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The construction FACE database — Codifying the NIOSH FACE reports☆

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A B S T R A C T

Introduction: The National Institute for Occupational Safety and Health (NIOSH) has published reports detailing the results of investigations on selected work-related fatalities through the Fatality Assessment and Control Evaluation (FACE) program since 1982. *Method:* Information from construction-related FACE reports was coded into the Construction FACE Database (CFD). Use of the CFD was illustrated by analyzing major CFD variables. *Results:* A total of 768 construction fatalities were included in the CFD. Information on decedents, safety training, use of PPE, and FACE recommendations were coded. Analysis shows that one in five decedents in the CFD died within the first two months on the job; 75% and 43% of reports recommended having safety training or installing protection equipment, respectively. *Conclusion:* Comprehensive research using FACE reports may improve understanding of work-related fatalities and provide much-needed information on injury prevention. *Practical Application:* The CFD allows researchers to analyze the FACE reports quantitatively and efficiently.

1. Introduction

The construction industry has the highest number of work-related fatal injuries in the United States. In 2015, 985 construction workers died at worksites, accounting for 20.4% of the overall work-related fatal injuries in the country (U.S. Bureau of Labor Statistics [BLS], 2016). These numbers are disproportionally high given that construction workers made up less than 7% of the overall total employment in 2015 (CPWR, 2017). Accurate surveillance and examination of contributing factors are necessary for effective injury prevention (Bunn, Costich, & Slavova, 2006). However, few data sources contain information on detailed circumstances and situations leading up to and surrounding fatal injuries (Higgins, Casini, Bost, Johnson, & Rautiainen, 2001). Although the Census of Fatal Occupational Injuries (CFOI) provides a substantial amount of information on occupational fatalities, it does not collect information on safety training, use of personal protective equipment (PPE), whether a malfunction or unsafe design of machinery or tools were involved in an incident, and how to avoid similar incidents in the future.

To provide insight into work-related fatal injuries, the National Institute for Occupational Safety and Health (NIOSH) started the NIOSH Fatality Assessment and Control Evaluation (FACE) program in 1982, and added the State FACE program in 1989 (https://www.cdc.gov/niosh/docs/2017-145/). These programs have targeted varying types of events for investigation over the years. For example, NIOSH is currently focusing FACE resources on investigating falls in construction, as well as deaths involving machinery, and foreign-born workers, particularly among states that do not have funding for the State FACE program. In addition to investigating NIOSH targets, individual states conduct a limited number of investigations of fatalities related to state-level targets. The FACE reports are the result of these extensive fatal injury investigations, combining information collected from the employer, coworkers, safety personnel, emergency response crews, and other witnesses. In addition to the decedents' demographic and employment information, FACE collects information on the decedents' employers, such as whether the employer had a safety program, provided safety training, PPE, and much more. Such information is crucial for understanding the mechanisms by which fatalities occur (Bunn, Slavova, & Hall, 2008). FACE reports also provide detailed recommendations on how to avoid such incidents based on information obtained during the investigations (Higgins et al., 2001). These recommendations and detailed incident descriptions can be critical for injury prevention and interventions, including safety policies and procedures, engineering controls, and other aspects of the safety climate (Menendez, Castillo, Rosenman, Harrison, & Hendricks, 2012).

Since the FACE program was established, a number of case studies have been generated from the FACE reports to highlight specific risks

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or policy implications (Hallman, Gelberg, & Hallisey, 2005; Morbidity and Mortality Weekly Report (MMWR), 2001, 2004, 2012; NIOSH, 1990, 2006, 2007, 2010, 2011a, 2014). For example, a FACE report about a fall from a “catch” platform in New Jersey led to an Occupational Safety and Health Administration (OSHA) *Letter of Interpretation*, stating that “catch” platforms must comply with OSHA's Scaffold Standard (OSHA, 2009). Findings based on FACE reports also contributed to a Massachusetts law protecting the safety and health of floor finishing workers (NIOSH, 2011b). Several reports covered various aspects of the Minnesota agriculture industry as well (Brown, Parker, Seeland, Boyle, & Wahl, 1997; MMWR, 1993, 1996, 1998, 1999). In addition, a few studies have applied FACE findings more broadly. These topics include tractors (Bunn et al., 2008), motor vehicle collisions (Bunn & Struttmann, 2003), electrocutions in construction (Zhao, Thabet, McCoy, & Kleiner, 2014), tree care operations (MMWR, 2009), younger workers (Higgins, Tierney, & Hanrahan, 2002), and homicides (Harrison & Gillen, 1996).

FACE reports are categorized by major industry on the NIOSH website. Since 1982, the NIOSH and State FACE programs have investigated hundreds of work-related fatal injuries in the construction industry, providing detailed information on the circumstances and recommendations to protect construction workers from similar incidents occurring again. In order to efficiently explore specific information in the FACE reports for the construction industry, the Construction FACE Database (CFD) was developed using all NIOSH and State FACE reports in construction posted to the NIOSH FACE website as of June 30, 2015. Since FACE programs are ongoing and the annual counts are subject to change, reports posted on the NIOSH FACE website after the cutoff date are not covered by the CFD. To assist safety and health professionals who may use the CFD, this study describes the development and major contents of the CFD, and provides examples of how to employ the CFD for construction safety and health research. Considerations of the CFD and future research applications are also discussed.

2. Materials and methods

Selected data from each construction-related FACE report were manually entered into the CFD, including information on decedents, their employers, type of injury, environment, and recommendations (Appendix A). Information on safety equipment, safety programs, and training was also included. The selected data items were coded using coding systems available in 2000 when the CFD was first created. Occupation and industry were coded using the 1990 Census Occupational Classification System (U.S. Department of Commerce, 1999) and the 1987 Standard Industrial Classification System (Office of Management and Budget (OMB), 1987), respectively. The fatal incident details were classified according to the BLS' Occupational Injury and Illness Classification System (BLS, 2007). While these classification systems have been updated in recent years, changes related to the construction industry have been relatively minor. In order to maintain consistency and ease usage of the CFD, the coding systems have remained the same since inception.

A key element of the CFD is the compilation of FACE recommendations. Since a corresponding classification system is not available, codes were created to categorize the narrative recommendations included in FACE reports (Appendix B). A two-digit classification schema was developed to capture major categories as well as finer details for each recommendation. The first digit designates the main categories: Personal Protective Equipment (PPE; coded 1×), Equipment (2×), Training (3×), Organizational (4×), and Violations (5×). The second digit classifies more specific recommendations within each of the major categories (e.g., 14 – Provide functional Personal Fall Arrest System (PFAS); or 42 – Conduct Job Safety/Hazard Analysis). Detailed recommendation codes are displayed in Appendix B.

The CFD was created in Microsoft Excel, and can be easily imported to other statistical packages, such as SAS. Examples of analyzing the CFD using SAS (version 9.4) and descriptive statistics from the analyses are reported below.

3. Results

3.1. Trend analysis

The CFD includes 768 construction-related fatal injuries reported by FACE, covering the fatalities that occurred from 1982 through 2014 (Fig. 1). While some investigations involved multiple fatalities, for analysis purposes, the CFD uses an individual death as the unit. According to the CFD, about one-third (270) of the fatalities were reported by the NIOSH internal FACE program and the remainder (498) by the State FACE programs. The NIOSH FACE program peaked in 1988 with 38 fatalities. The highest number (53) reported by State FACE programs was in 1998; making that year the highest reported total (64) for all FACE programs.

State FACE programs were reduced shortly after 1998, leading to fewer active State FACE programs. Since then, the number of annual FACE reports has decreased. In June 2015, nine states were conducting FACE programs — California, Iowa, Kentucky, Massachusetts, Michigan,

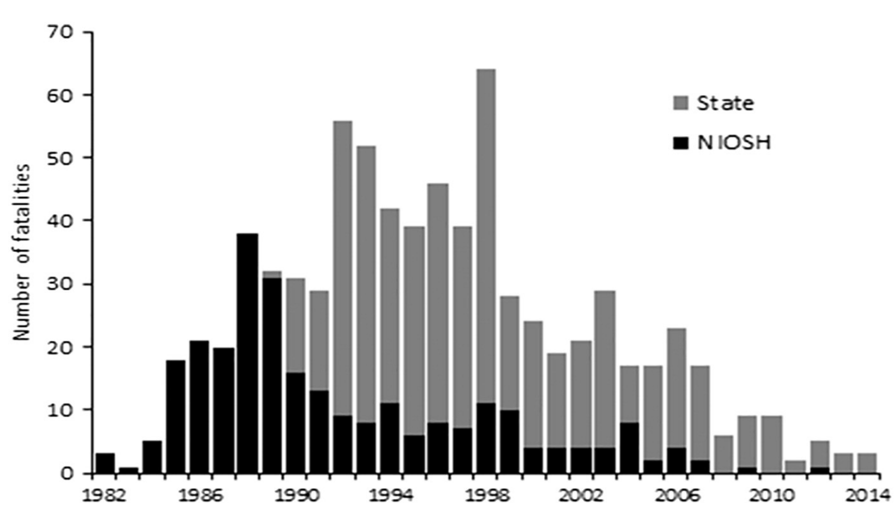

Fig. 1. NIOSH and State FACE reports in construction, by year.
(Source: NIOSH and State FACE Reports for Construction.)

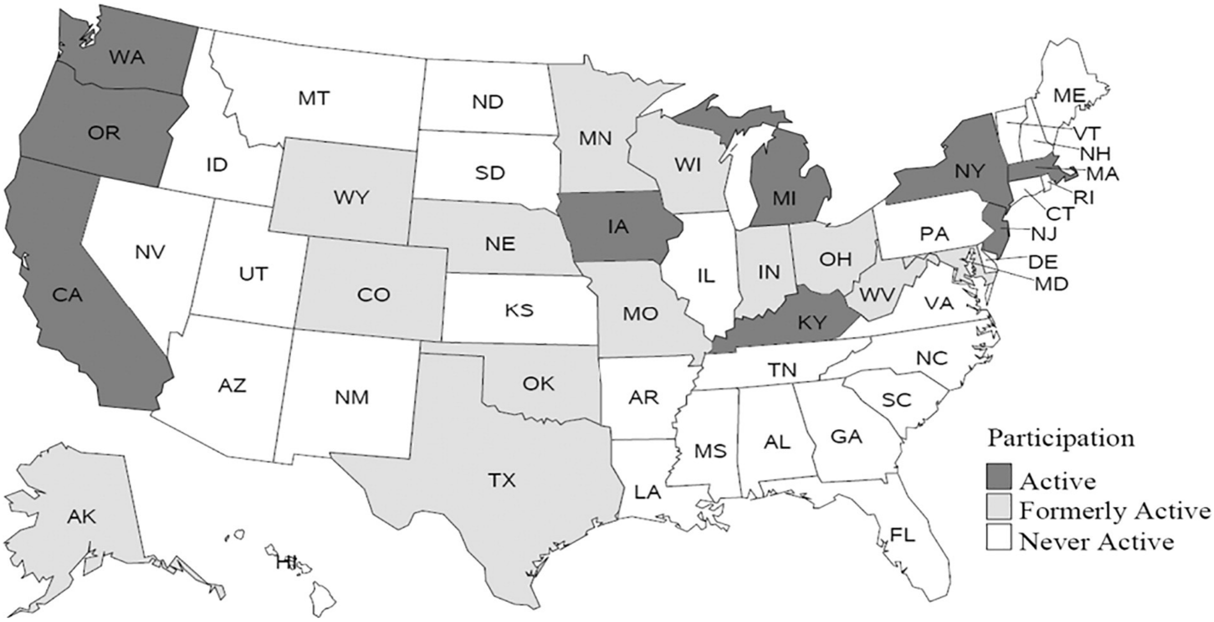

Fig. 2. Active and formerly active State FACE programs.
Note: These are reflective of the FACE States in June 2015.
(Source: State FACE website.)

New Jersey, New York, Oregon, and Washington, and 13 other states previously participated in the FACE program (Fig. 2).

FACE data collection has improved significantly in many respects over the years. For example, while age was only collected in 44% of cases from 1982 to 1987, it was collected in 95% of cases in the most recent period (2008–2014; Table 1). Similarly, the collection of race and foreign-born status jumped from 1.5% to more than 40% during the same time period. Moreover, job tenure collection increased from 22% to 89%, as did employer time in business (from 28% to 73%).

3.2. Descriptive analysis of decedents

Based on demographic information available in the CFD, nearly all decedents were male (759). The mean age of construction decedents involved in a FACE investigation was 38 years, with 20 fatalities occurring among minors under the age of 18 (Table 2). The youngest decedent was only 13 years old. About half of all investigations involved fatalities among those between the ages of 25 and 44 years. Geographically, about 35% of all investigated fatalities occurred in the South, compared to just 17% in the West. At least one fatality was investigated in 34 states; Massachusetts had the highest number of construction-related fatalities investigated (74), and California ranked the second highest (69).

Employment information of the decedents is reported in Table 3. Nearly one-quarter of the decedents were construction laborers or helpers. Construction foremen accounted for the next largest occupational group of decedents. The majority of the decedents were wage-and-salary workers (87%), and the rest were self-employed (9%) or worked for a family business (4%). Job tenure information was available for 570 (74%) of the decedents. The average job tenure was nearly five years, but one in five decedents died during the first two months of employment.

3.3. Analyzing decedents' employers

This analysis shows that the majority of employers (97%) were in the private sector, and 45% were employers with 20 or fewer employees (Table 4). By industry sector, 16% were general building contractors, with 9% in nonresidential and 7% in residential, respectively. About 22% were in heavy construction, including 8% in highway and street construction. More than half (53%) of the employers were in specialty trades, such as the roofing, siding, or sheet metal industry (10%), electrical work (7%), and painting and paper hanging (5%). Additionally,

Table 1
FACE reports in construction, number and percent of data completeness by time period, 1982–2014.

Characteristic	1982–1987 (N[a] = 68)		1988–1992 (N = 186)		1993–1997 (N = 218)		1998–2002 (N = 156)		2003–2007 (N = 103)		2008–2014 (N = 37)		Total (N = 768)	
	n	%	n	%	n	%	n	%	N	%	n	%	n	%
Age	30	44.1%	180	96.8%	217	99.5%	156	100.0%	97	94.2%	35	94.6%	715	93.1%
Race	1	1.5%	11	5.9%	16	7.3%	12	7.7%	35	34.0%	15	40.5%	90	11.7%
Foreign-born	1	1.5%	4	2.2%	9	4.1%	11	7.1%	31	30.1%	16	43.2%	72	9.4%
Employer time in business	19	27.9%	136	73.1%	170	78.0%	133	85.3%	82	79.6%	27	73.0%	567	73.8%
Job tenure	15	22.1%	130	69.9%	177	81.2%	133	85.3%	82	79.6%	33	89.2%	570	74.2%
Employer size	49	72.1%	163	87.6%	187	85.8%	139	89.1%	87	84.5%	34	91.9%	659	85.8%
Number of workers on injury site	54	79.4%	162	87.1%	192	88.1%	138	88.5%	86	83.5%	33	89.2%	665	86.6%
Using safety equipment	60	88.2%	129	69.4%	133	61.0%	93	59.6%	68	66.0%	29	78.4%	512	66.7%
Written safety plan	55	80.9%	158	85.0%	146	67.0%	122	78.2%	79	76.7%	29	78.4%	589	76.7%
Employer-provided job training	26	38.2%	106	57.0%	136	62.4%	113	72.4%	74	71.8%	33	89.2%	488	63.5%

[a] N represents the number of fatalities.

Table 2
FACE reports in construction, by demographic characteristics of decedents, 1982–2014.

Characteristic	Number	Percent
Age (Mean = 38 years)		
<18 years	20	2.6%
18–24 years	106	13.8%
25–34 years	188	24.5%
35–44 years	187	24.4%
45–54 years	123	16.0%
55–64 years	66	8.6%
65+ years	25	3.3%
Unknown/not reported	53	6.9%
Sex		
Male	759	98.8%
Female	8	1.0%
Not reported	1	0.1%
Race/ethnicity		
White, non-Hispanic	17	2.2%
Hispanic	66	8.6%
Asian	7	0.9%
Unknown/not reported	678	88.3%
Foreign-born		
Foreign-born	70	9.1%
Native-born	2	0.3%
Unknown/Not reported	696	90.6%
Geographic region		
Midwest	204	26.6%
Northeast	165	21.5%
South	267	34.8%
West	129	16.8%
Not reported	3	0.4%
Total fatalities	768	100.0%

nearly 8% of the decedents were working on construction sites when the injury occurred but were employed in a non-construction industry (e.g., an electrician could be employed by a telephone company).

Table 3
FACE reports in construction, by employment characteristics of decedents, 1982–2014.

Characteristic	Number	Percent
Occupation		
Construction laborers, helpers	186	24.2%
Foremen, construction	98	12.8%
Structural metal workers	61	7.9%
Equipment & machine operators	59	7.7%
Carpenters	55	7.2%
Electricians, power/phone line installers	51	6.6%
Roofers	40	5.2%
Painters	38	5.0%
Plumbers, pipefitters, & steamfitters	26	3.4%
Miscellaneous mechanics & repairers	18	2.3%
Truck drivers	18	2.3%
Construction, n.e.c.	100	13.0%
Other, n.e.c.	18	2.3%
Employment status		
Wage-and-salary	666	86.7%
Self-employed	71	9.2%
Family business	29	3.8%
Volunteer	2	0.3%
Job tenure (Mean = 4 years, 10 months)		
1 day	18	2.3%
2 days	17	2.2%
3–14 days	55	7.2%
>2 weeks to 1 month	26	3.4%
>1 month to 2 months	33	4.3%
>2 months to 6 months	71	9.2%
>6 months to 1 year	50	6.5%
>1 year to 2 years	55	7.2%
>2 years to 5 years	82	10.7%
>5 years to 10 years	72	9.4%
>10 years to 20 years	66	8.6%
>20 years	25	3.3%
Unknown/not reported	198	25.8%
Total fatalities	768	100.0%

Table 4
FACE reports in construction, by decedents' employer characteristics, 1982–2014.

Characteristic	Number	Percent
Employer ownership		
Private ownership	744	97.1%
Federal, state, or local government	22	2.9%
Unknown/not reported	2	0.3%
Industry		
Construction employer	698	90.9%
General building contractors	123	16.0%
General building contractors — nonresidential	70	9.1%
General Building Contractors — residential	53	6.9%
Heavy construction	167	21.8%
Highway & street construction, except elevated highways	62	8.1%
Water, sewer, pipeline, & communications & power line construction	51	6.6%
Heavy construction, n.e.c.	25	3.3%
Bridge, tunnel, & elevated highway construction	20	2.6%
Water well drilling	9	1.2%
Special trade contractors	408	53.1%
Roofing, siding, & sheet metal work	76	9.9%
Electrical work	54	7.0%
Structural steel erection	53	6.9%
Painting & paper hanging	41	5.3%
Special trade contractors, n.e.c.	37	4.8%
Carpentry & floor work	30	3.9%
Masonry, stonework, tile setting, & plastering	29	3.8%
Plumbing, heating & air-conditioning	27	3.5%
Excavation work	23	3.0%
Concrete work	22	2.9%
Wrecking & demolition work	9	1.2%
Installation or erection of building equipment, n.e.c.	7	0.9%
Non-construction employer	58	7.6%
Non-classifiable/not reported	12	1.6%
Employer size		
1–10 employees	249	32.4%
11–20 employees	99	12.9%
21–50 employees	110	14.3%
51–200 employees	108	14.1%
More than 200 employees	93	12.1%
Unknown/not reported	109	14.2%
Employer time in business		
≤1 year	23	3.0%
>1 year to 5 years	75	9.8%
>5 years to 10 years	83	10.8%
>10 years to 20 years	140	18.2%
>20 years to 30 years	101	13.2%
>30 years	145	18.9%
Unknown/not reported	201	26.2%
Written safety plan		
Yes	331	43.1%
No	258	33.6%
Unknown/not reported	179	23.3%
Employer-provided job training		
Yes	323	42.1%
No	165	21.5%
Unknown/not reported	280	36.5%
Total fatalities	768	100.0%

Employers had a written safety plan in 43% of cases, and provided job training in 42% of cases. Such information was missing for many cases; 23% of cases did not have information about a written safety plan, and 37% did not have information regarding training.

3.4. Analyzing events, locations, and other circumstances of incidents

In terms of events, falls accounted for 42% (325) of all investigated fatalities in construction (Table 5), of which nearly 17% were falls from scaffolding or staging. Contact with electricity resulted in almost 18% of the total deaths, with nearly two-thirds of those from overhead power lines. By location, more than one-third of the investigated fatalities occurred at nonresidential construction sites. Another 14% occurred at new residential construction sites, and 11% at residential remodeling,

Table 5
FACE reports in construction, by case event circumstances, 1982–2014.

Characteristic	Number	Percent
Event or exposure		
Contact with objects and equipment	150	19.5%
Struck by/against object or equipment	74	9.6%
Caught in/compressed by equipment or objects	47	6.1%
Excavation or trenching cave-in	29	3.8%
Falls	325	42.3%
Fall through floor opening/surface	24	3.1%
Fall from ladder	43	5.6%
Fall through existing roof opening	22	2.9%
Fall through roof surface	13	1.7%
Fall through skylight	18	2.3%
Fall from roof edge	49	6.4%
Fall from scaffold, staging	54	7.0%
Fall from building girders, other structural steel	36	4.7%
Fall to lower level, n.e.c.	66	8.6%
Exposure to harmful substances or environments	161	21.0%
Contact with electric current or wiring, etc.	50	6.5%
Contact with overhead power lines	86	11.2%
Inhalation/depletion of oxygen in confined space	18	2.3%
Drowning, submersion	7	0.9%
Transportation accidents	105	13.7%
Collision accident	7	0.9%
Non-collision accident	39	5.1%
Pedestrian accident	59	7.7%
Fires and explosions	10	1.3%
Other, n.e.c.	17	2.2%
Location		
Nonresidential construction site	262	34.1%
Residential construction site	106	13.8%
Home (home/apartment/farmhouse/n.e.c.)	83	10.8%
Industrial places & premises	77	10.0%
Road construction site	66	8.6%
Public building	51	6.6%
Street & highway	42	5.5%
Parking lot, garage	17	2.2%
Other, n.e.c.	56	7.3%
Unknown/not reported	8	1.0%
Number of workers on injury site		
Working alone	42	5.5%
2 workers	164	21.4%
3 workers	119	15.5%
4 workers	97	12.6%
5 workers	73	9.5%
6–9 workers	99	12.9%
10–19 workers	42	5.5%
20–99 workers	24	3.1%
100+ workers	5	0.7%
Unknown/not reported	103	13.4%
Using safety equipment		
Yes	119	15.5%
No	393	51.2%
Unknown/not reported	256	33.3%
Total fatalities	768	100.0%

renovation, and demolition sites. Nearly 80% of the investigated fatalities transpired on jobsites with fewer than 10 workers. Safety equipment was used in less than 16% of cases. However, such information was only available for two-thirds of cases.

3.5. Analyzing recommendations

FACE reports provide recommendations on a variety of issues. The most common recommendations were related to Equipment (81%), followed by Organizational matters (80%), Training (79%), and PPE (35%; Table 6). Among the Equipment-related recommendations, 43% of reports suggested the installation of safety protection—more than double the number of recommendations to provide functional PFAS (21%; PPE major category). Within the Training category, three in four cases recommended that employers provide safety training (e.g., CPR, how to handle an emergency, hazard recognition). For recommendations addressing Organizational issues, 40% suggested that employers

Table 6
FACE report recommendations for construction, 1982–2014.

Recommendations	Number[a] (n = 768)	Percent
Personal protective equipment	272	35.4%
Provide functional PPE	33	4.3%
Inspect PPE for functionality	2	0.3%
Enforce use of PPE	54	7.0%
Provide functional PFAS	158	20.6%
Inspect PFAS for functionality	9	1.2%
Enforce use of PFAS	130	16.9%
Equipment	618	80.5%
Provide proper equipment for the task	151	19.7%
Inspect equipment for functionality/condition	111	14.5%
Enforce proper use of equipment	158	20.6%
Install safety protection	327	42.6%
Prevention through design	122	15.9%
Other, n.e.c.	95	12.4%
Training	604	78.7%
Provide job training	94	12.2%
Provide safety training	574	74.7%
CPR training	19	2.5%
Provide training in a language the employee can understand	44	5.7%
Train local emergency medical services on worksite safety	28	3.7%
Other, n.e.c.	3	0.4%
Organizational	613	79.8%
Develop safety checklist	17	2.2%
Conduct job safety (hazard) analysis	307	40.0%
Ensure safe worksite conditions	186	24.2%
Improve employer awareness	74	9.6%
Verify employee qualifications for the job	55	7.2%
Designate competent worksite safety monitor	153	19.9%
Establish clear communication system	101	13.2%
Enforce safety requirements of subcontractors	41	5.3%
Other, n.e.c.	148	19.3%
Violations	31	4.0%
Enforce child labor laws	21	2.7%
Heavier/successive penalties for violations	7	0.9%
Other, n.e.c.	3	0.4%
Other, n.e.c.	1	0.1%

Note: Investigators could provide multiple recommendations per report, therefore, totals do not add to 100%.
[a] Number refers to the number of fatalities.

conduct a job safety/hazard analysis prior to beginning work, and 24% recommended that employers should ensure safe worksite conditions (e.g., assessing if weather conditions are too dangerous to proceed with work).

4. Discussion

This study describes the CFD development by codifying the NIOSH and State FACE reports on construction fatalities spanning more than 30 years. Analyses using the CFD provide findings that may not exist in the current literature. For example, demographic data from the CFD shows that 20 construction deaths were identified among minors under the age of 18. Because minors under the age of 18 are prohibited from working in hazardous occupations such as roofing and trenching (U.S. Department of Labor, 2010), this information may help to understand the issue of child labor at construction jobsites and highlights the need to enforce federal and state child labor laws to protect this vulnerable group. While the information on decedents' job tenure is incomplete, the results indicate that a large number of decedents died when they had just started a new job; one in five was killed within the first two months on the job. Despite missing data on training, only 42% of decedents were found to have received job-related training (including formal and informal safety training). Factors related to safety training could be further explored using the CFD.

Information on PPE or PFAS use is particularly valuable since such information is not collected in most data sources. The findings suggest that just 16% of decedents were using safety equipment at the time of the incident. Some FACE reports provide a detailed list of what the decedent was using or wearing when the incident occurred (e.g., hard hat, work gloves, work boots, reflective vest), and some describe whether the available PPE or PFAS was actually in use during the incident (e.g., the employer had PFAS in the truck, but the decedent was not wearing it). However, the current CFD only includes whether safety protection was used or not, and does not classify protection in detail (original FACE reports may be referenced if more information is needed).

The CFD can also be used to examine a specific event for fatalities. The largest proportion of investigated fatalities in construction was fall-related, accounting for 42% of the decedents, reflecting that falls are a priority of construction safety for NIOSH targets (NIOSH, 2008). A study addressing fall fatalities (including PFAS use and availability) using the CFD has been published (Dong et al., 2017). Other common events in construction, such as Exposure to Harmful Substances or Environments, or Contact with Objects and Equipment, could be examined in future research using the CFD.

Perhaps the most important element of the CFD is the FACE recommendations. The findings show that roughly three-quarters of reports included a recommendation for employers to provide safety training, and 43% recommended installing safety protection equipment. Conducting a job safety/hazard analysis (40%) and ensuring safe worksite conditions (24%) were also frequently recommended. Although the findings may not be representative of the entire construction industry, implementing these recommendations prior to beginning work may mitigate the risk of similar incidents in the future. Further detailed analysis of the recommendations captured in CFD could also be conducted to assess the impact of implementation.

While the CFD provides an easy way to analyze FACE reports, it only contains selected information within the construction industry. FACE reports are also not nationally representative because they are related to pre-selected targets and are voluntarily reported by participating states. In addition, the FACE program started more than 30 years ago, thus findings generated from the CFD may not reflect the conditions on current construction sites. Moreover, a large number of cases in the CFD have some missing data. For example, some demographic data points were only available in recent reports. Therefore, a detailed analysis on Hispanic or foreign-born workers is not suggested based on the current CFD version. Moreover, despite significant improvements in FACE reports, some information is still incomplete, such as safety training and use of safety equipment. A more detailed checklist for future FACE investigations could be helpful in evaluating and interpreting incidents. The CFD can be updated as more information is available.

Given the above considerations, the CFD may allow researchers to analyze the FACE reports quantitatively and efficiently. The CFD in Excel and its codebook in PDF format will be available on the NIOSH FACE website in the near future as a free download for interested parties. Comprehensive research using FACE reports may improve our understanding of work-related fatalities and provide much needed information on strategies for the prevention of future incidents.

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Appendix A. FACE database variables (Appendix A)

#	Variable	Information
Decedent characteristics		
1	Case Type (NIOSH or State)	N = NIOSH S = State
2	Record ID	
3	State	Two letter abbreviation
4	Age	In years
5	Gender	1. Male 2. Female
6	Race/ethnicity	1. White, non-Hispanic 2. Black, non-Hispanic 3. Hispanic 4. Asian 5. Native American 6. Other 7. Unknown/not reported
7	Foreign-born (FB)	1. Yes 2. No 3. Unknown/not reported
8	Occupation (OCCUP)	1990 Census Code
9	Employee status (ES)	1. Wage-and-salary 2. Self-employed 3. Family business 4. Volunteer 5. Not reported
10	Time with employer (TWEY)	Years Months Days
Employer characteristics		
11	Industry (SIC)	SIC
12	Ownership (OWNER)	1. Federal government 2. State government 3. Local government 4. Foreign government 5. Other government 6. Private ownership
13	Time: employer has been in business (TEIB)	In years
14	Establishment size (SIZE)	Number of employees
15	Written safety plan/program/procedure (WSP)	1. Yes 2. No 3. Unknown/not reported
16	Provide job training (PJT)	1. Yes 2. No 3. Unknown/not reported
Injury/incident		
17	Injury date	Month (IM) Day (ID) Year (IY)
18	Nature of injury (NOI)	OIICS 2007
19	Part of body (POB)	OIICS 2007
20	Source of injury (SOI)	OIICS 2007
21	Event or exposure (EOE)	OIICS 2007

(continued on next page)

Appendix A (*continued*)

#	Variable	Information
22	Activity	1. Vehicular & transportation operations 2. Using/operating tools, machinery 3. Constructing, repairing, cleaning 4. Materials handling 5. Physical activities, n.e.c. 6. Unknown/Not reported
23	Height of fall (Fall_feet)	In feet
Environment		
24	Location	1. Nonresidential construction site 2. Residential construction site 3. Home (home/apartment/ farmhouse/n.e.c.) 4. Industrial places & premises 5. Road construction site 6. Public building 7. Street & highway 8. Parking lot, garage 9. Other, n.e.c. 10. Unknown/not reported
25	Number of workers injured in the event (excluding decedent) (NOWIIE)	Number of employees
26	With SAFETY EQUIPMENT (WSE)	1. Yes 2. No 3. Unknown/not reported
27	What protection (e.g., fall protection) (WP)	Protection type
28	Fall protection (PFAS)	1. Present and in use 2. Present but not in use 3. Not present 4. Unknown/not reported
FACE report recommendations		
29	Report recommendations	See Appendix B
30	PFAS recommended (PFAS_Rec)	1. Yes 2. No

Appendix B. FACE recommendation categories (Appendix B)

B.1. Personal protective equipment (PPE – e.g., hard hat, gloves, PFAS or harness/lanyard)

11. Provide functional PPE (e.g., the employer did not provide, or provided inadequate or faulty PPE, NOT PFAS)
12. Inspect PPE for functionality (e.g., when PPE failed)
13. Enforce use of PPE
14. Provide functional PFAS (e.g., the employer did not provide, or provided inadequate or faulty PFAS)
15. Inspect PFAS functionality (e.g., when PFAS failed)
16. Enforce use of PFAS
19. Other

B.2. Equipment

21. Provide proper equipment for the task
22. Inspect equipment for functionality/condition (e.g., in cases with faulty lifts, broken seatbelt or backup alarm, worn labels that are illegible, damaged boards used as scaffold planks)
23. Enforce proper use of equipment
24. Install safety protection (e.g., guardrails, nets, alarms, warning signs)
25. Prevention through design (e.g., safety features added by manufacturer to equipment, safer design of worksite)
29. Other

B.3. Training

31. Provide job training (does NOT include safety training, but if both are mentioned, use both 31 and 32)
32. Provide safety training (includes ensuring employee awareness of safe work procedures)
33. CPR training (Cardiopulmonary resuscitation)
34. Provide training in a language the employee can understand
35. Train local emergency medical services on safe worksite practices and rescue procedures prior to incident (e.g., when and how to enter a trench in case of collapse)
39. Other

B.4. Organizational

41. Develop safety checklist
42. Conduct job safety (hazard) analysis
43. Ensure safe worksite conditions (e.g., barricade area below overhead work, restrict roof work during high winds)
44. Improve employer awareness (e.g., become familiar with available resources on safety standards and safe work practices, monitor workers for signs of alcohol and drug use)
45. Verify employee qualifications for the job (e.g., employee has proper training or certifications for equipment operation or task performance)
46. Designate competent person for worksite safety monitoring
47. Establish clear communication system (e.g., spotters, 2-way radios, signal person)
48. Enforce safety requirements of subcontractors (e.g., subcontractors must provide general contractors with written comprehensive safety program)
49. Other

B.5. Violations

51. Enforce child labor laws
52. Disciplinary procedures for non-cooperation
59. Other

B.6. Other

999. Other (not under any major categories)

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