fatalities and nearly 1.2 million new cases of occupational illness in the US.

Prevalence versus incidence

18. Occupational illnesses and even some occupational injuries may persist over a long period of time and may span more than a single calendar year. One can envision two ways of associating these cases to a particular reference year. One approach, which measures incidence, associates cases of injury and illness only with the year when they first occur. Cases are not counted again, even if they persist into subsequent years. The other approach, which measures prevalence, counts a condition in each year that it exists without regard to the year of occurrence.

19. Incidence and prevalence measures provide different information. Incidence helps focus attention on when and where an injury or illness case first occurs as a means of detecting workplace situations requiring prevention activities. Prevalence is preferable for social accounting in the sense that it indicates how health and economic activity is affected each year as the result of work-related injuries and illnesses.

20. The statistical system maintained by the US Bureau of Labor Statistics measures the incidence of new nonfatal injuries and illnesses. Consistent with the US approach, the resolution of the 16th ICLS states that "the statistics should relate to the number of cases of occupational injury occurring during the [reference] period."

21. Fatalities require special treatment. A workplace fatality may occur in a year following the year of accident or exposure. For enumeration purposes, the occurrence of each fatality could be associated either with the year of accident or exposure or with the year of death. The US Census of Fatal Occupational Injuries measures fatalities in the year of death (98 percent of all workplace injury deaths in calendar year 2000 resulted from an accident that occurred in 2000, while nearly 99 percent had accidents that occurred in either 1999 or 2000). In contrast to the US approach, the ICLS resolution states that "cases of fatal injury should be included in the statistics for the reference period during which the occupational accident occurred." Further, the ICLS resolution restricts occupational fatalities to those that arise within a year of the accident. This is a restriction that the US census does not impose.

Coverage of workers and industries

22. Clearly, it is desirable to collect data on injuries to all workers, including the self-employed, household workers, and workers in informal sectors. However, as noted above, data sources may limit the practical scope. For example, accident compensation schemes may not include self-employed or household workers.

23. The scope of the US Census of Fatal Occupational Injuries includes all civilian workers, including private wage and salary workers, self-employed and family workers, and public sector workers. In contrast, the nonfatal Survey of Occupational Injuries and Illnesses covers only private industry workers, excluding the self-employed; farms with fewer than 11 employees; private households; federal government agencies; and, for national estimates, employees in State and local government agencies. The nonfatal survey does produce estimates of injuries to State and local government workers in some states. Finally, data on injuries to Federal government workers are collected and reported by another Federal government agency.

Types of measures

24. There are a variety of measures of occupational safety and health. Some focus on the frequency of injury and illness cases, measured either as the number of cases or the number of cases per worker. Other measures focus on the severity of injuries, measured by the number of days that the injury or illness lasts.

Counts

25. Counts are tallies of the number of injuries occurring during a given time period, classified according to firm, worker, or injury case characteristics. These counts are useful in indicating where most injuries occur. The counts should refer to the number of separate injury cases. That means that if a given worker were injured twice in the reference period from two separate incidents, then two injuries should be counted. Further, if 5 workers were injured in a single incident (suppose a building under construction collapsed), then 5 separate injuries should be counted. However, if an injured worker sustains more than one injury from one accident, i.e., a fracture and a cut, then the case should only be counted once.

26. Counts are affected by the size of the population exposed to risk. For example, in the United States, the occupational grouping with the most injuries is truck drivers. But, while driving a truck is a risky profession, the fact that truck drivers sustain so many injuries partially reflects the large number of truck drivers in the US.

Rates

27. Injury rates adjust for the size of the exposed population and consequently measure the risk of injury, illness, or death. They are useful in detecting small worker populations that are exposed to high injury risks. They are calculated as the number of injuries in the reference population divided by a measure of exposure to risk to the reference population. The rates are then usually standardized for readability to measure the number of cases per 100 or 100,000 workers.

28. Typically, the measure of exposure to risk is either the employment or the hours worked of the reference population. Thus, for example, an injury rate for truck drivers could be calculated as the number of injuries in the reference period (a given calendar year, for example) divided by the total hours worked by truck drivers in the reference period (possibly multiplied by 200,000 to standardize to 100 fulltime equivalent workers working 2000 hours per year). Because some groups of workers tend to work less than fulltime, standardizing by hours is preferable to standardizing by employment, when possible.3

29. Importantly, the measure of exposure to risk almost always is a measure of labor supplied—either employment or hours worked—even though these measures do not actually refer to the amount of risk exposure in a particular situation. For example, in measuring the injury risk to truck drivers from vehicular accidents, in some circumstance it might be desirable to be able to divide highway-accident injuries by the number of hours that truck drivers are actually driving. Such information is rarely available.

30. Obtaining information on employment or hours worked for the denominator of the rates may require obtaining information from outside the source providing workplace safety and health data. The agencies that run accident compensation schemes or labor inspection programs may not have detailed information on employment or hours worked that can be classified by worker and firm characteristics. Such information may need to be obtained from another statistical program.

---

3 See Ruser (1998) for a discussion of the relative merits of using employment and hours worked in estimating fatality rates.

31. The US case is illustrative. As mentioned previously, the US obtains a census of workplace injury fatalities by collecting information from multiple sources. However the census does not obtain employment or hours worked from these sources. To the extent that the fatality census does produce rates, these are based on the Current Population Survey, a household survey that generates employment and hours worked estimates by worker demographic characteristics. The same is largely true for the US nonfatal survey. Hours data are collected only at the establishment level, permitting only the estimation of injury and illness rates by establishment characteristics such as industry and establishment size. No information is collected on hours worked by worker characteristics, so the nonfatal statistics program does not publish rates by worker traits.

Severity

32. Beyond measuring the frequency of injuries, illnesses and fatalities, another useful set of information addresses the severity of nonfatal injuries. One summary measure is the number of days that the injury lasts. This may be measured by the number of lost workdays or the number of calendar days. Measuring lost workdays indicates the economic cost associated with the loss of production on the job. But measuring lost calendar days measures the broader social cost associated with an injury, which would include lost work time, lost home production and leisure.

33. There are a variety of ways that this severity information might be displayed. One is a frequency distribution that shows the number of cases that last specific amounts of time. For example, the US data indicate that 13.9 percent of all sprains and strains last only one day out of work after the day of the injury. Another approach is to produce a measure central tendency such as the mean or median, or percentiles of the duration distribution. For example, the US data show that the median duration of a sprain and strain is 6 days away from work.

34. In addition to statistics on the duration distribution, other measures might include the total number of lost workdays for a reference population or that total divided by either hours worked or employment of the reference population.

35. Days lost from both severe injuries or injuries occurring at the end of the year might extend beyond the year that the accident or exposure first occurred. One issue that must be addressed is whether to relate all lost days back to the year when the accident or exposure occurred or whether instead to associate the lost days with the year that they are lost. The former requires attributing future days lost back to a previous year. The two measurement approaches have different purposes. Assigning days to the calendar year when they are lost is useful in measuring the amount of lost production in each year due to workplace injuries and illnesses. But, for understanding when accidents and exposures causing severe conditions occur (for example, to determine if more severe injuries occur during a business cycle upswing), all days lost should be attributed to the year when the accident or exposure occurred. The difficulty in this latter approach is that the timely production of statistics requires that an estimate of future lost workdays be attributed to long duration cases.

36. The 1998 resolution on workplace injuries passed by the ICLS recommends treating time lost from temporary and permanent injuries separately. For temporary injuries lasting a maximum of one year, statistical agencies should count the number of calendar days that an injured person is temporarily incapacitated, not including the day of the accident. Advice is also given that “time lost as a result of permanent incapacity for work or fatal occupational injuries may also be estimated.” However, the resolution does not indicate how the number of days lost for these more severe cases should be arrived at. According to the resolution, time lost is to be attributed to the year of accident.

37. The US system for measuring workplace injuries requires that all lost days be attributed to the year of the accident. Through calendar year 2001, employers were required to report the number of lost workdays. In the event that a case continued as of the time that the employer was reporting lost workdays, then the employer was required to report an estimate of lost workdays. New recordkeeping guidelines for calendar year 2002 and beyond require that employers report all days that the employee would not be able to work, even if not scheduled to work. As before, employers are required to estimate the number of days for long duration cases. But the employer does not need to report more than 180 days for any case. Under both the old and new recordkeeping guidelines, time loss data are not tabulated separately for temporary and permanent injuries, nor are estimates made for lost time due to fatalities.

38. Prior to 1992, the BLS reported on the mean and total number of lost workdays. However, a comparison of duration estimates from workers' compensation data compared to BLS estimates showed that the BLS estimates were much lower (Oleinick, 1993). This study indicated that the time estimates for long duration cases were seriously underestimated. As a result of this finding and of a redesign of the nonfatal survey, the only duration estimates now reported are the median days away from work and counts of the number of cases falling in specific duration intervals. The top interval is 31 or more days away from work. These statistics are robust to any downward bias in the estimate of long duration cases. However, it is not possible with the survey data to estimate the total number of lost workdays and hence the total social loss associated with workplace injuries.[4]

Data elements collected and tabulated

39. In order to present a complete picture of workplace injuries and illnesses, a statistical program should capture information about the employer where an injury or illness occurs, about the worker affected, and about the injury and illness case. This information should then be coded using trained coders. The coding schemes used should provide meaningful information to aid prevention and ideally should be comparable to statistical systems in other countries. Counts, rates, and measures of severity can then be tabulated according to worker, employer, and case characteristics. The resolution on occupational injuries of the 16th ICLS provides a list of data elements that should be captured, coding schemes that should be used, and tabulation that should be produced.

40. The data elements that are collected in the BLS Survey of Occupational Injuries and Illnesses come from two major parts. The first part, termed the summary data, collects totals from the surveyed establishments. Included is the total number of recordable injury and illness cases occurring in each sampled establishment in the survey year, as well as total hours worked by all workers in the establishment in the sample year. In addition to collecting the total number of recordable injury and illness cases, the total numbers of three specific types of cases are collected: non-lost-workday, restricted-workday-only, and days-away-from-work.[5]

41. The summary data are used to produce estimates of injury and illness counts and injury and illness rates per 100 fulltime equivalent workers. These counts and rates are tabulated by detailed industry (currently coded according to the US Standard Industrial Classification) and by establishment size category. Data are available in this format since 1972, though there have been some changes in industry coding and some minor changes in recordkeeping. Changes to recordkeeping rules that apply starting with

---

4 Miller and Waehrer (2000) used censored duration techniques to impute days for cases with long durations so as to arrive at the total costs of workplace injuries. Using a variety of data sources, Leigh et al. (1997) estimated that the total cost of workplace injuries, illnesses and death was $171 billion in the US in 1992.

5 Prior to 1992, the survey collected fatality counts. There are very few fatalities relative to the total number of non-fatal injuries, so there is no measurable difference between the survey estimates with and without fatalities.

reference year 2002 as well as a change from the Standard Industrial Classification (SIC) to the North American Industry Classification System (NAICS) that occur for reference year 2003 will limit the comparability of future data with data from the past.

42. In addition to summary data, responding establishments are asked to provide data on individual injury and illness cases with days away from work. These data are termed "case and demographic data." For each case, respondents provide data on the injured worker, including age, gender, occupation, length of service with the establishment and race/Hispanic ethnicity. Respondents also provide information about the specific case, including the number of days away from work and narrative information that is transformed by trained data coders into information about: the nature of the injury (for example, fracture, sprain); part of body affected; event (for example, fall, overexertion, or contact with object) and source (for example, a chemical, machinery). The US Bureau of Labor Statistics developed codes for nature, body part, event and source. The nature and body part codes are similar to codes appearing in the resolution of the ICLS. Starting with reference year 2002, the survey will also collect information on the time that the affected worker began work on the day of accident or exposure and the time of the event.

43. In the Census of Fatal Occupational Injuries, approximately 30 data elements are collected, coded, and tabulated, including information about the worker, the employer, the incident, and the machinery or equipment involved. The set of information collected here is slightly more expansive than is collected by the nonfatal survey, including additional demographic information such as country of birth and lifetime occupation and industry and additional information on case characteristics such as the worker activity at the time of the event.

II. Results from the BLS OSH data program

44. Having described the general characteristics of occupational safety and health statistics programs and having described in brief the US system, this section now turns to some findings for the US for the year 2000.

45. In calendar year 2000, there were 5.7 million recordable nonfatal workplace injury and illness cases in US private industry. The rate of cases was 6.1 per 100 equivalent full-time workers (Table 1). Further, there were 5,915 fatal work injuries among all workers, for a rate of 4.3 per 100,000 workers (Table 3).

46. Among nonfatal workplace injuries and illnesses, 1.66 million resulted in days away from work beyond the day of the incident or exposure, for a rate of 1.8 cases per 100 workers. Another 1.09 million cases resulted in restricted workdays, but no days away from work (1.2 cases per 100 workers). The remaining 2.90 million recordable cases resulted in no lost workdays beyond the day of the injury (3.2 cases per 100 workers).

47. The rate of all nonfatal cases and the rate of cases with days away from work have both been declining since the early 1990s (Chart 1). Both rates are the lowest since the Bureau of Labor Statistics began reporting this information in the early 1970s. These declining trends appear not only for the aggregation of all industries, but for individual industry groups. This suggests that the declines are not simply the result of shifting employment to safer industries.

48. In contrast to the declines documented above, the rate of cases with only restricted workdays has been increasing since the mid-1980s. The fact that the rate of days away from work cases has been declining while the rate of restricted work activity cases has increased suggests that some employers are keeping injured workers at work, but reducing their job duties or assigning them to alternative duties.

49. Among major industry groups, manufacturing has the highest total injury rate at 9.0 cases per 100 workers. However, construction has the highest rate of days away from work cases (3.2 per 100 workers). Finance insurance and real estate has the lowest injury and illness rate of all recordable cases (1.9 per 100 workers).

50. Information on the characteristics of days away from work cases indicates that sprains and strains are the predominant type of injury, comprising 43.8 percent of all disabling cases (Table 2). Bruises and contusions (9.1 percent), cuts and lacerations (7.3 percent), and fractures (7.0 percent) follow in frequency. The back was the most frequently affected part of the body, comprising nearly one-quarter of all cases. Overexertion and contact with objects and equipment were the two most prominent events leading to workplace injury. Each contributed about 27 percent of all cases.

51. The nonfatal survey indicates that among leading types of injuries, the most severe was carpal tunnel syndrome, with a median duration of 27 days away from work (Table 2). Fractures were next at 20 days and amputations were associated with 18 days. In contrast, the median duration of all injuries with days away from work was 6 days. Long duration cases were not rare, however, with 21 percent lasting 31 or more days. This suggests that the mean duration of cases, not tabulated by the Bureau of Labor Statistics, is longer than the median.

52. Fatality data have been collected since 1992. There is an indication of a slight downward trend in the number of deaths, despite an increase in employment. The average annual number of fatalities for 1995 to 1999 was 6164, while 6053 were recorded in 1999 and, as mentioned before, 5915 were recorded in 2000. Highway crashes are the leading cause of on-the-job fatalities, accounting for 1363 fatalities in calendar year 2000 or 23 percent of the total (Table 3). On-the-job falls resulted in 734 deaths (12 percent), while homicides accounted for another 677 deaths (11 percent). The number of homicides in 2000 was 37 percent lower than the high of 1080 homicides reported in 1994.

53. Despite having relatively equal shares of employment (54 percent for men versus 46 percent for women), men were far more likely to die on the job. 92 percent of all workplace fatalities were suffered by men, making a man nearly 10 times as likely as a woman to die on the job after controlling for employment shares.

54. Among industry divisions, construction had the highest number of fatalities at 1154, but its fatality rate of 12.9 per 100,000 employed was lower than that for mining (30 per 100,000 employed) and agriculture, forestry and fishing (20.9 per 100,000 employed). Consistent with the fact that the leading cause of death was highway accidents, truck drivers sustained the highest number of deaths among detailed occupations (852). Timber cutters, fishers, and airplane pilots all had fatality rates above 100 per 100,000 employed, far above the average rate of 4.3.

References

International Labour Office (1998) "Report on Meeting of Experts on Labour Statistics: Occupational Injuries", Geneva, 30 March-3 April 1998.

Leigh JP, Markowitz SB, Fahs M, Shin C, Landrigan PJ (1997) "Occupational Injury and Illness in the U.S.: Estimates of Costs, Morbidity, and Mortality" *Archives of Internal Medicine* 157: 1557-68.

Leigh JP, Markowitz SB, Fahs M, Ladrigan PJ (2000) *Costs of Occupational Injuries and Illnesses* University of Michigan Press, Ann Arbor, Michigan.

Miller TR, Waehrer GM, Leigh JP, Lawrence BA, Sheppard MA (2000) "Costs of Occupational Hazards: A Microdata Approach". Pacific Institute for Research and Evaluation, Calverton, MD. Final Report to National Institute of Occupational Safety and Health, Grant # R01/CCR312179-03.

Oleinick, A et al. (1993) "Current Methods of Estimating Severity for Occupational Injuries and Illnesses: Data from the 1986 Michigan Comprehensive Injury and Illness Database." *American Journal of Industrial Medicine* 23: 231-52.

Ruser JW (1991) "Workers' Compensation and Occupational Injuries and Illnesses." *Journal of Labor Economics* 9: 325-50.

Ruser JW (1998) "Denominator Choice in the Calculation of Workplace Fatality Rates." *American Journal of Industrial Medicine* 33: 151-6.

Ruser JW and Smith RS (1988) "The Effect of OSHA Records-Check Inspections on Reported Occupational Injuries in Manufacturing Establishments." *Journal of Risk and Uncertainty* 1 (December): 415-35.

Chart 1. Incidence rates of workplace injuries and illnesses for private industry, 1980-2000
(Rate per 100 full-time workers)

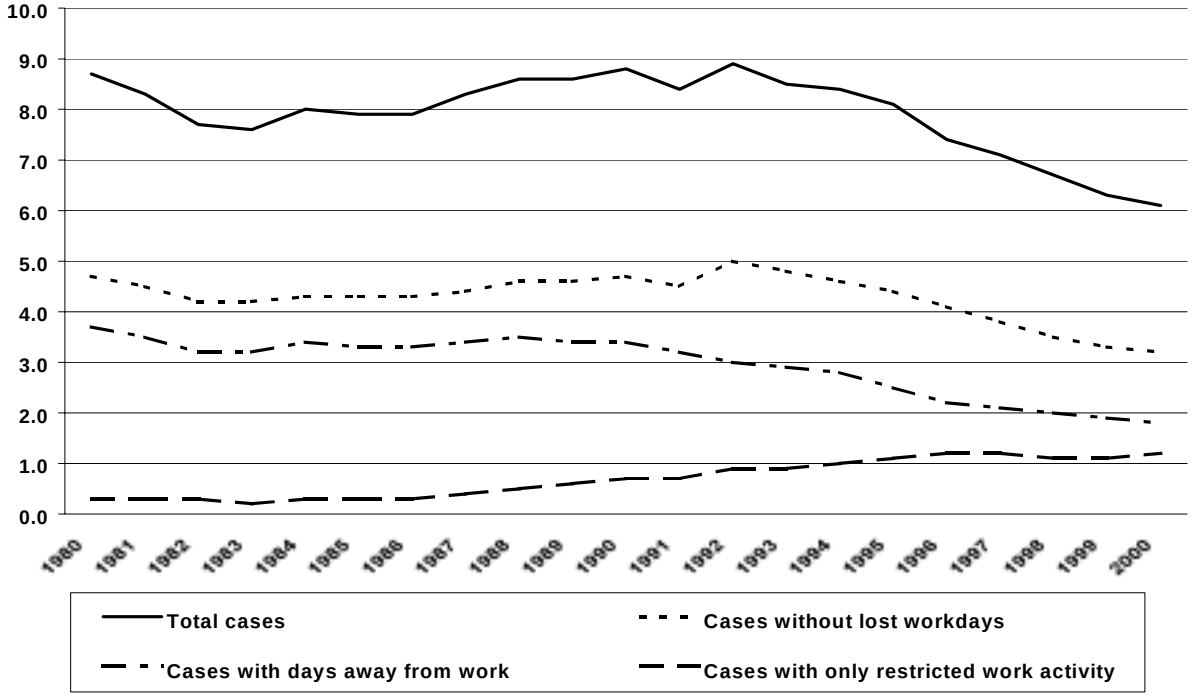

Table 1. Incidence rate per 100 workers of nonfatal injuries and illnesses by industry division, 2000

	Total cases	Cases with days away from work	Cases with only days of restricted work activity	Cases without lost workdays
Private industry	6.1	1.8	1.2	3.2
Agriculture, forestry, and fishing	7.1	2.5	1.1	3.5
Mining	4.7	2.4	0.6	1.7
Construction	8.3	3.2	0.9	4.2
Manufacturing	9.0	2.0	2.5	4.5
Durable goods	9.8	2.2	2.5	5.1
Nondurable goods	7.8	1.8	2.4	3.5
Transportation and public utilities	6.9	3.1	1.1	2.6
Wholesale and retail trade	5.9	1.7	1.0	3.3
Wholesale trade	5.8	1.9	1.2	2.7
Retail trade	5.9	1.6	0.9	3.4
Finance, insurance, and real estate	1.9	0.6	0.2	1.1
Services	4.9	1.4	0.9	2.6

Table 2. Number (in 000s), percent, and severity of injuries and illnesses with days away from work by nature, 2000

	Number	Percent	Median days away from work	Percent of cases lasting 31 or more days
Total cases	1,664.0	100.0%	6	21.0
Sprains, strains	728.2	43.8%	6	20.9
Bruises, contusions	151.7	9.1%	3	10.3
Cuts, lacerations	121.3	7.3%	3	9.0
Fractures	116.7	7.0%	20	40.1
Back pain	46.1	2.8%	7	25.4
Carpal tunnel syndrome	27.7	1.7%	27	44.9
Heat burns	24.3	1.5%	4	8.9
Tendonitis	14.4	0.9%	10	27.9
Amputations	9.7	0.6%	18	34.9
Chemical burns	9.4	0.6%	2	4.2

Table 3. Number and percent of fatal occupational injuries by event or exposure, 2000

Total	5,915	100%
Transportation incidents	2,571	43%
Highway	1,363	23%
Nonhighway (farm, industrial premises)	399	7%
Aircraft	280	5%
Worker struck by vehicle	370	6%
Assaults and violent acts	929	16%
Homicides	677	11%
Self-inflicted injuries	220	4%
Contact with objects and equipment	1,005	17%
Struck by object	570	10%
Caught in or compressed by equipment or objects	294	5%
Falls	734	12%
Exposure to harmful substances or environments	480	8%
Contact with electric current	256	4%
Fires and explosions	177	3%