

Comparison of Two Methodologies to Measure Agricultural Occupational Fatalities

DENNIS J. MURPHY, PhD, BARBARA L. SELTZER, BSN, MHA, AND CHARLES E. YESALIS, SCD

Abstract: Agricultural occupational fatalities in Pennsylvania for the years 1985–87 were followed up. Supplemental data concerning the occupation of the deceased and circumstances of the fatal accident were obtained from a family member. The number of fatalities designated as agriculturally and occupationally related by the National Traumatic Occupational Fatality (NTOF) system was compared with the number of fatalities identified by using alternative criteria for classification of agriculturally and occupationally related fatalities. There may be nearly a 30 percent error in the NTOF method resulting in a 20 percent undercount. (*Am J Public Health* 1989; 80:198–200.)

Introduction

The National Safety Council (NSC) estimates that agricultural industry fatalities for 1984* were 46 deaths per 100,000 workers¹ while the National Institute for Occupational Safety and Health (NIOSH) estimates them at 18.36 for the same year.²

The reliability and validity of the data used to generate these estimates have been questioned. Of specific concern is that these data are derived from information on death certificates regarding usual occupation, type of business or industry, and injury at work categories.^{2–6} In agriculture, occupational work is difficult to distinguish from non-occupational work since the worksite is often the place of residence. This combination results in exposure to worksite hazards in both working and non-working situations and in both occupational and non-occupational activity.^{7–9}

Additionally, the agricultural labor force is composed in part of individuals less than 16 years of age, individuals who work in other occupations on a full-time basis, and family members and relatives who may lend a helping hand only occasionally. These labor characteristics are not normally the case in other industries. Furthermore, agricultural land is often used for recreational purposes such as hunting, swimming,

riding, etc, and for both non-occupational and occupational work. Lastly, differing methodologies are used to record and classify agricultural fatalities by the NSC and NIOSH.^{1,2}

This paper compares the number of fatalities designated as both agricultural and occupational by the National Traumatic Occupational Fatality (NTOF) system, a system developed by NIOSH, with the number of fatalities identified by using alternative criteria for classification.

Methods

NIOSH developed the NTOF classification system to monitor occupational fatalities for all industrial sectors in the United States, including agriculture. The NTOF system collects and analyzes data on traumatic occupational fatalities using information from death certificates recorded by vital statistics reporting units in all 50 states and the District of Columbia.² These selected death certificates are then coded for the “usual industry” of the victim by divisional level industry categories listed in the Standard Industrial Classification Manual.^{2,10} The assumption is made that “usual industry” at the divisional level is a proxy for the occupation engaged in at the time of the fatality. The number of death certificates coded into the agricultural industry are then considered agricultural occupational fatality cases.

We obtained copies of all death certificates for the years 1985–87 that indicated deaths that were accidental, and included “farm” or “agriculture” in any category (N = 141) from the Pennsylvania Department of Health, Division of Health Statistics and Research. For the same time period, a clipping service forwarded all newspaper accounts of farm and agricultural accidents and fatalities occurring in Pennsylvania.

The sample of fatality cases was reduced to 100 since only the death certificates that could be matched with a newspaper clipping containing the name and address of the deceased member’s family were used. Of these 100 fatalities, 66 (66 percent) individuals from families of the deceased agreed to participate in the study. This group will hereafter be referred to as the supplemental data group.

A family member, usually a spouse, parent, or child of the deceased, was contacted by either telephone or mail to obtain supplemental data on the deceased’s primary or usual occupation, secondary or part-time occupation, and the relationship between the activity at the time of the fatality and the deceased’s primary or secondary occupation, non-occupational work, recreational pursuits, or other activities. The terms “primary or usual occupation” and “secondary or part-time occupation” were not further defined to the individuals questioned. Further information on the methodology

Address reprint requests to Dennis J. Murphy, PhD, Associate Professor, Agriculture Engineering, Pennsylvania State University, 221 Agricultural Engineering Building, University Park, PA 16802. Ms. Seltzer is Research Assistant in that department at the University; Dr. Yesalis is Professor, Health Policy and Administration, and Exercise and Sport Science, at Penn State. This paper, submitted to the *Journal* March 13, 1989, was revised and accepted for publication June 26, 1989.

*The agricultural industry, as defined by Standard Industrial Classification (SIC) codes 01 through 09 includes production agriculture (farms, ranches, commercial orchards, truck gardens, etc.), various agricultural services, commercial hunting and fishing, and forestry, excluding logging.

used to collect the supplemental data are detailed elsewhere.**

The alternative criteria for designating an agricultural occupational fatality included cases whose victims were:

- engaged in a work activity related to *either* their primary or secondary occupation of agriculture at the time of the fatality,
- under the age of 16 and engaged in a farm work activity, or
- under the age of 16 and injured by exposure to an agricultural worksite hazard although not engaged in an agricultural work activity.

Results

Our alternative criteria and the supplemental data were used as one data source when comparisons, explained below, were made. Because of the single data source, the effect of the alternative criteria and the supplemental information cannot be separated in this analysis. Table 1 compares characteristics of three groups: cases with supplemental data, cases that did not respond to our survey, and cases for which there was no match with a newspaper clipping. There are no differences between the 66 cases followed up and the other two groups.

Twenty-six of the 66 cases (39 percent) were identified by the NTOF criteria as agricultural occupational fatalities; the remaining 40 cases (61 percent) were excluded. Using the alternative criteria and supplemental information, 39 of the 66 cases (59 percent) were classified as agricultural occupational fatalities; the remaining 27 cases (41 percent) were excluded.

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TABLE 1—A Comparison of Selected Variables between the Supplemental Data Group and the Non-response and Death Certificate Only Groups

Variables Compared	Groups		
	Supplemental Data Group (%)	Non-response Group (%)	Death Certificate Only Group (%)
Sex			
Male	63 (95)	33 (97)	35 (85)
Female	3 (5)	1 (3)	6 (15)
Age (years)			
Under 16	9 (14)	8 (24)	7 (17)
16 or over	57 (86)	26 (76)	34 (83)
Time of death			
AM	22 (33)	6 (18)	9 (22)
PM	44 (67)	27 (79)	31 (76)
Unknown	—	1 (3)	1 (2)
Injury at work			
Yes	31 (47)	19 (56)	13 (32)
No	28 (42)	14 (41)	25 (61)
Blank	7 (11)	1 (3)	3 (7)
Accidental injury			
Yes	63 (95)	31 (91)	40 (98)
No	—	1 (3)	—
Blank	3 (5)	2 (6)	1 (2)
Medical examiner			
Yes	56 (85)	30 (88)	35 (85)
No	4 (6)	2 (6)	3 (7)
Blank	6 (9)	2 (6)	3 (7)
Autopsy			
Yes	22 (33)	12 (35)	16 (39)
No	42 (64)	20 (59)	24 (59)
Blank	2 (3)	2 (6)	1 (2)

Of the 26 cases designated by NTOF as agricultural occupational fatalities, 3 (12 percent) were found to be non-agricultural occupational; the misclassification was due to relying on "usual industry" as a proxy for the occupation engaged in at the time of the fatality.

Sixteen of the 40 cases (40 percent) excluded by the NTOF criteria should have been classified as agricultural occupational fatalities. There were three reasons why these cases were missed by NTOF:

- In three cases, the "injury at work" category on the death certificate was either marked "no" or left blank.
- In seven cases, the fatality was from the secondary occupation of agriculture and secondary occupations are not listed on the death certificate.
- In six cases, the victim was under the age of 16 and was involved in farm work or was fatally injured from exposure to a worksite hazard.

Of the agricultural occupational cases NTOF did identify, three should *not* have been included. This means 19 of 66 cases were misclassified. However, because 16 cases were undercounted and three cases were overcounted, the net error was an undercount of 13 (20 percent) agricultural occupational fatalities.

The 27 cases that were excluded by our alternative criteria and supplemental data were examined to determine the specific reasons for their exclusion. These cases fell into four groups (Table 2) and are clearly non-agricultural and/or non-occupational.

Discussion

Our research suggests that there may be nearly a 30 percent error in the NTOF method for designating agricultural occupational fatalities which resulted in a 20 percent undercount of these fatalities. This error is due to problems of incomplete and inaccurate information on the death certificates, NTOF's limiting criteria for inclusion as an agricultural occupational fatality case, and the use of "usual industry" as a proxy for work engaged in at the time of the fatality.

Adjusting the NIOSH estimate (18.36 per 100,000 workers) upwards by 20 percent still leaves their estimate well short of the National Safety Council estimate (46 per 100,000 workers). There are at least two possible explanations for the remaining difference. One reason may be the different denominators each used. NIOSH used Census Bureau data for their denominator,² while the NSC used Bureau of Labor Statistics data.¹

A second reason is that the NSC estimate may include some cases similar to the 27 cases that were excluded by our alternative criteria and supplemental data (we found 15 cases that involved non-occupational work). Death certificates do not differentiate

TABLE 2—Supplemental Data Group Identification of the 27 Non-agricultural Occupational Fatalities

	Number
Non-Occupational Work	15
Recreational	4
Underlying Medical Condition	5
Operator/Passenger in a Licensed Motor Vehicle*	3
Total	27

*A fatality where the victim was an operator or passenger in a licensed motor vehicle and was involved in a collision with agricultural machinery, livestock, or other agricultural hazard. A public roadway accident is the primary example.

between occupational and non-occupational work, but unless supplemental data are collected, it is difficult to differentiate these fatalities. Differentiating fatal work accidents that are both agriculturally and occupationally related from those that are simply work related or that happen to occur on a farm or in a rural area is critical if agriculture, as an occupation, is to be fairly and accurately compared with other occupations.

The supplemental data collected in this study have additional benefits besides helping to more accurately identify agricultural occupational fatalities. This information can also yield information on non-occupational related injury and health problems. The Cooperative Extension, which has responsibility for farm and home safety education, can use this information to guide safety education and injury prevention activities. Yet another benefit is to assist state agencies to appropriately allocate resources for injury prevention.

The agricultural industry's unique workforce and workplace characteristics pose a greater challenge than most other industries for the tracking of its occupational work fatalities. The NTOF system is a good start for enumerating fatal agricultural occupational work cases at the national level and it is replicable for a single industry at the state level. This allows those interested in single industry state level data to conduct follow-up studies such as we have reported. These state studies can be used as a basis for state statistics, and for adjusting particular industry totals at the national level.

This study should be replicated in several states to better

quantify errors of both the NTOF system for agriculture, and non-occupational fatal injuries in agriculture.

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Use of OSHA Inspections Data for Fatal Occupational Injury Surveillance in New Jersey

MARTHA STANBURY, MSPH, AND MARCIA GOLDOFT, MD, MPH

Abstract: Occupational Safety and Health Administration (OSHA) computerized inspections data, death certificates, and medical examiner records identified 204 fatal occupational injuries in New Jersey, 1984-85. OSHA computerized data uniquely identified seven cases. They did not identify 35 fatalities under OSHA's jurisdiction, of which 24 were investigated by OSHA but not recorded, four were not considered work-related, and seven were not known to OSHA. Eighty-seven were outside OSHA's jurisdiction; 28 were among the self-employed who are not under the health and safety protection of any governmental agency. (*Am J Public Health* 1990; 80:200-202.)

Introduction

Surveillance data for fatal occupational injuries have been compiled in several states.¹⁻⁵ These data systems are based largely on death certificates, but are usually supplemented by

one or more sources of data such as workers' compensation reports and medical examiner reports. Each source independently captures some fraction of cases. Another potential source of data for surveillance systems is data from occupational fatality investigations carried out by the Occupational Safety and Health Administration (OSHA). Investigation data are maintained in a computer database, OSHA's Integrated Management Information System (IMIS).

We examined the usefulness and completeness of these OSHA inspection data for New Jersey's fatal occupational injury surveillance system. The objectives were to determine: whether OSHA investigation data identified cases not captured on death certificates or medical examiners' records; and whether OSHA investigation data were available for all work-related deaths within OSHA jurisdiction that were identified from other data sources in the surveillance system.

Methods

Unintentional occupational fatalities were ascertained for calendar years 1984-85. A fatal occupational injury was defined as a death resulting from an unintentional workplace injury. New Jersey cases were identified from the New Jersey computerized death certificate file by a code that indicated unintentional injury at work and from medical examiner records by manually sorting through reports in the state medical examiner's office. Cases from each source were then merged into one computerized file by matching on the name of deceased.

From the New Jersey Department of Health, Division of Occupational and Environmental Health. Address reprint requests to Martha Stanbury, MSPH, Program Manager, Occupational Epidemiology Program, Division of Occupational and Environmental Health, New Jersey State Department of Health, CN360, Trenton, NJ 08625-0360. Dr. Goldoft is Research Scientist, Environmental Health Service. This paper, submitted to the *Journal* June 5, 1989, was revised and accepted for publication August 3, 1989.

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