

Occupational Fatalities in Kentucky — 1994

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In Kentucky, seven out of nine industry groups exceed the national average fatality rates; in 1994, the agriculture/forestry/fishing industry rate of 80/100,000 was more than three times the national average. This paper describes the occupational fatality data collected during the first year of operation (1994) of the Fatality Assessment and Control Evaluation (FACE) Project in Kentucky. Investigators used multiple reporting sources to identify incidents, which were then systematically recorded and updated. On-site investigations were conducted for certain categories of fatalities. One hundred sixty-six occupational fatalities were recorded for 1994. Motor vehicle incidents were the most common cause of death, followed by machine-related incidents. Ages of victims ranged from 15 to 86 with a median of 46. Investigators completed 22 on-site visits during the period. In this article, descriptive statistics are presented, as well as suggestions for ways the medical community might contribute to the occupational fatality prevention effort.

Background

Nationally, one-sixth of all injury deaths occur on the job.¹ On average, 17 workers die each day in the United States. Between 1980 and 1989 the average annual occupational fatality rate for the US civilian labor force was 7/100,000²; Kentucky's rate is 9/100,000 (FACE data 1994). In Kentucky, 166 workers were killed on the job in 1994. Our occupational fatality rate exceeds all contiguous states except West Virginia.³

One of the Centers for Disease Control's national objectives is to reduce the annual occupational death rate to no more than 4/100,000 by the year 2000.⁴ Clearly it will take a concerted effort from physicians, public health officials, labor force representatives, researchers, and educators to achieve this goal in Kentucky.

To prevent and control occupational injury deaths we must precisely describe who is fatally injured at work, in what industry, and by what cause. A partnership of the Kentucky Department for Public Health and the University of Kentucky Chandler Medical Center has created the Kentucky Injury Prevention and Research Center. One element of the Injury Center's Occupational Injury Prevention Program is the Fatality Assessment and Control Evaluation (FACE) Project, which uses surveillance data and comprehensive case investigations in order to develop injury prevention strategies. Kentucky is one of 14 states participating in this project, which is funded by the National Institute for Occupational Safety and Health (NIOSH).

The objectives of the FACE Project are to:

- conduct surveillance of all occupational deaths;
- identify work situations at high risk for fatal injury;
- evaluate causal factors for targeted categories of fatal injuries; and,
- formulate and disseminate prevention strategies to those who can intervene in the workplace.

The on-site investigations and prevention strategy development of the FACE Project go beyond other surveillance programs in working toward reduction of occupational fatalities in Kentucky. This paper describes the data collected during the first year of the project's operation.

Methods

An occupational fatality was defined as a death that occurs while an individual is working. Standardized criteria established by the Association for Vital Records and Health Statistics (AVRHS)^{2,3,5} were used to define the concept of work:

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Operational Guidelines for Determination of Injury at WorkCriteria when on employer premises:

- Engaged in work activity, apprentice, vocational training
- On break; in hallways, restroom, cafeteria, storage area
- In employer parking lot while working, arriving or leaving

Criteria when not on employer premises:

- Working for pay or compensation, including at home
- Working as a volunteer EMS, firefighter or law enforcement officer
- Working in family business, including family farm (Activity should be clearly related to a profit-oriented business.)
- Traveling on business, including to and from customer/business contacts (excludes commuting)
- Engaged in work activity where vehicle is considered the work environment

Heart attack deaths which occur on the job are not included unless the medical examiner's report or autopsy indicates that the heart attack was due to overexertion or trauma. Cases in which death occurred in another state were included if the injury occurred in Kentucky.

Investigators used multiple reporting sources to identify occupational fatalities in Kentucky during a 1-year period beginning January 1, 1994. Sources included county coroners, the Occupational Health Nurses in Agricultural Communities (OHNAC) Project,[†] emergency medical personnel, Kentucky Labor Cabinet's Census of Fatal Occupational Injuries (CFOI),[‡] Kentucky State Police's Fatal Accident Reporting System (FARS),^{‡‡} Kentucky Vital Statistics Registrar, newspapers, and radio and television news reporters.

Trained data coordinators maintained electronic and paper copies of accumulated data. Data were entered into EPI INFO, a word processing, data base and statistics program designed specifically for epidemiological purposes.⁶ Data entered included demographics and all necessary information to describe the incident, but excluded any personal identifiers such as name of decedent or employer. Information describing the occupation⁷ and industry⁸ of the decedent, as well as the type of injury,⁹ was coded for entry into the data base.

An industrial hygienist conducted on-site investigations for selected categories of fatalities. (In 1994 these categories, which are determined by NIOSH, were electrocutions, falls, machine-related, and confined-space deaths.) Twenty-two case investigations were completed during the period of this study. In these instances the investigator traveled to the scene to photograph and measure the area (eg, slope, distance, opening, height). Interviews with the county coroner and any witnesses, employers, family members, law enforcement personnel, or others involved with the case were conducted. The investigator developed prevention strategies after reviewing the circumstances prior to, during, and after the event. Copies of a narrative which included these prevention recommendations were mailed to all parties involved in the investigation. Twice during the year copies of all such reports were also mailed to health and safety professionals, physicians, researchers, agricultural extension agents, and others who were in a position to effect workplace change.

Results

In 1994, KY FACE identified 166 occupational fatalities, an average of more than three per week. Ninety-two percent of these deaths were males ($n = 153$), although men make up only 58% of the part- and full-time work force.¹⁰ Of the 13 females (8%) killed on the job, eight (62%) worked in a service industry, two in agriculture, and one each in construction, retail trade, and manufacturing. The median age of females (29) was significantly lower than that of males (47). The leading cause of female fatalities was homicide (8). Females made up 54% of the work-related homicide fatalities in Kentucky.

The decedents were primarily white (93.3%) and ranged in age from 15 to 86. Age groups accounting for the most fatalities were 30-39 years (25.3%) and 50-59 years (22.8%) (See Fig 1); nearly half of all deaths of those over age 50 were among farmers. Monthly distribution of the fatalities is shown in Fig 2; over one-third occurred in July, August, and September. On a per-day basis, April had the lowest rate.

KY FACE identified over half (56.6%) of the occupational fatalities within 1 week of death and 45.8% within 2 days, providing the opportunity to obtain additional information in a timely manner. Nearly all of the workers (89.8%) died within 1 day of the incident; another 4.8% died within 1

week. CFOI (n = 40) and newspapers (n = 33) were two primary sources of initial notification of incidents.

The industry for each worker at the time of death was classified using the Standard Industrial Classification (SIC) Manual 1987.⁶ The number of fatalities per industry and industry-specific death rates are shown in Table 1. As shown in Fig 3, the highest number of fatalities occurred in the agriculture/forestry/fishing industry (n = 47). Further industry division reveals that 45 of those deaths occurred in agricultural incidents, accounting for 27.1% of the total number of fatalities in Kentucky. Of the 22 deaths in the manufacturing industry, over half (54.5%) occurred in logging operations.

With respect to occupations, farming/forestry/fishing, which includes both agricultural and logging occupations (see Fig 4), accounted for more than one-third (34.9%) of all work-related deaths in 1994. Twenty-four workers were killed while doing work that was not their usual occupation. Of those, 17 were fatally injured while engaged in farming activities.

External causes of death are shown in Fig 5. Motor vehicle incidents were the most frequent cause (28.3%), followed by machine-related incidents (24.1%). It is important to note that the motor vehicle category includes farmers killed while traveling during the course of their work, but that, for this analysis, all incidents involving tractors were classified as machine-related. Of the 40 machine-related incidents, 29 (72.5%) involved agricultural machinery, with the most common type being tractors. Of the 28 tractor-related deaths, 23 were caused by tractor rollovers.

Investigators analyzed information from 153 completed death certificates. When available, education, marital status, whether an autopsy was performed, and the "injury at work" response were recorded. Of the 109 which included education information, education ranged from 3 to 17 years; 70 (64%) of the 109 had a high school education or more. Of the 152 with marital status recorded, 70% of the decedents were married, 14% never married, 12% divorced, and the remaining widowed. Of the 152 with autopsy information, 48% indicated that an autopsy had been performed. Fifteen percent (n = 23) of the 153 erroneously indicated that death was not the result of an injury at work; six were left blank.

Twenty-two on-site investigations were conducted in 21 Kentucky counties during 1994.

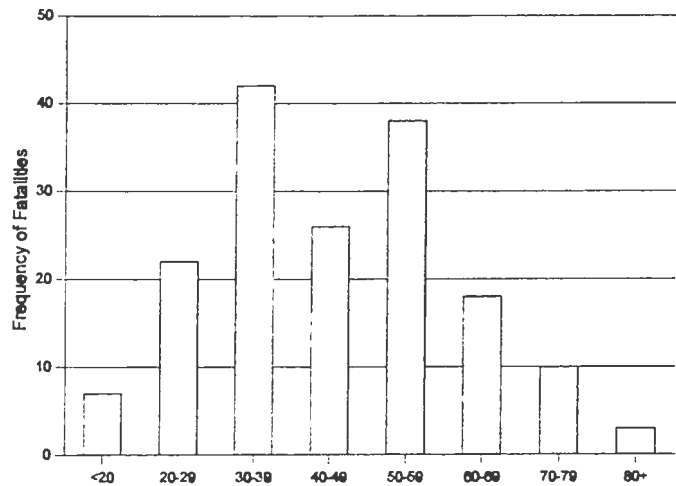


Fig 1 — Fatalities by Age Group.

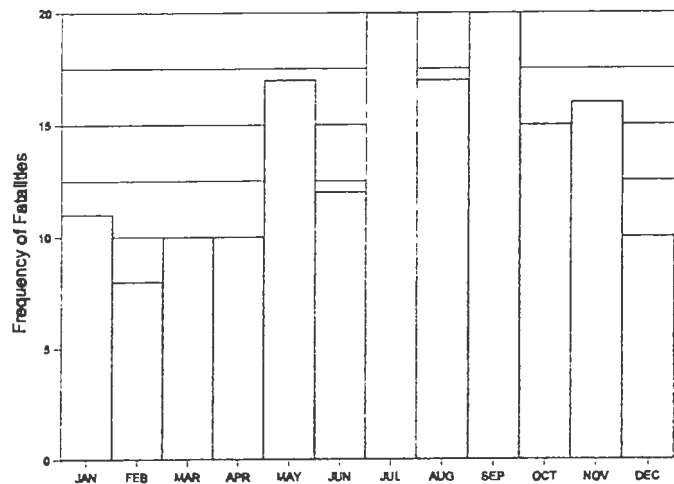


Fig 2 — Fatalities per Month.

Table 1. Occupational Fatalities in Kentucky by Industry, 1994. (Rates calculated per 100,000 workers^a)

Industry ^b	(n)	KY Rate	US Rate ^c
Agriculture/Forestry/Fishing	47 (28.3%)	80	26
Construction	25 (15.0%)	26	14
Manufacturing	22 (13.3%)	7	4
Transportation/Public Utilities	22 (13.3%)	22	13
Services	16 (9.6%)	5	2
Retail/Wholesale Trade	12 (7.2%)	4	5
Mining	11 (6.6%)	32	26
Public Administration	8 (4.8%)	3	3
Finance/Insurance/Real Estate	3 (1.8%)	4	2
Totals	166 (100.0%)	9	5

^a Labor force census obtained from Geographic Profile of Employment and Unemployment, 1993 US Department of Labor Statistics, September 1994, Bulletin 2446.

^b Office of Management and Budget. Standard Industrial Classification Manual. 1987. Springfield, VA: National Technical Information Service. (NTIS No. PB 87-100012.)

^c Monthly Labor Review, October 1994, Fatal Occupational Injuries by Industry and Event or Exposure, 1993. Census of Fatal Occupational Injuries, 1993.

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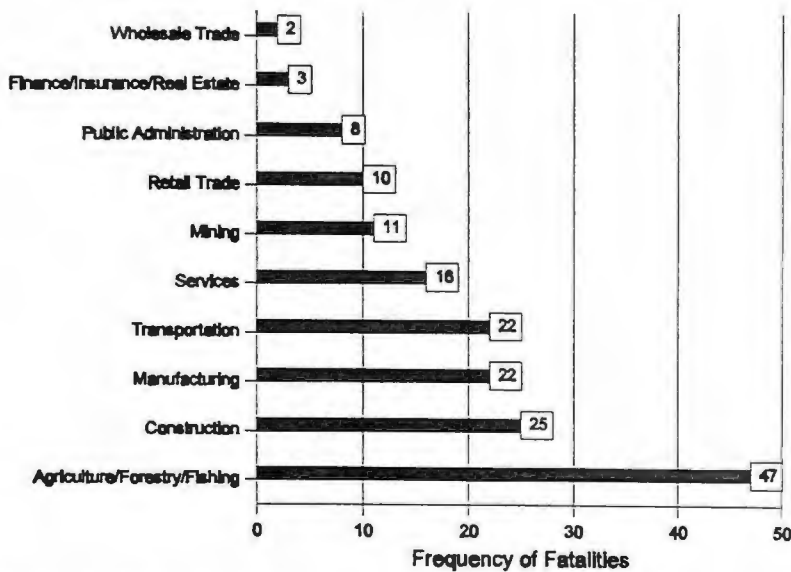


Fig 3 — Fatalities by Industry.

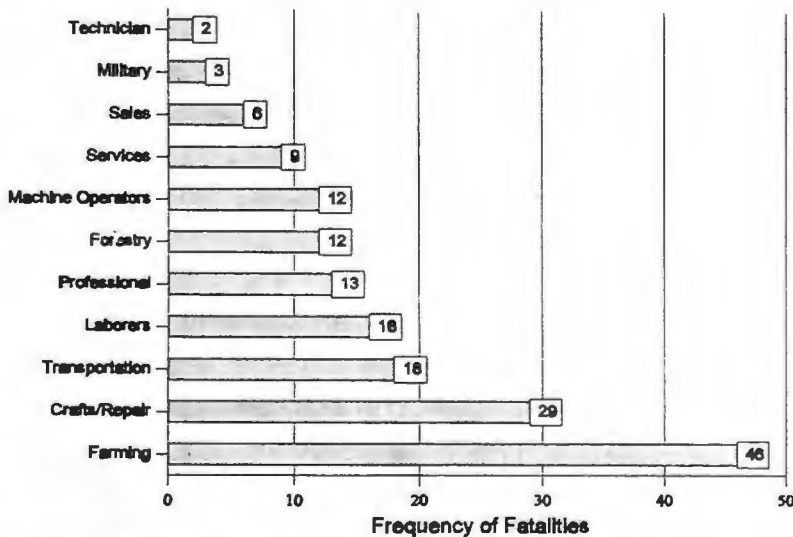


Fig 4 — Fatalities by Occupation.

These included 20 machine-related incidents (18 farm, 1 logging, 1 other) and two falls. Twenty-four different recommendations were made for prevention of similar incidents. These recommendations included mechanical modifications of equipment, safety training, and installation of operator protective devices, as well as suggestions

for improved emergency response systems. More than 470 copies of these reports were disseminated during the year.

Discussion

When compared to US rates, Kentucky has a higher death rate in seven of nine industry classifications as well as a higher total rate for all workers. (See Table 1.) Most striking is the rate found in the industry of agriculture/forestry/fishing where there were 80 deaths per 100,000 workers, which is three times higher than the US rate of 26 per 100,000 workers. FACE data suggest three likely reasons for this. First, bi-vocational farmers (those who work other jobs in addition to farming) accounted for one-third of the agricultural deaths. Individuals who identify an industry other than agriculture as their primary one might not be included in an agricultural census count. As well, such individuals may be at higher risk due to longer working hours, lack of experience and/or training, and the increased stress that results from time constraints. Second, the median age of the 42 agricultural workers was 60.5, whereas the median age in all other industries was 39, suggesting an older workforce and consequent increased risk.¹¹ Third, investigators found a number of older model tractors with minimally operable brakes. Average tractor age involved in the incidents was 25 years, whereas for the US the average tractor age was 22.8 years.¹² In 23 tractor rollover cases, the fatalities might have been prevented if the tractors had been fitted with rollover protective structures (ROPS) and seatbelts.¹³

Alternatively, it is possible that some portion of Kentucky's high agricultural fatality rate could be accounted for by differences in case identification and reporting. For example, FACE investigators confirmed an occupational relationship in 23 cases where the death certificates had negative responses to the "injury at work" question. Seventy percent ($n = 16$) of these were in the agricultural industry. This is higher than found by other researchers in farming.¹¹ Of the 70%, nine held other jobs in addition to farming, three were retired but continued to farm, and four were full-time farmers.

Kentucky's second-highest rate for 1994 was in the construction industry. This rate also exceeded the national. Causes included motor vehicles ($n = 6$), falls ($n = 6$), and electrocutions ($n = 4$). The manufacturing industry rate, nearly dou-

ble the national rate, was largely due to the inclusion of logging operations, where 12 workers were killed. The transportation, communications, and public utilities industry's death rate exceeded the national rate as well; 64% of these resulted from motor vehicle incidents.

This study has a number of limitations. First, resources were not available to complete on-site investigations of all occupational fatalities. Only 38.6% of those identified as electrocutions, falls, machine-related, and confined-space deaths were investigated; this represents only 13.3% of all 1994 occupational fatalities. Second, the difficulty of calculating an exposure period in order to determine risk factors, particularly in the agricultural setting where work hours are not clearly defined, limits more definitive conclusions. Third, long-term behaviors, attitudes, and cultural patterns were not addressed in determining causal factors.

Conclusions and Recommendations

With ongoing and systematic collection, analysis, and interpretation of statewide occupational fatality data, researchers and public health practitioners can plan, implement, and evaluate public health interventions. FACE investigations go beyond this traditional surveillance system. Using the host, energy agent, and environment model in a time sequence (pre-event, event, post-event), FACE findings not only illuminate who is being killed, by what means and where, but offer specific recommendations for preventing similar types of fatalities.

The effort to reduce Kentucky's high occupational fatality rate can and should involve the medical community. Toward this end, three recommendations are suggested. First, all physicians need to be aware of the high occupational fatality rate in Kentucky and use every opportunity to advocate safe work practices with their patients. Second, primary care physicians should take an occupational history from all patients. Third, physicians should offer prevention information such as a suggestion to install ROPS and seatbelts when an occupational history reveals tractor operation.

Areas for further research aimed at reduction of occupational fatalities should include evaluation of FACE recommendations made, in-depth analysis of the psychosocial and socioeconomic factors which might contribute to increased risk, sensitivity analysis of death certificates as a mechanism to identify work-related deaths, and factors

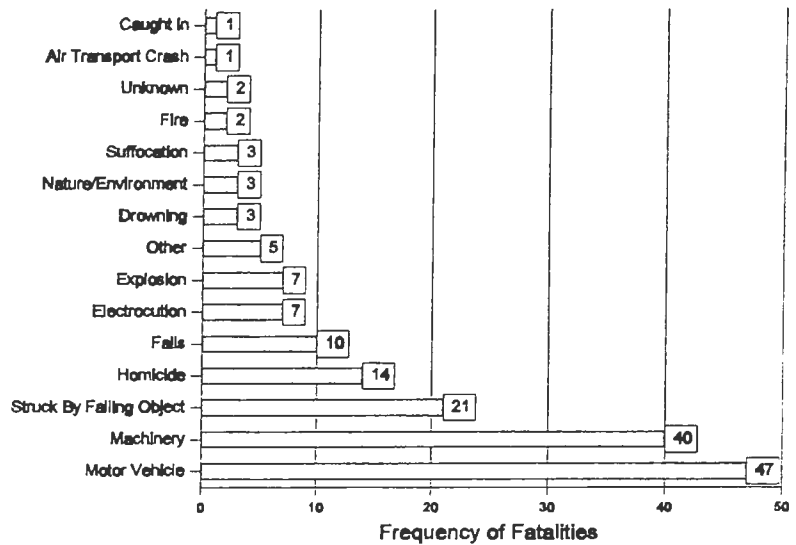


Fig 5 — Occupational Fatalities by Cause.

associated with violence against women in the workplace.

Endnotes

† The Occupational Health Nurses in Agricultural Communities (OHNAC) Project is a NIOSH-funded agricultural injury surveillance program in nine Kentucky counties. Registered nurses collect and record case reports on fatal and non-fatal injuries which occur on a farm or in an agricultural setting. The program has been active since 1992 and is administered by the Kentucky Injury Prevention and Research Center's Occupational Injury Prevention Program.

‡ The Census of Fatal Occupational Injuries (CFOI) is a national surveillance system of occupational fatalities administered by the Kentucky Labor Cabinet, Department of Workplace Standards, in cooperation with the US Department of Labor, Bureau of Labor Statistics.

‡‡ The Fatal Accident Reporting System (FARS) is a national reporting system of fatal injuries occurring on public roadways, administered by the Kentucky State Police.

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