ARTICLE

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Fatalities in the construction industry: findings from a revision of the BLS Occupational Injury and Illness Classification System

Version 2.01 of the BLS Occupational Injury and Illness Classification System enables researchers to more readily identify factors that contribute to construction industry fatalities and provide the industry with insight into developing injury prevention strategies; the revision improves on current safety and health surveillance and will have long-term effects on safety and health intervention programs and policies targeted at both the construction industry and the overall U.S. workforce.

Construction, one of the largest industries in the United States, is also one of the most dangerous. Despite a decline in overall construction injuries thanks to continual prevention and intervention efforts, workers in the industry are still at high risk.[1] In 2011, the construction industry experienced 781 fatal injuries, more than any other industry in the United States.[2] Accordingly, tracking construction safety and health performance is an important long-term task that will continue to provide updated and accurate information aimed at preventing injuries and illnesses in the industry.

Because of the nature of the work, occupational hazards and exposures in construction are quite different from those in other industries. For example, injuries from falls claim more than one-third of fatalities in construction, accounting for about 40 percent of all work-related fatal falls in the United States.[3] As a result, detailed information on falls to a lower level is critical for preventing injuries in construction, but is less relevant to industries which are rarely exposed to hazards that may lead to such falls. Hazards and exposures also vary within construction occupations. For instance, roofers and ironworkers both have a high risk of fatal falls; however, the types of fall-related hazards that they experience on their respective jobsites may be different.[4] As Joyce Northwood, Eric Sygnatur, and Janice Windau stated, "occupational injuries and illnesses require a context to be best understood."[5] Pinpointing specific causes and circumstances that characterize workplace injuries is essential for developing strategies to protect workers from injuries.

Notwithstanding the importance of information underlying falls and other severe workplace injuries, previous data available were insufficient for detailed analysis. For example, despite using data from the Bureau of Labor Statistics (BLS, the Bureau)—the major source for data on occupational injuries and illnesses in the United States—researchers were unable to obtain details regarding fatalities that were due to falls from roofs.[6] Thus, they failed to identify risk factors for such fatalities and were thereby prevented from formulating strategies that could mitigate those factors. Similarly, questions such as "How many workers died from falls from roofs under 15 feet high?" and "How many pedestrians died from being struck by a vehicle backing up in a roadway or nonroadway area?" were repeatedly asked but remained unanswered for years.

The restructuring of the Occupational Injury and Illness Classification System (OIICS version 2.01) in 2012 has provided a research tool for those who have been longing for detailed information on occupational injuries. OIICS version 2.01 is the first such restructuring since the OIICS was initially released in 1992.[7] To enhance understanding of the revised coding system, this article uses 2010 and 2011 data from the Census of Fatal Occupational Injuries (CFOI) to analyze fatal injuries in

construction. The 2010 data are coded in accordance with the old OIICS, and the 2011 data are coded in conformity with the new, revised OIICS.

Method

The CFOI is conducted by the Bureau through a federal–state cooperative program that has been implemented in all 50 states and the District of Columbia since 1992.[8] The 2011 CFOI data were coded on the basis of OIICS version 2.01, whereas 2010 CFOI data were classified by the 2007 version of OIICS. Two sections of the coding systems—"Event and Exposure" and "Source"—were selected for analysis. The "Event" section covers the manner in which the incident occurred. For example, fires, falls, and vehicular collisions are all "Events." The "Source" section includes codes that identify "objects, substances, equipment, and other factors that were responsible for the injury or illness or that precipitated the event."[9] For example, chemicals, machinery, tools, and vehicles are all "Sources."[10] Detailed analysis focused on two major events in construction: falls and transportation incidents. Cross-tabulations were produced for construction fall fatalities by "Primary Source." The number of fatalities in construction includes all deaths that were coded as belonging in NAICS 23, regardless of whether the worker was self-employed or employed in the private or public sector. These counts may differ from those presented in certain BLS tabulations, which show separate totals for the public and private sectors. The 2010 data presented in this article were generated with SAS version 9.2 under restricted access to BLS CFOI microdata.

Results

Both the new and the old OIICSs have four component structures; two are used to depict the circumstances of the incident (i.e., "Event or Exposure" and "Source of Injury or Illness/Secondary Source"), and two are used to describe the characteristics of the injury or illness (i.e., "Nature" and "Part of Body Affected"). The analysis presented here focuses on the structures and components used to explain the circumstances of the incident. Although both versions of OIICS are organized hierarchically by four-digit numeric codes, the new version eliminated the "0" subsection from "Event" and "Source." (See tables 1 and 2.) This seemingly minor change has made data manipulation in spreadsheets and statistical packages more efficient without conflating codes. In addition, OIICS 2.01 includes a new "Event" category—*Falls, slips, trips*—developed by combining *Falls* with *Slip, trip, and loss of balance—without fall* from the previous version. (See table 3.) This revision makes sense from an intervention standpoint because prevention methods may be the same for slips and trips, regardless of whether or not they result in a fall. Also, the "Source" categories *Containers* and *Furniture and fixtures*, which were separate categories under "Source" in the 2007 version, are combined into one category in version 2.01. (See table 2.) In addition, the order of the "Event" codes has been changed and clearly represents the coding precedence. For example, in the new system, if a worker falls because of a coworker's push, the "Event" is coded as *Intentional injury by person* (code 11) rather than *Falls, slips, trips* (code 4). (See table 1.) The coding would have been similar in the old version; however, the codes were not rank ordered, making their precedence difficult to follow.

Table 1. Coding for "Event or Exposure" for fatal work injuries in the construction industry

OIICS 2.01		2011	
Code	Title	Fatalities	Percent
…	Total	781	100.0
1	Violence and other injuries by persons or animals	33	4.2
11	Intentional injury by person	26	3.3
2	Transportation incidents	221	28.3
24	Pedestrian vehicular incident	78	10.0
26	Roadway incident involving motorized land vehicle	102	13.1
27	Nonroadway incident involving motorized land vehicle	27	3.5
3	Fires and explosions	11	1.4
4	Falls, slips, trips	269	34.4
43	Falls to lower level	260	33.3
5	Exposure to harmful substances or environments	113	14.5
51	Exposure to electricity	70	9.0
53	Exposure to temperature extremes	19	2.4
55	Exposure to other harmful substances	24	3.1
6	Contact with objects and equipment	132	16.9
62	Struck by object or equipment	80	10.2
64	Caught in or compressed by equipment or objects	19	2.4

OIICS 2.01		2011	
65	Struck, caught, or crushed in collapsing structure, equipment, or material	32	4.1
7	Overexertion and bodily reaction	–	–
9999	Nonclassifiable	–	–
OIICS 2007			2010
Code	**Title**	**Fatalities**	**Percent**
…	Total	802	100.0
0	Contact with objects and equipment	141	17.6
02	Struck by object or equipment	66	8.2
03	Caught in or compressed by equipment or objects	33	4.1
04	Caught in or crushed in collapsing materials	38	4.7
1	Falls	267	33.3
11	Fall to lower level	256	31.9
2	Bodily reaction and exertion	–	–
3	Exposure to harmful substances or environments	126	15.7
31	Contact with electric current	76	9.5
32	Contact with temperature extremes	19	2.4
34	Exposure to caustic, noxious, or allergenic substances	23	2.9
38	Oxygen deficiency (including drowning)	8	1.0
4	Transportation incidents	209	26.1
41	Highway incident	106	13.2
42	Nonhighway incident, except rail, air, water	30	3.7
43	Worker struck by vehicle, mobile equipment	55	6.9
44	Railway incident	12	1.5
5	Fires and explosions	27	3.4
6	Assaults and violent acts	30	3.7
61	Homicides	8	1.0
62	Self-inflicted injuries	22	2.7
9	Other events or exposures	–	–
9999	Nonclassifiable	–	–

Note: Dash indicates no data reported or data do not meet BLS data release criteria.
Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries.

Table 2. Coding for "Source" for fatal work injuries in the construction industry

OIICS 2.01	2011

Code	Title	Fatalities	Percent
…	Total	781	100.0
1	Chemicals and chemical products	26	3.3
2	Containers, furniture, and fixtures	12	1.5
3	Machinery	105	13.4
32	Construction, logging, and mining machinery	65	8.3
34	Material and personnel handling machinery	33	4.2
4	Parts and materials	64	8.2
41	Building materials—solid elements	18	2.3
44	Machine, tool, and electric parts	38	4.9
5	Persons, plants, animals, and minerals	46	5.9
56	Person—injured or ill worker	20	2.6
57	Person—other than injured or ill worker	10	1.3
58	Plants, trees, vegetation—not processed	9	1.2
6	Structures and surfaces	214	27.4
61	Confined spaces	17	2.2
62	Buildings—office, plant, residential	14	1.8
63	Structures other than buildings	51	6.5
65	Other structural elements	119	15.2
7	Tools, instruments, and equipment	78	10.0
74	Ladders	70	9.0
8	Vehicles	212	27.1
84	Highway vehicles, motorized	186	23.8
86	Off-road and industrial vehicles—powered	16	2.0
...	All other	24	3.1
OIICS 2007			**2010**
Code	**Title**	**Fatalities**	**Percent**
...	Total	802	100.0
0	Chemicals and chemical products	28	3.5
1	Containers	12	1.5
2	Furniture and fixtures	5	.6
3	Machinery	81	10.1
32	Construction, logging, and mining machinery	57	7.1
34	Material handling machinery	21	2.6
4	Parts and materials	90	11.2

41	Building materials—solid elements	31	3.9
44	Machine, tool, and electric parts	44	5.5
5	Persons, plants, animals, and minerals	15	1.9
6	Structures and surfaces	297	37.0
62	Floors, walkways, ground surfaces	267	33.3
7	Tools, instruments, and equipment	22	2.7
8	Vehicles	190	23.7
82	Highway vehicles, motorized	172	21.4
85	Plant and industrial powered vehicles, tractors	12	1.5
...	All other	62	7.7

Note: Dash indicates no data reported or data do not meet BLS data release criteria.
Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries.

With detailed codes for fall injuries in the revised version, the two coding sequences differ substantially in the "Event" section as follows (see table 3):

Version 2.01, "Event or Exposure" component:

> *Falls, slips, trips* (4) → *Falls to lower level* (43) → *Fall through surface or existing opening* (432) → *26 to 30 feet* (4326).

Version 2007, "Event or Exposure" component:

> *Falls* (1) → *Fall to lower level* (11) → *Fall from roof* (115) → *Through existing roof opening* (1151).

Table 3 presents fatal falls in construction by detailed "Event" category. The table shows that the category with the greatest number of construction falls was *Falls to lower level* (2011: *n* = 260; 2010: *n* = 256). The third digit in version 2.01 introduces the three major subcategories of *Falls to lower level*: *Fall through surface or existing opening*, *Fall from collapsing structure or equipment*, and *Other fall to lower level*, into which 72 percent of fatal falls in 2011 were categorized. The fourth digit in version 2.01 provides details about the distance of the fall: *Less than 6 feet*, *6 to 10 feet*, *11 to 15 feet*, and so on. About 30 percent of fatal falls were from a height of 15 feet or less. The 2007 version classifies *Fall to lower level*, such as falling from a ladder, from a roof, and from scaffolding or staging, among others, at the third digit. In 2010, 34 percent of fatal falls in construction were categorized as *Falls from roof*. Most of the third-digit categories were moved from "Event" to "Source" in version 2.01. According to the new classification rules, for most types of "Event," a "Source" that "directly produced or inflicted the injury or illness" has been replaced by what is actually responsible for the injury or illness.[11] For example, if a person fell from a platform and hit the ground, the old coding system would have listed the "Source" as *Ground*; in contrast, the new coding system lists the "Source" as *Platform*. Another data element, the "Secondary Source," is now available to indicate contributing factors, such as ice or other objects that contributed to a fall. Previously, "Secondary Source" indicated what the worker fell from.

Table 3. Coding for falls, slips, and trips (OIICS 2.01) and for falls (OIICS 2007) in the construction industry

OIICS 2.01		2011	
Code	Title	Fatalities	Percent
4	Falls, slips, trips	269	100.0
40	Fall, slip, trip, unspecified	–	–
41	Slip or trip without fall	–	–
42	Falls on same level	5	1.9
43	Falls to lower level	260	96.7
431	Fall from collapsing structure or equipment	24	8.9
4310	Unspecified	–	–
4311	Less than 6 feet	–	–
4312	6 to 10 feet	–	–
4313	11 to 15 feet	–	–
4314	16 to 20 feet	7	2.6
4315	21 to 25 feet	–	–
4316	26 to 30 feet	–	–
4317	More than 30 feet	10	3.7
432	Fall through surface or existing opening	35	13.0
4320	Unspecified	–	–
4321	Less than 6 feet	–	–
4322	6 to 10 feet	–	–

OIICS 2.01		2011	
4323	11 to 15 feet	5	1.9
4324	16 to 20 feet	9	3.3
4325	21 to 25 feet	–	–
4326	26 to 30 feet	6	2.2
4327	More than 30 feet	9	3.3
433	Other fall to lower level	194	72.1
4330	Unspecified	20	7.4
4331	Less than 6 feet	13	4.8
4332	6 to 10 feet	21	7.8
4333	11 to 15 feet	37	13.8
4334	16 to 20 feet	29	10.8
4335	21 to 25 feet	20	7.4
4336	26 to 30 feet	19	7.1
4337	More than 30 feet	35	13.0
44	Jump to lower level	–	–
45	Fall or jump curtailed by personal fall arrest system	–	–
49	Fall, slip, trip, n.e.c.	–	–
OIICS 2007			**2010**
Code	**Title**	**Fatalities**	**Percent**
1	Falls	267	100.0
10	Fall, unspecified	–	–
11	Fall to lower level	256	95.9
110	Fall to lower level, unspecified	–	–
111	Fall down stairs or steps	5	1.9
112	Fall from floor, dock, or ground level	–	–
1120	From floor, dock, or ground level, unspecified	–	–
1121	Through existing floor opening	–	–
1122	Through floor surface	–	–
1123	Through loading dock	–	–
1124	From ground level to lower level	–	–
1129	From floor, dock, or ground level, n.e.c.	–	–
113	Fall from ladder	69	25.8
114	Fall from piled or stacked materials	–	–
115	Fall from roof	90	33.7

OIICS 2.01		2011	
1150	From roof, unspecified	–	–
1151	Through existing roof opening	6	2.2
1152	Through roof surface	13	4.9
1153	Through skylight	11	4.1
1154	From roof edge	43	16.1
1159	From roof, n.e.c.	–	–
116	Fall from scaffold, staging	37	13.9
117	Fall from building girder or other structural steel	15	5.6
118	Fall from nonmoving vehicle	17	6.4
119	Fall to lower level, n.e.c.	17	6.4
12	Jump to lower level	–	–
122	Jump from structure, structural element, n.e.c.	–	–
13	Fall on same level	8	3.0
130	Fall on same level, unspecified	–	–
131	Fall to floor, walkway, or other surface	7	2.6
132	Fall onto or against objects	–	–
139	Fall on same level, n.e.c.	–	–
19	Fall, n.e.c.	–	–

Note: Dash indicates no data reported or data do not meet BLS data release criteria; n.e.c. = not elsewhere classified.
Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries. The fatality data for 2010 were generated under restricted access to BLS data.

The increase in granularity in OIICS version 2.01 also becomes evident in a comparison of pedestrian vehicular incidents, which are classified under *Transportation incidents* (2011: $n = 221$; 2010: $n = 209$). (See table 4.) An examination of table 4 shows that categories in version 2.01 were expanded to four-digit classification from three-digit classification in the 2007 version. The fourth digit for the 2011 data is more clearly defined and provides more detail than the earlier classification. For example, in the new version, the direction of the vehicle's motion, such as *forward-moving* or *backing up*, is captured. In addition, a separate category for incidents occurring in work zones was added; in 2011, 28 construction workers were killed *by forward-moving vehicles in work zones* and 14 were killed *by vehicles backing up in work zones.* In the 2007 version, pedestrian incidents are classified only by the following locations: *roadway, side of road, or parking lot/nonroadway area*.

Table 4. Coding for pedestrian vehicular incident injuries (OIICS 2.01) and for pedestrian, nonpassenger struck by vehicle, mobile equipment injuries (OIICS 2007) in the construction industry

OIICS 2.01	2011

Code	Title	Fatalities	Percent
2	Transportation incidents	221	100.0
24	Pedestrian vehicular incident	78	35.3
240	Pedestrian vehicular incident, unspecified	–	–
241	Pedestrian struck by vehicle in work zone	45	20.4
2410	By vehicle in work zone, unspecified	–	–
2411	By vehicle propelled by another vehicle in work zone	–	–
2412	By forward-moving vehicle in work zone	28	12.7
2413	By vehicle backing up in work zone	14	6.3
2419	By vehicle in work zone, n.e.c.	–	–
242	Pedestrian struck by vehicle in roadway	8	3.6
2420	By vehicle in roadway, unspecified	–	–
2421	By vehicle propelled by another vehicle in roadway	–	–
2422	By forward-moving vehicle in roadway	7	3.2
2423	By vehicle backing up in roadway	–	–
2429	By vehicle in roadway, n.e.c.	–	–
243	Pedestrian struck by vehicle on side of road	5	2.3
2430	By vehicle on side of road, unspecified	–	–
2431	By vehicle propelled by another vehicle on side of road	–	–
2432	By forward-moving vehicle on side of road	5	2.3
2433	By vehicle backing up on side of road	–	–
2439	By vehicle on side of road, n.e.c.	–	–
244	Pedestrian struck by vehicle in nonroadway area	18	8.1
2440	By vehicle in nonroadway area, unspecified	–	–
2441	By vehicle propelled by another vehicle in nonroadway area	–	–
2442	By forward-moving vehicle in nonroadway area	6	2.7
2443	By vehicle backing up in nonroadway area	11	5.0
2449	By vehicle in nonroadway area, n.e.c.	–	–
249	Pedestrian vehicular incident, n.e.c.	–	–
OIICS 2007			**2010**
Code	**Title**	**Fatalities**	**Percent**
4	Transportation incidents	209	100.0
43	Pedestrian, nonpassenger struck by vehicle, mobile equipment	55	26.3
431	By vehicle, mobile equipment in roadway	27	12.9
432	By vehicle, mobile equipment on side of road	15	7.2

433	By vehicle, mobile equipment in parking lot or nonroadway area	13	6.2

Note: Dash indicates no data reported or data do not meet BLS data release criteria; n.e.c. = not elsewhere classified.
Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries. The fatality data for 2010 were generated under restricted access to BLS data.

Additional information on non-transport-related incidents involving vehicles is available from the category *Contact with objects and equipment* in version 2.01. Separate categories are available for being struck by a rolling vehicle; a swinging or falling part of a vehicle, such as a boom; a vehicle tipping over; or an object falling from a vehicle.

Table 5 uses fatal falls in construction according to the old and new codes to illustrate the noteworthy changes in "Source." In OIICS version 2.01, "Source" is categorized by what is responsible for the injury instead of what directly produced the injury, as in OIICS version 2007. By the new codes, *Roofs* (34 percent) and *Ladders* (24 percent) were the predominant "Primary Source" of fatal *Falls, slips, and trips* in construction in 2011. By the old codes, *Ground* and *Floors* together were the "Source" of 68 percent of fatal falls in construction in 2010. Similarly, other sources, such as *Machinery* and *Vehicles*, were not often used to identify construction falls in the old version, but provide important information in the new version.

Table 5. Coding for falls, slips, and trips (OIICS 2.01) and for falls (OIICS 2007), by primary source, in the construction industry

OIICS 2.01		2011	
Code	Title	Fatalities	Percent
...	Total	269	100.0
3	Machinery	14	5.2
34	Material and personnel handling machinery	14	5.2
346	Elevators, hoists, aerial lifts, personnel platforms—except truck-mounted	10	3.7
3467	Aerial lifts, scissor lifts—except truck-mounted	8	3.0
6	Structures and surfaces	173	64.3
62	Buildings—office, plant, residential	5	1.9
63	Structures other than buildings	45	16.7
634	Scaffolds, staging	35	13.0
6342	Scaffolds—self-supporting staging	13	4.8
635	Towers, poles	5	1.9
65	Other structural elements	107	39.8
654	Roofs	91	33.8
6541	Skylights	9	3.3
6542	Existing roof openings, other than skylights	7	2.6
6543	Roof surface, other than roof edge	14	5.2
6544	Roof edges	48	17.8
655	Trusses, girders, beams—structurally attached	8	3.0
66	Floors, walkways, ground surfaces	9	3.3
7	Tools, instruments, and equipment	64	23.8
74	Ladders	64	23.8
742	Movable ladders	44	16.4
7421	Extension ladders	13	4.8
8	Vehicles	13	4.8
84	Highway vehicle, motorized	8	3.0

OIICS 2.01		2011	
842	Trucks—motorized freight hauling and utility	8	3.0
86	Off-road or industrial vehicle—powered	5	1.9
862	Industrial vehicles, material hauling and transport—powered	5	1.9
8621	Forklift, order picker, platform truck—powered	5	1.9
...	All other	5	1.9
OIICS 2007			2010
Code	**Title**	**Fatalities**	**Percent**
...	Total	267	100.0
6	Structures and surfaces	251	94.0
62	Floors, walkways, ground surfaces	244	91.4
620	Floors, walkways, ground surfaces, unspecified	10	3.7
622	Floors	77	28.8
623	Ground	105	39.3
624	Sidewalks, paths, outdoor walkways	27	10.1
626	Street, road	11	4.1
628	Parking lots	7	2.6
629	Other floors, walkways, ground surfaces	6	2.2
...	All other	16	6.0

Note: Dash indicates no data reported or data do not meet BLS data release criteria; n.e.c. = not elsewhere classified.
Source: U.S. Bureau of Labor Statistics, Census of Fatal Occupational Injuries. The fatality data for 2010 were generated under restricted access to BLS data.

Discussion

The coding in OIICS version 2.01 provides more detailed information than that in version 2007, thus enhancing the system's usefulness in injury prevention. With respect to common fatalities in the construction industry, additional information is available on falls and on pedestrians struck by vehicles, which together accounted for 44 percent of construction fatalities in 2011. Information on the height of falls, along with information on what the worker fell from, can be used in designing fall prevention equipment and developing industry safety standards and best practices. Information on the prevalence of pedestrian fatalities resulting from backward- vs. forward-moving vehicles and in work zones can be used in developing intervention strategies to limit interactions between workers and these vehicles. Finally, the removal of codes with leading zeros makes data manipulation (e.g., data sorting) easier and eliminates confusion between codes, such as might exist between 0319 and 319.

The new coding system does have several disadvantages. One of them is that implementing it increases the difficulty in analyzing data across years. There are nearly 20 years of BLS injury, illness, and fatality data coded according to the 2007 version of OIICS. With the new categories and rules of selection, not all data prior to 2011 are comparable to data from 2011 and forward. Another disadvantage of the new system becomes evident when one is looking at construction falls. The "Event"

category *Fall to lower level* in version 2007 specified primarily what the worker fell from. (See table 3.) Although this information is still available, more than 70 percent of fatalities due to falls in 2011 are categorized in version 2.01 as *Other fall to lower level*, a category that is too general to be useful. As a result, detailed information on injuries due to falls must be elicited by cross-tabulation of the "Event" and "Source" sections in version 2.01. Moreover, information on the distance the worker fell was not reportable for about 10 percent of the fatal falls to a lower level in construction in 2011. Most of these deaths involved self-employed workers or occurred several months after the initial injury and, therefore, were less likely to have a detailed investigation report describing the incident. This disadvantage affects nonfatal injuries in construction even more: the distance the worker fell was missing for 51 percent of the nonfatal falls to a lower level in private sector construction in 2011.[12] Researchers must use the data with caution in cases where half of the values are missing.

The study presented in this article is based on the first release of data coded according to the newly released OIICS version 2.01. Future studies could include analyzing other "Events" and associated "Sources," such as *Contact with objects and equipment*, which accounted for 132 fatal injuries in the construction industry in 2011. Studies could also evaluate detailed data for *non*fatal injuries in construction. Once data for several years are classified according to the new OIICS, time-series studies will be possible. Comparing the data before and after the new codes over a longer period than that examined here could give a better idea of the impact of the new codes on safety and health surveillance, as well as be helpful in tracking progress in safety and health in the construction industry.

Notes

[1] *The construction chart book: the U.S. construction industry and its workers,* 5th ed. (Silver Spring, MD: CPWR—The Center for Construction Research and Training, 2013).

[2] Census of Fatal Occupational Injuries (U.S. Bureau of Labor Statistics, 2011), table A-3, "Fatal occupational injuries to private sector wage and salary workers, government workers, and self-employed workers by industry, All U.S., 2011," http://www.bls.gov/iif/oshwc/cfoi/cftb0261.pdf.

[3] Census of Fatal Occupational Injuries (U.S. Bureau of Labor Statistics, 2011), table A-1. "Fatal occupational injuries by industry and event or exposure, all U.S., 2011," http://www.bls.gov/iif/oshwc/cfoi/cftb0259.pdf.

[4] *The construction chart book*.

[5] Joyce M. Northwood, Eric F. Sygnatur, and Janice A. Windau, "Updated BLS Occupational Injury and Illness Classification System," *Monthly Labor Review*, August 2012, pp. 19–28, http://www.bls.gov/opub/mlr/2012/08/art3full.pdf.

[6] Tycho K. Fredericks, Osama Abudayyeh, Sang D. Choi, Mike Wiersma, and Marcia Charles, "Occupational injuries and fatalities in the roofing contracting industry," *Journal of Construction Engineering and Management*, November 2005, pp. 1233–1240.

[7] *Occupational Injury and Illness Classification System manual* (U.S. Bureau of Labor Statistics, January 10, 2014), http://www.bls.gov/iif/oshoiics.htm. A minor update to the original OIICS manual was released in 2007. This update (referred to as OIICS 2007) entailed a few changes in code titles, some corrections, and several additions to the alphabetic indexes. OIICS 2.01 is a minor update to version 2.0, which was released in 2010.

[8] For more information on the CFOI, see *BLS handbook of methods*, chapter 9, "Occupational safety and health statistics" (U.S. Bureau of Labor Statistics), http://www.bls.gov/opub/hom/pdf/homch9.pdf.

[9] *Occupational Injury and Illness Classification System manual*.

[10] Northwood, Sygnatur, and Windau, "Updated BLS System."

[11] Ibid.

[12] Survey of Occupational Injuries and Illnesses, table R64, "Number of nonfatal occupational injuries and illnesses involving days away from work by event or exposure leading to injury or illness and industry sector, private industry, 2011" (U.S. Bureau of Labor Statistics), http://www.bls.gov/iif/oshwc/osh/case/ostb3266.pdf.

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