

Identification and Characterization of Kentucky Self-Employed Occupational Injury Fatalities Using Multiple Sources, 1995–2004

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Background Identification and characterization of occupational injury fatalities in self-employed workers typically relies on a single data source and thus may miss some cases.

Methods Kentucky self-employed worker injury fatalities were identified using Fatality Assessment and Control Evaluation (FACE) program data (1995–2004) and compared to non self-employed worker data. Occupations and industries listed on death certificates were compared to those in which the decedent was actually engaged.

Results Of 1,281 Kentucky worker injury deaths, 28% were self-employed. Death certificates failed to identify 31% of these deaths as work-related; industry and occupation were incorrectly identified in 27% and 16%, respectively. Fifty-seven percent of the deaths were in agriculture, primarily tractor-related. For Kentucky, the self-employed crude death rate was higher (27.6/100,000) than the non self-employed worker (5.4/100,000) rate or the US (11.5/100,000) self-employed rate.

Conclusions Multiple information sources improve identification of self-employed status in work-related injury fatalities. Effective prevention requires accurate surveillance and examination of contributing factors. Self-employed worker injuries in high-risk industries should be more fully examined for development of effective injury prevention programs. *Am. J. Ind. Med.* 49:1005–1012, 2006. © 2006 Wiley-Liss, Inc.

KEY WORDS: self-employed; fatality rates; agricultural industry; older workers

INTRODUCTION

Self-employment is an economic sector that has grown in recent years and self-employed workers may be at increased risk for death compared to private-sector workers [Mutaner et al., 2004]. Self-employed workers usually work long hours, are at increased risk for occupational injuries, and are older, either in their primary career or in self-employment

status after retirement [Hungerford et al., 2001–2002; Pegula, 2004]. Nationwide, self-employed workers comprise 10% of the total employed workforce [US Census Bureau, Census, 2000] but account for 19% of all worker deaths [Bureau of Labor Statistics, 2002]. Kentucky self-employed workers also comprise 10% of the total employed workforce [US Census Bureau, Census, 2000] but accounted for 25% of Kentucky worker deaths in 2004 and 29% in 2002.

The identification of self-employed worker deaths due to external causes of injury has been primarily through medical examiner reports alone [Mirabelli et al., 2003] or combined with only one other source such as workers' compensation reports as in the case of Census of Fatal Occupational Injuries (CFOI) data [Pegula, 2004]. While these sources provide essential information regarding the demographic and work-related factors contributing to an occupational fatality as well as an estimate of the occupational fatality rate for self-employed workers, the data used to produce CFOI

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self-employed fatality estimates may not provide a comprehensive examination of self-employed fatalities because of the intrinsic difficulty of ascertaining self-employed status.

The Kentucky Fatality Assessment and Control Evaluation (FACE) program conducts surveillance of all work-related deaths in Kentucky and performs on-site evaluations of targeted fatality incidents in order to develop injury prevention information and disseminate it to similar industries and occupations. The Kentucky FACE program was initiated in 1994 and contains a comprehensive database of risk factor variables that contribute to occupational fatalities. Case identification is based on a number of source documents similar to the CFOI program that include newspapers, coroner reports, medical examiner reports, death certificates, copies of Occupational Safety and Health Administration (OSHA) Form 36 submitted to the Kentucky Department of Labor, and Kentucky State Police electronic data. Personal interviews are conducted with coroners or medical examiners when needed to verify information on self-employment status and other variables of interest.

Occupational injuries include unintentional trauma (e.g., falls, and motor vehicle injuries) and intentional injuries at the work site such as homicides and suicides (National Center for Injury Prevention and Control). FACE data do not include cases where a medical condition such as a heart attack contributed to a worker death unless the medical condition that caused the injury death was a direct result of a work-related exposure. The occupation and industry information provided by death certificates contains the "usual industry" and "usual occupation" rather than the occupation and industry in which the decedent was actually engaged in at the time of death due to external injury. In contrast, the occupation and industry coded by the FACE program are based on the type of work performed at the time of the fatal occupational injury.

This study uses FACE program data to identify and analyze the work-related and demographic characteristics of Kentucky self-employed worker deaths due to external causes of injury and compare them to Kentucky and US non self-employed (private industry and government employees') traumatic injury fatalities. In addition, the usual occupation and industry listed on the death certificate were compared to the occupation and industry in which the decedent was engaged at the time of death as coded in the FACE database after reviewing all source documents and conducting phone interviews with coroners, medical examiners, or funeral directors.

MATERIALS AND METHODS

The Kentucky FACE program data files for the period 1994–2003 include all workers who were on the job at death within Kentucky's boundaries. If the fatal work injury occurred outside Kentucky but the death occurred in

Kentucky (e.g., during emergency transport or hospitalization), the case would not be included in the dataset. Inclusion criteria for a fatal occupational injury on employer premises included: engaged in work activity, apprentice, or vocational training; on break; and in employer parking lots while working, arriving, or leaving. An employee not on work premises is considered at work when working for pay or compensation, including at home; working as a volunteer EMS, firefighter or law enforcement officer; working in a family business including a family farm if it is a profit-oriented business; traveling on business including to and from customer/business contacts; and when engaged in a work activity where the vehicle is considered the work environment. A person is not considered working if they are a homemaker working at homemaking activities; working for self non-profit (e.g., mowing lawn); a student engaged in school activities; operating a vehicle for non-profit purposes; and commuting to or from the work site. The determination of work-relatedness was jointly developed by the Association for Vital Records and Health Statistics, the National Institute for Occupational Safety and Health, the National Center for Health Statistics, and the National Center for Environmental Health and Injury Control [Higgins et al., 2000]. This study is part of the broad spectrum of the FACE program which is approved by the University of Kentucky and Cabinet for Health and Family Services' Institutional Review Boards.

Self-employment was defined as working for profit or fees in the worker's own business, profession, trade, or farm (Bureau of Labor Statistics). Self-employed status was determined upon examination of all source documents and if there was a questionable case, status was verified in phone conversations with local coroners, medical examiners, or funeral home directors. Self-employment was coded as "yes" or "no" when the case was initially entered in the FACE database. The industry and occupation engaged in by the worker at the time of death were also coded and entered in the database. Industry data were coded with the Standard Industrial Classification (SIC) system [1998], and occupation data were coded with the Standard Occupational Classification system (SOC) [1998]. For 2003 and 2004 data, both the 1997 North American Industry Classification System (NAICS), United States, and SIC codes were used to classify industry. Only SIC data are included in this study. The external cause of death for each case was coded using the International Classification of Diseases and Related Health Problems, (ICD-10) system. Additional data variables based on case data were entered in the database.

Initial identification and confirmation of cases as work-related was based on information derived from death certificates ("yes" response for "injury at work" tick box on death certificate form), OSHA 36 fatality reports, coroner interviews, and police interviews. Cases initially identified as work-related but later determined to be non-working

after consulting these sources are excluded from the database.

There were 1,281 occupational fatalities recorded by the FACE program from 1995 to 2004 and 360 decedents were determined to be self-employed. Death certificates were available for 357 of the self-employed cases (95%) and 837 (91%) of the non self-employed workers. A sensitivity analysis was performed to determine self-employment identified through the FACE surveillance system compared to self-employment identified through death certificates alone.

Numerator data for the Kentucky self-employed fatality rates per year were obtained from KY FACE data while CFOI data were used to determine the US self-employed death rate per year. Denominator data including total numbers of both Kentucky and US self-employed and non self-employed persons were derived from the US Current Population Survey (CPS) (years 1997–2004). Kentucky self-employed statistics (years 1995 and 1996) were obtained from the 1996 and 1997 Small Business Profile produced by the US Small Business Administration. A descriptive analysis was performed and frequencies were determined for each variable using Epi Info 6 (Centers for Disease Control and Prevention). Dependent crude self-employed fatality rates per year were compared using the following formula:

$$\mu = (o - e) / \sqrt{e} \text{ where :}$$

o = number of Kentucky self-employed fatalities per year.

e = expected number of Kentucky self-employed fatalities per year under the national self-employed fatality rate.

[Pennsylvania Department of Health, 2001]. Rates were determined using Statistical Product and Service Solutions (SPSS) for Windows, Release 10.0.5 (SPSS, Inc., Chicago, IL). It should be mentioned that the number of Kentucky self-

employed fatalities is included in the national self-employed fatality rate.

RESULTS

Crude Death Rates

The average crude injury-related death rate per year for Kentucky self-employed workers (Fig. 1) for the period 1995–2004 was higher than the US self-employed worker death rate (27.6 Kentucky worker deaths/100,000 compared to 11.5 US worker deaths per 100,000) per year. The Kentucky self-employed worker crude death rate per year was also five times higher than the Kentucky non self-employed worker crude death rate (Table I) per year. The crude death rate per year for self-employed workers in Kentucky decreased over the 10-year period analyzed, whereas, the US self-employed fatal work injury rate per year remained steady. The Kentucky and US non self-employed fatal work injury rates per year also remained unchanged over the period examined.

Demographics

Over half of the Kentucky self-employed decedents were employed in the agriculture, forestry, and fishing industry sector (57%) (Fig. 2), whereas Kentucky's non self-employed decedents were most frequently employed in the transportation/communications industry (24%). As in national statistics, Kentucky self-employed decedents were older (mean \pm SD = 57 \pm 17 years) when fatally injured (Fig. 3) compared to non self-employed decedents (mean \pm SD = 41 \pm 14 years). When time of fatal injury was

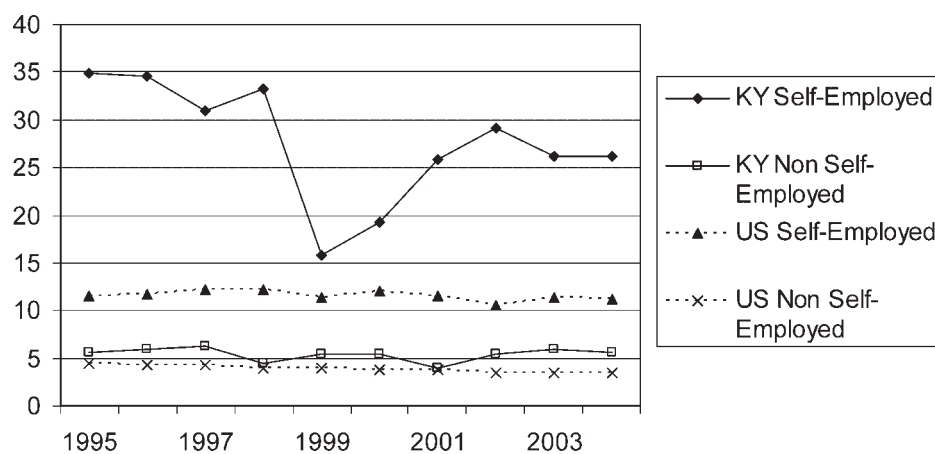


FIGURE 1. Self-employed worker crude death rates^a due to injury, 1995–2004; Kentucky. ^aSelf-employed and non self-employed worker death rates were calculated as the number of worker deaths per 100,000 self-employed or non self-employed workers per year, respectively.

TABLE I. Fatality Rates for Kentucky Self-Employed and Non Self-Employed Workers Injured at Work

Year	Self-employed		Non self-employed	
	# Of deaths	Crude rate ^a	# Of deaths	Crude rate
1995	44	34.9	98	5.6
1996	39	34.5	98	6.0
1997	42	30.9	104	6.2
1998	41	33.3	76	4.4
1999	23	15.8	96	5.5
2000	28	19.3	94	5.4
2001	36	25.9	69	4.0
2002	39	29.1	95	5.5
2003	33	26.1	98	6.0
2004	35	26.2	93	5.6
Average crude death rate		27.6		5.4

^aNumber of worker deaths per 100,000 workers.

examined, a larger percentage of self-employed workers died between 12 pm and 3:59 pm (Table II), whereas more non self-employed workers died between 12 am and 7:59 am when compared to self-employed workers. Both Kentucky self-employed and non self-employed workers who were fatally injured on the job in Kentucky were primarily males, white, not of Hispanic origin, and married. Most of the self-employed decedents who died due to injury on the job were Kentucky residents and 37% had less than a high school education. For self-employed injury fatalities, there were 35 missing values for time of fatal injury, 15 for race, 18 for

ethnicity, 0 for state of residence, 94 for years of education, and 16 for marital status. For non self-employed injury fatalities, there were 69 missing values for time of fatal injury, 83 for race, 91 for ethnicity, 20 for state of residence, 230 for years of education, and 86 for marital status.

Identification of Self-Employed Worker Deaths

The overall sensitivity of death certificates alone to identify self-employment among occupational fatalities was 26% (93 death certificates were recorded as owners or self-employed, 3 death certificates were missing, and the FACE program identified 360 self-employed worker deaths). The sensitivity of the Kentucky FACE program identification of self-employment was compared to self-employment identified through death certificates alone for primary occupational groups. The sensitivity of the death certificates for the identification of self-employment in farmers was 8% (only 15 death certificates of the 178 FACE-identified self-employed farmer deaths were recorded as owners or self-employed), 10% for loggers (2 of 20 self-employed logger deaths), 59% for truck drivers (10 of 17 total), 78% of retail shop owner deaths (35 of 45 total), and 63% of construction/building contractor deaths (24 of 38 total).

Typically, the Kentucky FACE program identifies and confirms worker death cases through a number of different source documents. When death certificates were examined for each occupational fatality case, we found that the “injury at work” tick box filled in by the medical examiner or coroner did not correctly identify 25% of the self-employed cases (Table III). There was a reduced percentage of self-employed



FIGURE 2. Actual employment industry of Kentucky self-employed and non self-employed worker deaths on the job due to injury, 1995–2004.

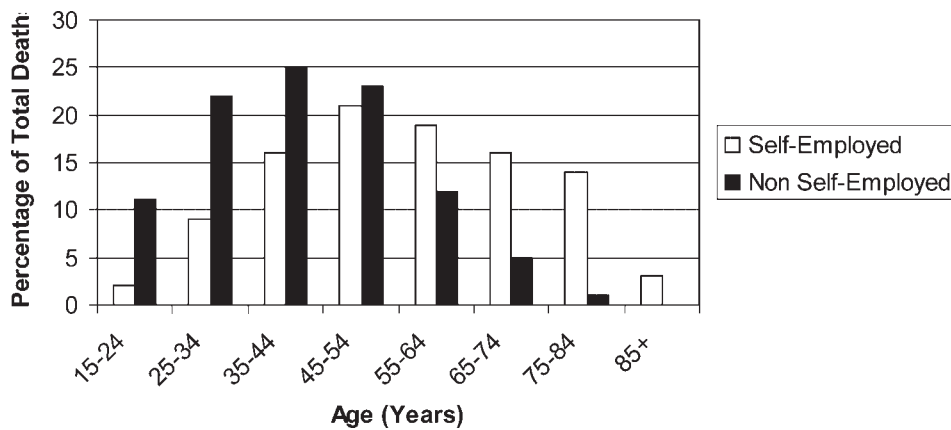


FIGURE 3. Age of Kentucky self-employed and non self-employed decedents due to injury on the job, 1995–2004.

TABLE II. Demographic Characteristics of Kentucky Self-Employed (n = 360) and Non Self-Employed Worker Injury Fatalities (n = 921), 1995–2004

Characteristic	Self-employed (n) (%)	Non self-employed (n) (%)
Time of fatal injury		
12:00 am–03:59 am	9 (3%)	55 (6%)
04:00 am–07:59 am	11 (3%)	109 (13%)
08:00 am–11:59 am	99 (30%)	220 (26%)
12:00 pm–03:59 pm	124 (38%)	236 (28%)
04:00 pm–07:59 pm	63 (19%)	154 (18%)
08:00 pm–11:59 pm	19 (6%)	78 (9%)
Gender		
Male	350 (97%)	851 (92%)
Female	10 (3%)	70 (8%)
Race		
White	334 (97%)	773 (92%)
Black	7 (3%)	47 (6%)
Other	4 (1%)	18 (2%)
Ethnicity		
Hispanic origin	4 (1%)	14 (2%)
Not of Hispanic origin	338 (99%)	816 (98%)
State of residence		
Kentucky	343 (95%)	732 (81%)
Out-of-state	17 (5%)	169 (19%)
Years of education		
<High school graduate	98 (37%)	131 (19%)
High school graduate	116 (44%)	406 (59%)
≤Years of college	46 (17%)	131 (19%)
>4 years of college	6 (2%)	23 (3%)
Marital status		
Married	250 (73%)	550 (66%)
Never married	29 (8%)	139 (17%)
Widowed	12 (3%)	10 (1%)
Divorced	53 (15%)	136 (16%)

cases identified with the “injury at work” box checked as “yes” (69% marked as “yes”) compared to non self-employed workers (79% marked as “yes”). Fewer Kentucky self-employed decedents’ “usual occupation” and “usual industry” boxes were correctly identified compared to non self-employed workers. The working industry at the time of death for 27% of the self-employed cases was incorrectly identified on the death certificate whereas less than 10% of the non self-employed worker industries at the time of death were incorrectly identified through death certificates. The “injury at work” tick box was not marked on 22 self-employed and 84 non self-employed death certificates. The “usual occupation” and “usual industry” tick boxes were not marked for 10 and 13, respectively of the self-employed deaths certificates, and for 20 and 23, respectively, of the non self-employed death certificates. Nineteen percent of the self-employed decedents were small business owners.

TABLE III. Identification of Self-Employed and Non Self-Employed Worker Injury Deaths Using Death Certificates, 1995–2004, Kentucky

	Self-employed (n) (%)	Non self-employed (n) (%)
“Injury at work” tick box was marked as:		
Yes	235 (69%)	661 (79%)
No	84 (25%)	136 (16%)
No Response	19 (6%)	40 (5%)
Did the “Usual Occupation” box on the death certificate correctly identify actual occupation at time of death?		
Yes	293 (84%)	815 (90%)
No	57 (16%)	86 (10%)
Did the “Usual Industry” box on the death certificate correctly identify actual industry at time of death?		
Yes	254 (73%)	822 (91%)
No	93 (27%)	76 (9%)

TABLE IV. External Cause of Death and Associated Factors for Kentucky Self-Employed and Non Self-Employed Worker Deaths, 1995–2004

	Self-employed (n) (%)	Non self-employed (n) (%)
External cause of death		
Electrocution	12 (3%)	45 (5%)
Fall	21 (4%)	93 (10%)
Machine	19 (5%)	59 (6%)
Other	25 (7%)	99 (11%)
Motor vehicle collision	59 (16%)	325 (35%)
Struck by	46 (13%)	139 (15%)
Agricultural machine	107 (29%)	35 (4%)
Homicide	36 (10%)	55 (6%)
Suicide	11 (3%)	19 (2%)
Explosion	5 (1%)	23 (2%)
Animal related	11 (3%)	3 (<1%)
Caught in	11 (3%)	26 (3%)
Tractor-relatedness of agricultural deaths		
Tractor overturn	58 (29%)	24 (32%)
Fell off tractor/run over	18 (9%)	8 (11%)
Tractor and motor vehicle	15 (7%)	3 (4%)
Other tractor-related	42 (21%)	7 (9%)
Non-tractor-related	68 (34%)	33 (44%)

Causes of Death

Agricultural machinery (e-code: E919.0) was the main external cause of death for self-employed workers (29%), while a motor vehicle collision (e-code: E810.0-E829.9) (35%) was the primary external cause of death for non self-employed workers (Table IV). Non self-employed workers died more frequently from falls (E880.0-E888.0) than self-employed workers.

Since agricultural machines were the primary cause of death among self-employed workers, the role of tractors in the fatal agricultural injuries was further explored. Of the 201 self-employed agricultural fatalities recorded, the majority were tractor-related (66%); of the 75 non self-employed agricultural fatalities recorded, 56% were tractor-related. Tractor rollovers accounted for approximately 29% of both self-employed and 32% of non self-employed agricultural deaths.

DISCUSSION

Self-employment is a growing economic sector of the workforce [Mutaner et al., 2004]. Few studies have been undertaken to fully examine and characterize self-employed

worker deaths due to injury [Driscoll et al., 2003; Mirabelli et al., 2003; Pegula, 2004], including identification and confirmation of self-employment status. The crude death rates for Kentucky self-employed workers are higher than for non self-employed workers, and self-employed agricultural industry workers are at particular risk for an occupational fatality. The Kentucky general and agricultural occupational fatality rates among self-employed workers were more than double the national rates found by Pegula [2004] for the same period, 1995–2001.

Identification of self-employed status in occupational injury fatalities for the FACE program is a labor-intensive investigative process involving several source documents. As others have noted [Russell and Conroy, 1991; Stout and Bell, 1991; Peek-Asa et al., 1997], death certificates were found to be unreliable as the sole source of identification for both self-employed and non self-employed occupational injury fatality cases. There was an even lower sensitivity of the “injury at work” box for classification of self-employed workers. In addition, the “usual industry” was incorrect for the work being performed at the time of death in more than one-quarter of all self-employed cases. One reason for this may be that the majority of fatal self-employed worker injuries are in the agriculture/forestry/fishing industry. If agricultural workers are working on a farm for income and suffer a fatal occupational injury, they are included in the FACE dataset, even if they are retired from a different industry or occupation. Peek-Asa et al. [1997] used vignettes about workers who were not performing their usual job tasks at the time of death and approximately 98% of coroners surveyed determined these vignettes to be “work related.” Unfortunately, no vignettes included questions about retired workers performing other jobs. Additionally, the authors found that self-employment vignettes led to uncertain responses. These results address the need for standardization and uniform coding on the death certificate.

A variety of source documents are required for the identification of occupational fatalities [Stout and Bell, 1991; Smith et al., 2005]. The use of one source alone, such as death certificates, does not capture all occupational fatality cases. CFOI relies on at least two document sources for confirmation of a work-related injury death. The KY FACE program utilizes even more source documents for the identification and confirmation of occupational injury fatalities. With our method of capture and identification, we found that 28% of all Kentucky fatal occupational injuries were to self-employed workers, which is higher than the national average of 20% [Pegula, 2004]. In comparison, Mirabelli et al. [2003] found that approximately 21.5% of all North Carolina occupational fatalities were to self-employed workers. The authors used only investigated medical examiner reports for their data. We find that FACE data is a more representative data source for identification of self-employed injury fatality cases.

The average age at death for the Kentucky self-employed worker injured on the job was 57 years, similar to the results in the Mirabelli et al. [2003] study. Fifty-three percent of all Kentucky self-employed worker fatalities were aged 55 years and older at the time of death. This is higher than the national average of 43% of self-employed workers who were age 55 and older at death [Pegula, 2004]. In addition to being older, having less than a high school education was more common among Kentucky self-employed decedents (37%) than non self-employed decedents in Kentucky (19%) and unincorporated self-employed workers (national average: 11%) [Hipple, 2004].

Using multiple sources and a strict definition for “injury at work” that excludes most heart attacks, this study found that the majority of Kentucky self-employed worker injury deaths occurred in the agricultural industry (57%). In comparison, the North Carolina study [Mirabelli et al., 2003] determined that 34% of the self-employed fatalities were in the agriculture industry. These differences may reflect the use of multiple source documents in our FACE data and the coding of worker deaths by industry where they were engaged in work in the FACE database in contrast with industry coding by medical examiners in North Carolina.

The increased percentage of self-employed agricultural deaths in Kentucky may be due to a larger proportion of farmers in Kentucky’s workforce than in that of North Carolina. In Kentucky, the agricultural employment rate was 379 agricultural workers per 10,000 employed workers in the year 2000 compared to 277 agricultural workers per 10,000 employed workers in North Carolina [US Census Bureau, Census, 2000]. Also, in 2005, there were 84,000 farms in Kentucky and 50,000 farms in North Carolina [National Agricultural Statistics Service, 2005]. Over half of the agricultural deaths were tractor-related and almost one-third involved a tractor overturn. These results reflect the continuing need for targeted prevention programs in the agriculture/farming/forestry industry in Kentucky and, in particular, on the prevention of tractor rollovers in older agricultural workers.

There are several limitations to this study. First, denominator data for the employment estimates and classification of self-employed workers may be understated due to variability in data collection (sample size and self-employed classification) and data analysis using the CPS. Self-employment can be difficult to ascertain with this survey and certain occupations may be excluded because of small numbers [Pegula, 2004]. Self-employed workers may also be employed in the informal work force and will not identify themselves as self-employed [Mirabelli et al., 2003]. Self-employment may be underrepresented due to underreporting and therefore, self-employed fatality rates may be over-estimated because more workers may actually be self-employed. Second, the adoption of the NAICS industry coding system may have altered the industry classification

for employers and employees for the years 2003–2004, leading to overstatement or understatement of fatality rates. Last, we included government workers in the same group as private industry workers since the contribution of government workers to the overall non self-employed worker group was too small ($n = 84$ or 6% of the total occupational fatalities) for separate analysis.

Self-employed worker injury deaths in Kentucky represent a significant percentage of the occupational injury fatalities in Kentucky. In this study, the characteristics of self-employed worker injury deaths were identified so that appropriate prevention efforts can be directed in predominantly self-employed industries.

Safety and health training have been successfully implemented in small businesses [Barbeau et al., 2004; Harrington et al., 2004] and should be offered and promoted to those starting small businesses in Kentucky. Currently, prospective entrepreneurs can access the internet to obtain the complete list of all licenses required to open a small business with the “One-Stop Business Licensing Program.” A link is currently available to the Division of Compliance, Kentucky Occupational Safety and Health Programs, which contains a contact name at the state OSH office and directs the user to post safety and health posters for workers. However, this source does not provide training or course information including relevant state OSH standards to be followed by the employer and employees who apply for a specific business license. Users should be directed to applicable safety and health training courses delivered by Kentucky OSH Division of Education and Training safety consultants, peer educators, or safety and health educators that include relevant OSH standards and safety procedures for small businesses. Safety and health training courses should contain FACE report narratives of real-life fatal occupational injuries that occurred in small businesses along with the safety recommendations that were suggested to prevent similar types of injuries in the workplace. Safety training courses should be mandatory and provided online or in person for those applying for a business license.

Injury prevention efforts should also be enhanced to reach those self-employed workers in the informal workforce. Employers who hire day laborers need to train experienced and inexperienced workers in their assigned job tasks and in the recognition of job hazards, as well as ensure that personal protective equipment is utilized correctly and used at the appropriate times. Several different organizations and agencies may also be mobilized for the dissemination of injury prevention materials such as community churches, local health clinics and local health departments, and community health educators.

In addition, focused injury prevention interventions in the agricultural industry, tailored and targeting older under-educated agricultural workers, should be developed and evaluated. An example is a Kentucky community-based

intervention that was developed to increase the use of rollover protective structures (ROPS) on older tractors in years 1997–1999. Following the intervention, the mean number of agricultural tractor injury deaths declined from 22.25 deaths per year in years 1994–1997 to 12.2 deaths per year from 1998 to 2002 (FACE data). Publications from that campaign indicated that narrative-based messages, those that incorporate fear appeals [Morgan et al., 2002], and those that include the cost effectiveness of employing good farming practices [Struttmann et al., 2001] may be most effective in reaching the older farmer. This safety and health training may be targeted to the older farmer by insurance companies or through local employers to reach the older part-time farmer [Brandt et al., 2001].

There was a decline in the number of self-employed worker injury deaths in 1999–2000. Since 57% of the worker deaths occurred in the agricultural industry, the decline may have been due in part to the Kentucky ROPS intervention study that was undertaken from 1997 to 1999 and a decreased number of tractor-associated deaths after the intervention recorded in the FACE database for the same time period. This intervention could also account for the slow increase in the years after the initial drop since the intervention was not routinely reinforced in the farming public.

This study shows that self-employed workers have a higher injury fatality rate than those employed in private industry or by the government. A comprehensive analysis of the factors contributing to these worker deaths in targeted industries such as agriculture is essential to develop effective prevention materials.

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