

Multiple Jobholder Mortality Patterns in Kentucky: An Examination of Occupational Fatalities

Ashley M. Bush, MPH, Sarah E. McKee, PhD, and Terry L. Bunn, PhD*

Background *The percentage of multiple jobholders was elevated in Kentucky compared to the US from 2002 to 2010.*

Methods *Kentucky Fatality Assessment and Control Evaluation (FACE) multiple jobholder fatality data were analyzed to identify contributing injury factors from 2002 to 2010.*

Results *Kentucky's total occupational fatality rates were higher than US rates for all years (2002–2010). Kentucky multiple jobholder fatalities averaged 8.4 deaths per 100,000 employees compared to the total average occupational fatality rate of 6.5. Almost half of multiple jobholder fatalities (47%) occurred in the agricultural industry and management occupation as the primary industry and occupation; 67% were tractor-related. The most prevalent secondary industry and occupation were the construction industry and management occupation.*

Conclusions *Increased surveillance of multiple jobholder injuries is needed to improve safety and health on the job. Future investigations should include the relationship between multiple jobholding and agricultural employment as farm owners.* Am. J. Ind. Med. 56:881–888, 2013. © 2013 Wiley Periodicals, Inc.

KEY WORDS: *multiple jobholders; agriculture; fatalities; jobsite; management*

INTRODUCTION

An increase in the number of persons performing part-time work, temporary, and self-employed work has been observed in the United States [Kimmel and Powell, 1999]. Multiple jobs, including multiple full-time jobs,

multiple part-time jobs, temporary jobs, and self-employment, or any combination thereof, qualify jobholders as multiple jobholders. Temporary job wages may be less than wages for someone working full-time, and typically lack the benefits and job security a full-time job may provide. Seasonal variation may contribute to multiple jobholding; construction workers labor full-time in summer months, and to support income during the winter months if laid off, they may acquire a second job for the winter season. Alternatively, if the construction employee is working under a lighter workload in the winter, they may acquire a concurrent job to supplement their income. Also, farmers may seek an additional job(s) in the winter when crop harvest is completed and farming duties have decreased.

There is a positive correlation between multiple jobholding and the percentage of high school graduates [Bullard, 1997]. In 1995, the proportion of all employed multiple jobholders increased with educational level [United States Bureau of Labor Statistics, 1996]. Workers holding

Kentucky Injury Prevention and Research Center, College of Public Health, University of Kentucky, Lexington, Kentucky

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*Correspondence to: Dr. Terry L. Bunn, PhD, Kentucky Injury Prevention and Research Center, College of Public Health, University of Kentucky, 333 Waller Ave., Suite 242, Lexington, KY 40504. E-mail: tlbunn2@uky.edu

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multiple jobs tend to be higher educated than those not holding multiple jobs [United States Bureau of Labor Statistics, 1996; Amuedo-Dorantes and Kimmel, 2009]. Hipple [2010] concluded similar findings: as education levels increased, the number of persons holding multiple jobs increased. There was a higher prevalence of workers with advanced degrees and professional degrees among multiple jobholders compared to those without multiple jobs.

There may be consequences of working more than one job evidenced by increased stress, fatigue, and workload with decreased rest time, that may jeopardize a multiple jobholders' health status [Benavides et al., 2000; Stutts et al., 2003; Bohle et al., 2004]. Occupational stress is considered to be "one of the most significant workplace health hazards" [Spector, 2002]. In 2009, multiple jobholders averaged a 46.8-hr work weeks, approximately 8 more work hours per week than the single jobholder [Hipple, 2010]. Also, multiple jobholders are more likely to be drivers in sleep-related car crashes, because multiple jobholders average few hours of sleep a night, poorer quality sleep, drive most often at late night, and are sleepier during the day [Stutts et al., 2003]. Based on Current Population Survey data by the U.S. Census Bureau, Hipple [2010] suggested that people sought second jobs primarily for financial reasons, the pleasure an additional job brought, for entrepreneurial endeavors, or to obtain experience and knowledge in another job field. Some people continue to work full-time while simultaneously starting an entrepreneurial venture. Schramm and Litan [2008] wrote "Entrepreneurship and radical innovation have long been hallmarks of the American experience." The full-time job can serve as a means of health insurance or financial security needed to jumpstart his or her entrepreneurship. An individual may have a flexible primary job that permits him or her extra time to run his or her own business [United States Bureau of Labor Statistics, 1996]. People may even choose to continue full-time employment, while their proprietary business flourishes (e.g., rental property owners who work other jobs unrelated to rental property).

In 2010, approximately 6.9 million people held more than one job in the United States [U.S. Bureau of Labor Statistics, 2011]. The percentage of multiple jobholders was 5.5% in Kentucky in 2010 compared to 4.9% for the United States, and has remained fairly stable for the last decade [Campbell, 2004, 2007, 2010, 2011; Bureau of Labor Statistics].

The primary objective of this study was to determine the occupational mortality patterns that exist among multiple jobholders employed in Kentucky by: (1) calculating trends over time of the proportion of deaths among multiple jobholders compared to the proportion of total (all) occupation-related deaths; (2) defining demographic

characteristics of multiple jobholders who died on the job; and (3) identifying industry- and occupation-specific patterns of multiple job holder decedents.

METHODS

The cases in this study were all workers who received work injuries in Kentucky and either died in Kentucky or out of state over the period of 2002–2010. This study is part of the broad spectrum of the Kentucky Occupational Safety and Health Surveillance program, which is approved by the University of Kentucky Institutional Review Board. Data were downloaded into spreadsheets for analysis.

The study population included all decedents who held multiple jobs at the time of the fatal work injury, and were entered into the Kentucky Fatality Assessment and Control Evaluation (FACE) program database of occupational fatalities. State FACE programs were created in 1989 to perform fatal occupational injury and illness surveillance, investigate worker deaths, and prescribe preventive measures [NIOSH, 2012]. It is important to note that "FACE is [not] a regulatory program; investigators do not enforce compliance with State or Federal occupational safety and health standards and do not determine fault or blame" [NIOSH, 2012].

The FACE database builds on information contained in death certificates, coroner reports, Occupational Safety and Health Administration (OSHA) 36 forms, and media reports. Death certificates, media articles, and coroner interviews were primary sources of identification and ascertainment of multiple jobholding status for this study. The death certificates (in Kentucky) include time, date and place of death, as well as the industry and occupation in which the person was working at the time of death. The place of injury, a description of the injury, and the location of the injury are available in text form. If the worker death was transportation-related, a variable specifies whether the decedent was the driver, passenger, pedestrian, or other. Newspaper accounts and obituaries provide data on multiple jobholder status through the mention of employment in secondary industries or occupations in the news article or obituary. Coroners are routinely interviewed for further clarification on individual FACE cases, including the ascertainment of multiple jobholder status if (1) the description of the injury in the death certificate did not correlate with the occupation or industry listed; (2) there was a possible indication of multiple jobholding in the media news article; and (3) if the circumstances surrounding the death were suspicious. The OSHA 36 reports provide additional information on many deaths occurring on the job including: (1) a description of the fatal incident; (2) the number of employees in the business; (3) the event date and time; (4) the number of fatalities, hospitalized injuries, and non-

hospitalized injuries; (5) the primary industry; and (6) the primary occupation through the job title field. Secondary industry and occupation information is not available on the OSHA-36 form. Fatalities and catastrophes are reported by OSHA Area Offices and State Plan states on OSHA-36 forms, and Fatality/Catastrophe Reports.

Other individual level data were collected, such as the type of fatal injury, in addition to the time and place of death. Primary industry and occupation referred to the industry and occupation the individual was engaged in at time of death, whereas secondary industry and occupation referred to the concurrent industry and occupation where the individual was employed. Other information collected included job duration, as well as basic demographic data such as race, gender, age, ethnicity, marital status, etc.

Two classification systems were used to code worker fatalities by industry and occupation. The North American Industry Classification System (NAICS) was used for industry coding of multiple jobholders. Occupations were coded through the use of the Standard Occupational Classification (SOC) system produced by the United States Office of Management and Budget. These codes aided in classifying workers into occupational categories for research purposes. Currently, there are 461 expansive occupational groups, 97 subgroups, and 23 major groups for specific occupations in the SOC manual. Similar occupational duties and skills were aggregated in this classification system.

Definitions

Multiple jobholder: A person holding more than one job in different or same industries or occupations; person may hold full-time and/or part-time jobs, or any combination.

Multiple jobholder death: A decedent that held more than one job in different or same industries or occupations. The decedent's residence can be in or out of Kentucky; he/she must have died from injuries sustained on the job in Kentucky.

Total occupational fatalities: Total number of workers who suffered a fatal injury on the job (single jobholders + multiple jobholders).

Primary industry and occupation: The industry and occupation the decedent was working in when the fatal injury was sustained.

Secondary industry and occupation: The concurrent industry and occupation in which the decedent was employed in at the time of death; may be the same or different industry from primary industry and occupation.

For national comparisons, fatal work injury information was obtained from the Bureau of Labor Statistics and United States Department of Labor [2011]. Kentucky fatal occupational injury data were obtained from the Kentucky

FACE database. Fatal injury frequencies were determined and US and Kentucky rates per 100,000 workers were calculated. Calculations of total fatal occupational rates included both single and multiple jobholder deaths. Multiple jobholder fatality numbers, (as a proportion of total occupational fatalities) and mortality rates were calculated. The multiple jobholding employment percentages were obtained from the Bureau of Labor Statistics' analyst Jim Campbell.

Occupational fatalities were identified for all 9 years and downloaded into an Excel spreadsheet that also included demographic characteristics. The mean age of single and multiple jobholder decedents for each year were calculated. Fatalities were stratified by gender to investigate any possible gender-related trends. Race was categorized into four categories: White, Black, Asian, and Unknown. Ethnicity was examined for multiple jobholder decedents. Education for each single and multiple jobholder fatality was classified into the following categories: Less than High School, Some High School, Finished High School, Some College, College and Beyond, and Unknown. Decedents were grouped according to his or her marital status (Married, Never Married, Widowed, Divorced, and Unknown).

Multiple jobholders were classified by primary and secondary industries. The major industry categories included: Agriculture, Forestry, Fishing and Hunting; Mining; Construction; Manufacturing; Trade; Transportation and Warehousing; Real Estate and Rental Leasing; Administrative and Support and Waste Management and Remediation Services; Educational Services; Arts, Entertainment, and Recreation; Accommodation and Food Services; and, Public Administration. Frequencies were calculated for primary and secondary industries among multiple jobholders. Occupation-specific information was used to determine the type of incident that caused the fatal injury in multiple jobholder decedents. Primary and secondary occupations of the multiple jobholder decedents were examined by industry.

For comparison purposes, all occupational fatalities were organized into the primary industries at time of death. Multiple jobholder fatality rates were compared to total occupation-related fatal injury rates on the state level. All multiple jobholder deaths ($n = 36$) within the agriculture (primary) industry were analyzed by population traits.

RESULTS

Once all information was gathered, multiple jobholder deaths were identified and frequencies were counted. These frequencies were compared to the total occupation-related fatalities obtained from the FACE database.

There were a total of 1,026 occupational fatalities during 2002–2010, and of these, there were 76 multiple

jobholder deaths. Multiple jobholder deaths averaged 7.4% of the total occupational fatalities in the Commonwealth of Kentucky for the study period (Table I).

From 2002 to 2010, Kentucky's average employment was 1,746,003 workers per year, while the US average employment was 141,100,000 [BLS Data Series, 2012; BLS Labor Force Statistics, 2012]. This 2002–2010 information was used to compare Kentucky's fatal occupational injury rate to the US fatal occupational injury rate (Table I). Total fatal occupational rates included both single and multiple jobholder deaths identified during the study period was used to calculate average and annual multiple jobholder mortality rates. The proportion of multiple jobholder fatalities to total occupational fatalities increased slightly from 2006 to 2010. This indicates an elevated fatal injury trend for multiple jobholders as a percentage of all occupations in Kentucky. Total occupational fatalities decreased, but multiple jobholder fatalities remained relatively constant from 2002 to 2010. Fatal occupational injury rates for Kentucky were higher than national occupation-related rates from 2002 to 2010. Over the 9-year period, Kentucky's average rate was 6.5 deaths per 100,000 workers, compared to the US rate of 3.9 deaths per 100,000 workers. From 2002 to 2009, Kentucky's multiple jobholder fatality rate (per 100,000 multiple jobholders) averaged higher than Kentucky's and the United States total occupational fatality rates. Multiple jobholder deaths per 100,000 multiple jobholders was

elevated compared to the national fatal occupational injury rate from 2002 to 2009, except for the year 2006.

Population traits (mean age, gender, race, education, and marital status) of the multiple and single jobholder deaths were analyzed from 2002 to 2010. Table II depicts demographic characteristics for multiple and single jobholder decedents from 2002 to 2010. There was a slightly higher percentage of male multiple jobholder deaths compared to the male single jobholder mortality percentage. The percentage of multiple jobholder decedents with at least some college education (28%) was higher than the percentage of single jobholder decedents with at least some college education (19%). The percentage of multiple jobholder decedents who tended to be either never married or divorced was higher when compared to single jobholders. All multiple jobholder decedents were of Non-Hispanic ethnicity.

Multiple jobholder deaths were evaluated by primary and secondary industries of employment and calculated as frequencies and percentages (Table III). Agriculture (n = 36, 47%), Administrative and Support and Waste Management and Remediation Services (n = 9, 12%), and Public Safety (n = 6, 8%) were the primary leading industries for multiple jobholder deaths. Within those classifications above, the associated specific industries were farming, landscaping, and firefighting. The secondary industries of employment by multiple jobholder decedents at the time of death were the Construction (n = 12, 16%),

TABLE I. Single- and Multiple-Jobholder Fatality Rates, 2002–2010

	2002	2003	2004	2005	2006	2007	2008	2009	2010	Avg
Fatal injury frequency										
Kentucky ^a	135	131	128	120	138	112	105	92	65	114
United States ^b	5,534	5,575	5,764	5,734	5,840	5,657	5,214	4,551	4,690	5,395.4
Total fatal occupational injury rates ^b										
Kentucky	7.9	7.6	7.4	6.8	7.8	6.2	5.9	5.4	3.8	6.5
United States	4.1	4.0	4.1	4.0	4.0	3.9	3.6	3.5	3.6	3.9
Multiple jobholder deaths ^{a,c}										
Kentucky	12	12	9	7	3	7	9	9	8	8.4
Single jobholder deaths ^a										
Kentucky	123	119	119	113	135	105	96	83	57	105.6
Multiple jobholder fatality rates ^d										
Kentucky	12.3	12.1	8.7	6.3	3.0	6.9	8.5	9.6	8.5	8.4
Single jobholder fatality rates ^e										
Kentucky	7.6	7.4	7.3	6.9	8.0	6.2	5.7	5.1	3.3	6.4

^aKentucky Fatal Database.

^bUnited States Bureau of Labor Statistics.

^cJ.Campbell, BLS economist.

^dNumber of multiple jobholder deaths/100,000 multiple jobholders.

^eNumber of single jobholder deaths/100,000 single jobholders.

TABLE II. Demographic Characteristics of Single- and Multiple-Jobholder Deaths in Kentucky, 2002–2010

	Multiple jobholders	Single jobholders
Mean age (years)	48	46 ^a
Gender		
Male	95%	92%
Female	5%	8%
Race		
White	86%	86%
Black	4%	5%
Asian	1%	<1%
Other	0%	2%
Unknown	9%	6%
Education		
Less than High School	12%	10%
Some High School	16%	12%
Finished High School	34%	48%
Some College	16%	12%
College and Beyond	12%	7%
Unknown	11%	12%
Marital status		
Married	57%	64%
Never Married	18%	14%
Widowed	1%	2%
Divorced	20%	13%
Unknown	4%	7%

Percentages may not total 100% due to rounding.

^aTwo single jobholders' ages unknown (2002 and 2006).

Transportation, Warehousing, and Utilities industry (n = 11, 15%), and the Manufacturing industry (n = 8, 11%).

According to the SOC Occupation codes, Management (n = 35, 46%) was the primary occupation of multiple jobholder decedents at time of death, followed by the Transportation and Material Moving occupation (n = 10, 13%; Table IV). The secondary occupations that the multiple jobholders were employed in at the time of death were the Management occupation (n = 16, 21%), and the Construction and Extraction occupation (n = 11, 14%). Managers consisted primarily of farmers (n = 23), and construction managers (n = 10).

Since agriculture was the primary industry that many of the multiple jobholders died in while working (n = 36), a comprehensive examination of the agriculture deaths was performed (Table V). Of the 36 agriculture industry multiple jobholder deaths, 34 were farm-related and 24 were tractor-related. Farm-related was defined as those fatal injuries occurring on a farm; tractor-related refers to those fatal injuries involving tractor use on a farm. Of the tractor-related deaths, 46% (11/24) were roll over protective structure (ROPS)-related, and seven were either bush-hog-related or power take off (PTO)-related. One of the agriculture cases was coded as "unknown" regarding death type, because of the long latency period between the time of injury and death. Therefore, we lack information regarding whether or not the fatality was tractor, ROPS-, bush-hog-, and/or PTO-related. Eleven of the multiple jobholder deaths involved a tractor overturn, six were run over by the tractor, and four fell off the tractor.

DISCUSSION

The declining total occupation injury fatality rates in Kentucky from 2006 to 2010 are consistent with the slight decrease in the national fatal work injury rates cited by the U.S. Bureau of Labor Statistics, and U.S. Census Bureau, and are consistent with Ruhm's [2000] evidence that occupational fatalities decrease during economic declines. Factors such as increased safety prevention measures on the job, underreporting of fatal job injuries, and economic factors could contribute to the decreasing total occupation-related death rates from 2002 to 2010 [Smith et al., 2005].

From 2002 to 2010, there were 76 multiple jobholder deaths identified in Kentucky. Estimates of true multiple jobholding rates are difficult to capture. Baba and Jamal [1992] examined 12 empirical studies of multiple jobholding rates and determined multiple jobholding rates to be much higher than those reported in government studies (i.e., Bureau of Labor Statistics). Baba and Jamal suggested that the discrepancies between the government rate and the rates based on the empirical studies could be due to the fear of tax penalties, the perceived loss of the

TABLE III. Kentucky Multiple Jobholder Fatalities by Primary and Secondary Industry Classifications, 2002–2010

NAICS Industry Sector	Primary	Secondary
Agriculture, Forestry, Fishing and Hunting	36	6
Public Safety	6	6
Manufacturing	5	8
Services	17	24
Educational Services	a	10
Arts, Entertainment, and Recreation	4	a
Real Estate and Rental and Leasing	a	a
Administrative and Support and Waste Management and Remediation Services	9	a
Transportation, Warehousing and Utilities	4	11
Construction	3	12
Retail and Wholesale Trade	4	7
Mining	a	a
Total	76	76

^aNumbers <3 were suppressed.

TABLE IV. Kentucky Multiple Jobholder Fatalities by Primary and Secondary Occupation Classifications, 2002–2010

SOCC Occupational Group	Primary	Secondary
Management	35	16
Transportation and Material Moving	10	4
Building and Grounds Cleaning and Maintenance	8	0
Farming, Fishing, and Forestry	8	3
Protective Services	4	4
Construction and Extraction	3	11
Production	a	9
Sales and Related	a	4
Education, Training and Library	0	10
Installation, Maintenance, and Repair	a	8
Architectural and Engineering/Office and Administrative Support	0	3
Community and Social Service/Personal Care and Service/Arts, Design, Entertainment, Sports, and Media/Healthcare Practitioners and Technical	3	4
Total	76	76

^aNumbers <3 were suppressed.

primary job, or a perceived loss of stature in social groups. The elevated multiple jobholding employment rates in Kentucky may be attributed to a true higher rate or to a better reporting system than the national reporting system or may be related to the identified primary occupations (occupation that lead to death). Issues of multiple job underreporting, data collection errors, and coding errors

TABLE V. Kentucky Multiple Jobholder Fatalities in the Agriculture Industry: Tractor-Relatedness, 2002–2010

Type of tractor-related death	Percentage of total tractor-related	
	Cases	deaths
Tractor only related	10	42
Tractor and ROPS only related ^a	7	29
Tractor and Bush Hog or PTO related	7	29
Total tractor-related deaths (any combination)	24	100

Details of fatal tractor injury	Percentage of fatal tractor	
	Cases	injuries
Tractor overturn	11	46
Fall off and runover by tractor and/or attachment	3	13
Other runover	3	13
Other tractor related	7	29
Total	24	100

^aROPS not present.

could influence overall multiple jobholder reporting and statistics.

Kentucky's fatal total occupational injury rates were higher than the United States' fatal total occupational injury rates for all years (2002–2010). These rates raise concern regarding high-risk industries where workers are employed, workers' jobsite conditions, and overall worker safety among Kentucky's labor force. Loomis et al. [2009] found higher fatal injury rates clustered in the southern and western regions, and in areas that are more rural and less prosperous. Kentucky's rural population relies on the agricultural industry as a primary industry for employment.

The Kentucky multiple jobholder occupational fatality rate (8.4/100,000) was significantly higher than the Kentucky overall occupational fatality rate (6.4/100,000) in 2010; the average age was 48 years and gender was male. Since national data suggest women are more likely to hold multiple jobs [Hipple, 2010], our finding that only 5% of multiple jobholder decedents were women suggests that either not as many women comprise the multiple jobholder labor force in Kentucky or that men are more likely to be working at jobs with higher risks for injury and death. Also, over 60% of the multiple jobholder decedents identified in this study finished at least high school. Our data corroborate national studies that show multiple jobholding is more prevalent among persons with higher education compared to single jobholders [Amuedo-Dorantes and Kimmel, 2009; Hipple, 2010].

Agriculture has traditionally had high rates of multiple jobholding [Kimmel and Powell, 1999]. Agriculture is a hazardous industry and was the predominant primary industry of death for multiple jobholder decedents. Holding more than one job is a "significant part of rural households" when it comes to earning a living according to Shaffer [1998]. Agricultural work is also the most predominant form of employment in the world [Frank et al., 2004], and according to the BLS Census of Fatal Occupational Injuries (CFOI) program (2011), the agriculture, forestry, and fishing industry had the highest fatality rate in 2010 (26.8 deaths per 100,000 full-time equivalent workers). BLS CFOI data (2010) indicates that off-road tractor overturns increased 4% in 2010. Since over 45% of identified Kentucky multiple jobholder deaths occurred in the agriculture industry, additional investigation is warranted on the prevention and safety practices in agriculture. Fatigue and distraction management, along with safe equipment usage (ROPS fitted tractors) and equipment maintenance, should be addressed among agriculture industry workers who work more than one job.

Multiple jobholders working in the agriculture industry primarily died from tractor-related fatal injuries; this is consistent with results from Myers et al. [2004]. Kentucky, along with five other states (Tennessee, West Virginia,

Ohio, Pennsylvania, and Illinois), had the highest number of tractor overturn related fatalities from 1992 to 2004 in the United States [Cole, 2007]. Tractor overturns decreased from 1992 to 2007 [Myers and Hendricks, 2010], although fatalities due to tractor overturn increased in 2010 (US CFOI). There is a heightened risk for tractor-related and overturn fatal injuries in Kentucky, since it is located within and near the Appalachian Mountains [Cole, 2007] and has hilly terrain in the eastern section of the state. According to former NIOSH Director J. Donald Millar, "There is no scientific excuse for the persistence of this problem. This is something we know how to prevent" [NIOSH, 1993]. There are four E's of injury intervention: economics, engineering, education, and enforcement [Rockett, 1998] that can be applied to agricultural injury prevention. Regarding engineering, ROPS have been developed to prevent crushing injuries due to tractor rollovers. A ROPS is a steel structure built to form an enclosed cage to protect the tractor operator.

Equipping tractors with a ROPS has been determined to be cost-effective in preventing agricultural fatalities associated with overturns [Myers et al., 2004]. ROPS are now standard equipment on new tractors but there are still a large number of older tractors in use today that are older and lack a ROPS. The solution to making older tractors safe is in the use of retrofit ROPS kits, but retrofitting a tractor may be cost prohibitive for some. Affordability could increase the number of tractors retrofitted with ROPS, thereby saving many lives. Cole [2007] states that the decision to retrofit an older tractor with a ROPS may also be limited by the lack of a ROPS specifically retrofitted to that older tractor, and additional retrofit costs could prevent good decision-making based on cost-benefit ratios, as well. *The Kentucky ROPS Guide* (2010) was created to aid persons retrofitting their tractors with a ROPS.

Community education campaigns regarding the purchase of tractors with a ROPS, and retrofitting older tractors with a ROPS could be promoted in Kentucky. Farmers need to be educated on how a ROPS can prevent injury and death, along with the correct use of ROPS on their farm tractors. Myers et al. [2004] showed the effectiveness of community ROPS campaigns in two Kentucky counties that persuaded farmers to retrofit their tractors. The high percentage (67%) and number of agriculture multiple jobholder deaths in this study were tractor related, and the use of a ROPS may have prevented many of the multiple jobholder fatalities. Overturns, runovers, and older tractors are the main types of hazards associated with tractor use [Pennsylvania State University et al., 2004]. Furthermore, continuing education could be offered to farmers on the importance of regular maintenance, replacement, and tuning of farm equipment (i.e., the use of a master shield on the PTO stub shaft). Continuing educational efforts could be directed to multiple jobholders and

emphasized by agricultural extension agencies, the United States Department of Agriculture, and universities.

Farming deaths may have been over-represented as the primary industry and primary occupation where the fatal injury occurred since a non-farming industry and occupation were listed as the "usual" industry and "usual" occupation on the death certificate in many of the FACE occupational fatality cases. Secondary employment within the same industry (other than agriculture) may not have been captured well. The identification of multiple jobholder status through currently available FACE program data sources (e.g., OSHA 36 forms, media accounts, death certificates) should be validated through family interviews from a select number of FACE occupational fatality cases and/or more on-site investigations to capture all multiple jobholder fatalities.

CONCLUSIONS

Multiple jobholder occupational fatality rates were significantly higher than single jobholder fatality rates in Kentucky; most multiple jobholder deaths occurred among farmers, landscapers, and firefighters. The identification of multiple jobholder fatalities may be optimized through on-site investigations, and interviews of family members. The use of death certificates as a primary data source to identify multiple jobholder status could be enhanced with more information on the secondary industry of employment. Strengthened surveillance data collection tools would aid in the identification of multiple jobholder status; information on primary and secondary job durations and hours worked will increase targeted prevention efforts.

Multiple jobholder deaths were highly concentrated in the agriculture industry. The results of this study highlight the need for continuing education on tractor use by multiple jobholders. Sixteen percent of the world's food supply is produced on only 7% of the world's cultivable land in the United States [Frank et al., 2004], and there is an urgent need to protect this population-our agricultural workers.

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