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Fatal falls and PFAS use in the construction industry: Findings from the NIOSH FACE reports

Xiuwen Sue Dong[a,*], Julie A. Largay[a], Sang D. Choi[b], Xuanwen Wang[a], Chris Trahan Cain[a], Nancy Romano[c]

[a] CPWR – The Center for Construction Research and Training, 8484 Georgia Ave, Suite 1000, Silver Spring, MD 20910, United States
[b] University of Wisconsin-Whitewater, Department of Occupational & Environmental Safety & Health, Hyland Hall 3509, 800 West Main St., Whitewater, WI 53190, United States
[c] National Institute for Occupational Safety and Health, Division of Safety Research, 1095 Willowdale Rd., Room 1714, Morgantown, WV 26505, United States

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ABSTRACT

This study analyzed the Construction FACE Database (CFD), a quantitative database developed from reports of the Fatality Assessment and Control Evaluation (FACE) program conducted by the National Institute for Occupational Safety and Health (NIOSH). The CFD contains detailed data on 768 fatalities in the construction industry reported by NIOSH and individual states from 1982 through June 30, 2015. The results show that falls accounted for 42% (325) of the 768 fatalities included in the CFD. Personal fall arrest systems (PFAS) were not available to more than half of the fall decedents (54%); nearly one in four fall decedents (23%) had access to PFAS, but were not using it at the time of the fall. Lack of access to PFAS was particularly high among residential building contractors as well as roofing, siding, and sheet metal industry sectors (~70%). Although the findings may not represent the entire construction industry today, they do provide strong evidence in favor of fall protection requirements by the Occupational Safety and Health Administration (OSHA). In addition to stronger enforcement, educating employers and workers about the importance and effectiveness of fall protection is crucial for compliance and fall prevention.

1. Introduction

Occupational fatality statistics in the U.S. construction industry continue to highlight the risks and hazards associated with construction work. Data for 2014 show there were more fatalities in construction than in any other major industry in the U.S., and the annual number of construction fatalities has increased since 2011, which coincides with the recent economic recovery (U.S. Bureau of Labor Statistics, 2016). Moreover, fatal injuries caused by falls have remained the leading cause of fatalities in construction since 1992 (CPWR, 2013; U.S. Bureau of Labor Statistics, 2016).

Fall protection is an essential part of preventing fall injuries. The Occupational Safety and Health Administration (OSHA), which sets and enforces standards to ensure safe work conditions in the United States, requires that each employee on a walking or working surface (horizontal and vertical) with an unprotected side or edge that is 6 feet (1.8 m) or more above a lower level must be protected from falling by the use of guardrail systems, safety net systems, or a personal fall arrest system (PFAS) (OSHA, 2010). However, until 2010, these requirements did not apply to the residential construction industry. According to OSHA case reports of fatalities between 2005 and 2010 (prior to the change in requirements), there was little or no appropriate fall protection used in residential roofing (Moore and Wagner, 2014). Earlier studies found that more than 40% of fall injuries from scaffolding, staging, or floor openings could be attributed to non-compliant scaffolds and unguarded openings (Chi et al., 2005). Falls from ladders also account for a large proportion of workplace injuries related to falls from heights (DiDomenico et al., 2013), although fall protection is not required on portable ladders (29 CFR 1926.1053). In addition, a 1997 study found a significant relationship between injury severity and height of fall (Gillen et al., 1997). Despite improvements in OSHA standards, lack of fall protection remained at the top of OSHA's most frequently cited construction standards in 2014 (OSHA, 2015b).

Although a comprehensive understanding of the causal factors in fatal falls is important for injury intervention, the existing litera-

* Corresponding author at: Data Center Director, CPWR – The Center for Construction Research and Training, 8484 Georgia Ave, Silver Spring, MD 20910, United States.
E-mail address: sdong@cpwr.com (X.S. Dong).

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ture appears to lack a scientific review of falls from height (Nadhim et al., 2016). Data collection on the height of falls was just initiated in 2011 by the Census of Fatal Occupational Injuries (CFOI), which is the primary data source for occupational safety and health surveillance of fatalities. Information on usage of PFAS is even scarcer in the existing databases and literature.

To improve understanding of fatal incidents and provide recommendations for avoiding similar events in the future, NIOSH has maintained the Fatality Assessment and Control Evaluation (FACE) program since 1982. In addition to the demographic and employment data collected on decedents, FACE has reported information on height of falls since inception of the program. Information on fall protection status was also collected, including whether the decedent was wearing fall protection when the incident occurred; had access to fall protection (such as the equipment was provided to the decedent prior to the incident or was available on site), but did not use it; or no fall protection was provided. FACE investigators also made recommendations on how the incident may have been prevented based on the incident circumstances. These detailed incident descriptions and recommendations can be critical for designing injury prevention measures, including safety policies and procedures, engineering controls, and other aspects of the safety climate (Higgins et al., 2001; Menendez et al., 2012).

The Construction FACE Database (CFD), a numeric database covering all FACE reports in the construction industry published from 1982 to June 30, 2015, facilitates the use of the rich data included in the FACE reports (more information on the CFD creation and contents is reported separately). This study examined characteristics of fall fatalities and fall protection use in the construction industry by analyzing the CFD. The study attempts to fill certain research gaps, given the shortage of information on the height of falls and use of PFAS in the construction industry in the existing literature.

2. Materials and methods

The fatal cases involving falls were identified from the CFD. Height of these fatal falls, and access to and use of PFAS when the fall occurred, were examined and compared among the decedents with different demographic and employment characteristics. Heights of falls were grouped into four major categories: (1) less than 6 feet, (2) 6–15 feet, (3) 16–30 feet, and (4) more than 30 feet. These categories were based on OSHA's regulations and requirements (OSHA, 2014). To identify whether the decedent was wearing fall protection, or if not, whether fall protection was present at the incident site, PFAS status was categorized as: (1) present, in use; (2) present, not in use; (3) not present; and (4) unknown. Construction industry subsectors were coded according to the Standard Industrial Classification (SIC) system. Occupations were classified based on the 1990 Census Occupational Classification System. Only major construction occupations were reported in this study due to too few cases among smaller occupations and those with a lower risk of falls.

Table 1
Characteristics of FACE fatalities, all fatalities vs. fatal falls.

Characteristics	All Fatalities	Fatal Falls	
	Number	Number	% of all Fatalities
Age			
Less than 25 years	126	45	35.7%
25–44 years	375	169	45.1%
45–64 years	189	88	46.6%
65+ years	25	15	60.0%
Not reported	53	8	15.1%
Employment Status			
Wage-and-salary	666	278	41.7%
Self-employed	71	31	43.7%
Other/Not reported	31	16	51.6%
Occupation			
Construction laborers, helpers	186	60	32.3%
Structural metal workers	61	42	68.9%
Supervisors, construction	98	40	40.8%
Carpenters	55	34	61.8%
Roofers	40	31	77.5%
Other, n.e.c.	328	118	36.0%
Job Tenure			
Up to 1 week	67	36	53.7%
>1 week to 2 months	82	42	51.2%
>2 months to 6 months	71	33	46.5%
>6 months to 2 years	105	47	44.8%
>2 years to 5 years	82	36	43.9%
>5 years	163	69	42.3%
Unknown/Not reported	198	62	31.3%
Industry			
General Building Contractors – Residential	53	32	60.4%
General Building Contractors – Nonresidential	70	35	50.0%
Roofing, Siding, & Sheet Metal Work	76	58	76.3%
Structural Steel Erection	53	38	71.7%
Special Trade Contractors, n.e.c.	288	118	41.0%
Other, n.e.c.	228	44	19.3%
Employer Size			
Up to 20 employees	338	172	50.9%
21 to 200 employees	212	83	39.2%
More than 200 employees	89	33	37.1%
Unknown/Not reported	93	37	39.8%
Total	768	325	42.3%