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Fatal Occupational Injuries in US Industries, 1984: Comparison of Two National Surveillance Systems

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Abstract: This paper compares the results of analyses of 1984 fatalities as identified in the National Institute for Occupational Safety and Health (NIOSH) National Traumatic Occupational Fatality (NTOF) data base with those of the Bureau of Labor Statistics' Annual Survey of Occupational Injuries and Illnesses (AS) for 1984. The fatality rates for industries were similar in both analyses; however, differences in number of injuries suggest underrepresentation in the AS of fatal injuries in several, high-risk industries. Differences and similarities in methods and results between the two national surveillance systems are described and their application to research and injury prevention are discussed. (*Am J Public Health* 1988; 78:1215-1217.)

Introduction

Estimates of the number of workers killed on the job vary widely and are based on a variety of incomplete data sources.² For example, the number of traumatic occupational fatalities in 1984 was estimated at 3,740 by the Bureau of Labor Statistics,¹ 4,960 by National Center for Health Statistics,^{3*} and 11,500 by the National Safety Council.² While these discrepancies can be attributed in part to differences in methodologies and definitions, they illustrate the need for more definitive data.^{3,4} The National Institute for Occupational Safety and Health (NIOSH) has recently completed collection and analysis of five years of data on fatalities resulting from injuries at work.³ This data base, known as the National Traumatic Occupational Fatality (NTOF) system, fills a critical knowledge gap by providing an enumeration of traumatic work fatalities in the US for the years 1980-84, derived from all US death certificates.

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*Jeffery Maurer: National Center for Health Statistics, personal communication, April 16, 1987.

The Bureau of Labor Statistics (BLS) recently published 1984 and 1985 statistics on occupational fatalities from their Annual Survey of Occupational Injuries and Illnesses.¹ The 1984 occupational fatality numbers and rates from the BLS Annual Survey (AS) are compared here with those from the NIOSH NTOF and differences between the two sources are discussed.

Method

The NTOF data base comprises information obtained from death certificates of US residents who died as a result of a work-related injury. All 50 states and the District of Columbia cooperated in this project by providing death certificates for cases where: fatal injury occurred at work; the worker was at least 16 years old; and the cause of death was "external" (ICD-9th Rev. codes E800-E999). Because case identification is dependent on the knowledge and accuracy of those who fill out death certificates, some cases of fatal work injuries are probably excluded from NTOF. For example, it is suspected that occupational homicides and occupational highway fatalities may be under-enumerated due to inability or failure of persons completing death certificates to identify some homicides and highway deaths as work related. Despite limitations, the NTOF surveillance system is the most complete enumeration of fatal work injuries to date. The data base currently contains records of traumatic occupational deaths from the entire US for 1980 through 1984.

Numbers and rates of occupational fatalities by industry for 1984 are presented here for comparison with BLS data. The NTOF data base includes public sector employees; however, only private sector fatalities are reported here for consistency in comparison. To classify NTOF cases by industry, the entries on death certificates for "usual industry" were coded into division level industry categories in accordance with the Standard Industrial Classification Manual.⁵ Seventeen per cent of the cases could not be classified by industry due to inaccurate, non-specific, or missing entries. For the purpose of this comparison, the assumption is made that "usual industry", at the division level, is equivalent to industry at time of injury. The denominator for these rates was the Bureau of the Census' County Business Patterns for 1984. The 1982 Census of Agriculture

TABLE 1—US Occupational Fatalities, 1984: Comparison of NIOSH and BLS Data

Industry	NIOSH NTOF		BLS Annual Survey	
	Fatalities	Rate*	Fatalities	Rate*
Agriculture, forestry and fishing	710	18.3	110	16.3
Mining	328	33.7	370	41.4
Construction	906	21.7	660	22.8
Manufacturing	806	4.2	800	4.4
Transportation and public utilities	826	17.7	770	16.9
Wholesale and retail trade	349	1.6	440	3.1
Finance, insurance and real estate	78	1.3	80	1.9
Services	583	2.9	510	3.9
Not classified	972	—	—	—
Private Sector	5558	6.8	3740	6.4

*Rate per 100,000 workers.

was used to supplement County Business Patterns which lack data on employment in the agricultural sector. Fatality rates per 100,000 workers were calculated as: (number of fatalities/number of employees) \times 100,000.

The Bureau of Labor Statistics produces national estimates of occupational fatalities based on an annual survey of 280,000 private sector establishments with 11 or more employees. The accuracy of these figures is currently under question due to concerns of under- and over-reporting by employers in the sample.^{4,6} The BLS estimate of occupational fatalities for 1984, upon which this analysis is based, includes fatal occupational illnesses (9 per cent of the data¹) as well as injuries.

The denominator used by BLS for the calculation of fatality rates consists of the number of hours worked in 1984 by employees in private sector establishments with 11 or more employees. Therefore the exclusion of small firms is reflected in both the numerator and the denominator of fatality rates. Fatality rates per 100,000 workers are calculated in the AS as: (number of fatalities/total hours worked during year) \times 200,000,000 (base for 100,000 full time workers). Unlike NTOF, AS fatality and employment data are not disaggregated by demographic characteristics. Therefore, rates or standardization of rates by age and sex are not possible.

Results

The 1984 numbers and rates of occupational fatalities by industry published by BLS are compared in Table 1 with those determined by NIOSH. According to both data bases, the industries with the highest traumatic occupational fatality rates in 1984 were mining and construction, followed by agriculture, forestry, and fishing ranked third and transportation and public utilities ranked fourth. The rank order of fatality rates by industrial sectors was identical in both data bases. There was a notable discrepancy between the two sources in the fatality rate for mining (33.7 in NTOF versus 41.4 in AS), but differences between NTOF and AS fatality rates in other industries were negligible.

Differences between the two sources in the number of fatalities reported within industrial sectors were considered larger than were differences in rates. The largest discrepan-

cies were the far greater number of fatalities reported by NIOSH than by BLS in the agriculture, forestry, fishing industry (545 per cent greater in NTOF) and construction (37 per cent greater in NTOF).

Discussion

The BLS Annual Survey and the NIOSH NTOF projects share a common goal of describing the occupational fatality picture in the US to provide information necessary for developing prevention efforts and for targeting such efforts toward high-risk worker groups. However, quite different approaches are used to determine the number of work fatalities. This results in a number of discrepancies between the two sources of data. Methodological differences that may contribute to the discrepancies include: differences in source of information (census of death certificates versus sample of 280,000 employers); differences in definition of industry ("usual" in NTOF versus "at time of injury" in AS); unclassifiable cases in NTOF; differences in denominators (number of workers in NTOF versus number of full-time equivalent workers in AS); inclusion of occupational illness fatalities in AS (9 per cent of cases); and differences in definition of the universe population (all employed and self-employed workers in NTOF versus private sector workers in firms with 11 or more employees in AS).

The number of deaths occurring in some industries varies substantially between the sources. Agriculture and construction in particular appear to be greatly underrepresented in the BLS Annual Survey. This is likely due to the number of self-employed and small firm workers in these two particular industries that are included in NTOF but not in the Annual Survey. For example, Dunn and Bradstreet data for 1983 show that 82 per cent of agricultural establishments employ fewer than eight workers, and 69 per cent of construction firms have fewer than eight employees.^{4**} This indicates a considerable exclusion in the Annual Survey sample of firms in those industries.

The rank order of industries by fatality rate, however, is identical in both data bases. The similarity in rank order may be due to the fact that exclusion of some worker groups from the BLS data are consistent in both the numerator and the denominator of the Annual Survey rates. Mining was the only industry in which fatality rates differed substantially between NTOF and AS. Mining fatality data are provided to BLS by the Mine Safety and Health Administration and are therefore not collected in the same manner as fatality data in other industries.⁷ It may also be possible that mining fatalities reported in the AS include considerably more occupational illness fatalities (e.g., coal workers' pneumoconiosis) than other industries. The similarity between NIOSH and BLS industry-specific fatality rates and rankings lends credence to both data bases as a means of identifying industrial sectors in which workers are at a greater risk of suffering a fatal injury.

An accurate assessment of the magnitude of the occupational fatality problem should include a determination of both the rates and the numbers of work-related deaths among worker groups. To identify and effectively target cohorts with the greatest work fatality problem, we must understand not only the degree of risk (rates per number of workers) but also the number of workers affected and characteristics of the victims.

**National Institute for Occupational Safety and Health: Dunn and Bradstreet Industrial Profile, 1983. Compiled from Summary of Dunn and Bradstreet Data, 1983. Cincinnati, Ohio: NIOSH, 1983, (unpublished).

The NTOF census for 1984 indicates that, in terms of sheer numbers, work fatalities are a greater health problem in the US than the Annual Survey has indicated. Most traumatic occupational fatalities are preventable. The limited ability to identify problem areas, due to lack of adequate, detailed information, has hampered successful implementation of injury prevention efforts.

The National Traumatic Occupational Fatality data base provides a more comprehensive picture of traumatic occupational fatalities in the US workforce than previously available, by providing a census of traumatic work deaths. Even more significant is that NTOF includes, for the first time, demographic information about fatality victims. We can now begin to identify not only industrial sectors at risk, but demographic sectors as well (e.g., age, sex, occupation groups, geographic areas). The necessary information is now available for aiming injury prevention strategies at high-risk worker groups in order to reduce the staggering number of workers killed on the job.

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PREVENTION 89 Announces Call for Abstracts

PREVENTION 89, the sixth annual national disease prevention and health promotion meeting, to be held in Atlanta, Georgia, April 13-16, 1989, has issued a call for abstracts related to the meeting theme, "State of the Art." Areas for discussion will include the status of prevention policy, research, practice, professional education and training, and recent technological innovations affecting the science of prevention.

Abstracts representing the results of scientific research should address the theme or such special program topics as:

- prevention techniques used in clinical practice settings;
- AIDS (including implications of AIDS for clinical practice);
- the risk and prevention of cardiovascular disease, injuries, and suicide in the pediatric population;
- toxic substances in the community, including waste disposal;
- impact of retirement on health;
- evaluation of prevention strategies, including health education;
- disease prevention and health promotion for the homeless; and
- computer applications in disease prevention and health promotion.

Abstracts may be submitted for general sessions, presented paper sessions, demonstrations involving the use of computers, poster sessions, or workshops. A standard form for submitted abstracts is available from meeting headquarters, PREVENTION 89, 1030 15th Street, NW, Suite 410, Washington, DC 20005. Tel: 202/789-2928. The *deadline for receipt of abstracts is October 1, 1988.*