



A national safety stand-down to reduce construction worker falls



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ABSTRACT

Introduction: Falls are the leading cause of death and third leading cause of non-fatal injuries in construction. In an effort to combat these numbers, The National Campaign to Prevent Falls in Construction began in April 2012. As the campaign gained momentum, a week called the National Safety Stand-Down to Prevent Falls was launched to draw attention to the campaign and its goals. The purpose of this paper is to examine the reach of the Stand-Down and lessons learned from its implementation. **Methods:** The Occupational Safety & Health Administration offered a certificate of participation during the Stand-Down. To print the certificate, respondents provided information about their company and stand-down event. CPWR - The Center for Construction Research and Training conducted analyses on the data collected to assess reach and extent of participation. **Results:** In 2014, 4,882 stand-downs were reported. The total number reported in 2015 was 3,759. The number of participants, however, increased from 770,193 in 2014 to 1,041,307 in 2015. **Discussion:** The Stand-Down successfully reached the construction industry and beyond. Respondents were enthusiastic and participated nationally and internationally in variety of activities. They also provided significant feedback that will be influential in future campaign planning. **Conclusion:** Numbers of Stand-Downs and participants for both years are estimated to be substantially higher than the data recorded from the certificate database. While we cannot determine impact, the reach of the Stand-Down has surpassed expectations. **Practical applications:** The data gathered provide support for the continuation of the Stand-Down. Campaign planners incorporated findings into future Stand-Down planning, materials creation, and promotion. This analysis also provides insight on how organizations can partner to create targeted national campaigns that include activities stakeholders in the construction industry respond to, and can be used to replicate our efforts for other safety and health initiatives in construction and other industries.

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1. Problem

According to CPWR – The Center for Construction Research and Training's *Construction Chart Book* (2013), falls are the leading cause of death and the third leading cause of non-fatal injuries in the construction industry. Numbers fluctuate from year to year, but averaged 360 deaths annually during 1992 and 2010, a total of 6,858 construction workers. The 2014 Census of Fatal Occupational Injuries showed that fall injuries were responsible for 359 construction worker deaths, accounting for about 40% of all fatal work injuries in construction. Of those deaths, 111, or approximately one-third, occurred in residential construction (Bureau of Labor Statistics, 2016a). Falls also led to 17% of worker fatalities in all industries combined (not just construction) in 2014 (Bureau of Labor Statistics, 2016b).

In 1996, the National Institute for Occupational Safety and Health (NIOSH) engaged the construction sector through a government-labor-management partnership, representing state and federal government agencies (including the Occupational Safety and Health Administration

(OSHA)), professional organizations, trade associations, labor organizations, and private industry (including CPWR—The Center for Construction Research and Training) through the National Occupational Research Agenda (NORA). In 2008, this partnership identified construction falls as a key area requiring national attention. In setting a goal to address the sustained burden of construction-related fall injuries and fatalities, developing a national campaign, aimed at construction contractors, onsite supervisors, was a key component (Branche, 2013).

The National Campaign to Prevent Falls in Construction began in April 2012, originally targeting those most vulnerable to falls—residential contractors and workers (CPWR, 2013). The goal of the campaign is mainly to promote fall prevention and provide education on fall hazards and solutions. Despite the fact that many viable solutions exist to prevent falls from various heights, falls are still a large issue in the industry due to a lack of education and awareness of how to properly implement the solutions. Participants of the campaign are encouraged to conduct education in a way that suits their company, jobsite, and workers, and are provided access to a variety of materials and plans from the campaign to assist them in whatever method they choose. As the campaign gained momentum during 2012–2013, OSHA, NIOSH and CPWR, who are key partners in developing the campaign, decided

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to dedicate a week to draw attention to the campaign and fall prevention in general. This week, called the National Safety Stand-Down to Prevent Falls, launched in June 2014. The term 'stand-down' is used to describe a period of time during which an entire jobsite or company stops all work to focus on a specific issue or hazard, in this case falls. Companies were encouraged to use the Stand-Down to educate workers, inspect ladders and fall protection equipment, conduct drills and demonstrations, and more.

The first Stand-Down was held for one week, June 2–6, 2014. The second Stand-Down was held for two weeks, May 4–15, 2015. During both Stand-Downs, OSHA offered a certificate of participation through their website. OSHA used the certificates as an informal method of collecting data on participation. To print the certificate, respondents were asked to provide some information about their company, or the company they work for, and the stand-down event they participated in. OSHA invited CPWR to analyze the data to learn more about the reach of the Stand-Down and to help determine if future events would be worthwhile. This article presents what was learned from the 2014 and 2015 Stand-Downs. It highlights the unique public-private partnership of the campaign in general, and communicates the results of an evaluation that is the first of its kind on a large-scale social marketing campaign in the construction industry. Such a large amount of data and feedback as this is not typically available in construction, and with the industry being so decentralized learning how to better diffuse consumable safety and health messages to a large number of contractors and workers in real time is critical.

2. Methods

2.1. Data collection

All data were generated from OSHA's certificate of participation database. All information was provided by respondents voluntarily. Every time an individual or company logged in to receive a certificate, they were asked to provide information about their Stand-Down event. All results reported here are based only on self-reported data within six fields requested through the database. Required fields included Name of Business, State, Type of Industry, and Number of Workers who Participated. Optional fields included two open-ended questions: (1) Please tell us about your stand-down. What did you do? What materials did you use? How did it go? What do you expect to happen as a result of the Stand-Down?; and (2) How can we improve future initiatives like this? What could have been better? Each entry is equivalent to one stand-down and will be referred to as such in this report.

To address privacy concerns, CPWR signed a confidentiality agreement with OSHA prohibiting the release of identifying information and restricting us from contacting a company or employee to request additional information. Company names and related details, as well as any employee names were kept confidential; only aggregated data are reported here. Specifically, only demographic and general descriptive data are used in the results.

2.2. Data analysis

The quantitative analysis was based on the following variables, as distilled from the questions listed above: (1) Company or individual name. In this article, both individuals and companies who provided information and received a certificate are referred to as respondents. No restrictions were placed on who could obtain a certificate of participation. Many respondents were owners or safety managers representing a company. Others were individual participants who had attended an event. Relationships between individuals and companies were not always clear. The number of stand-downs and the number of respondents are equal; both terms will be used depending on context. (2) Location/State; the Stand-Down was a domestic United States effort, but companies outside of the U.S. participated in both years, and data from these

international respondents are included in the analysis. Respondents were able to select "INTL" instead of a state when applicable. (3) Type of construction, including commercial construction, residential construction, non-construction,¹ other construction, highway, and government. (4) Number of participants, or individuals that attended a stand-down event as reported by participating companies.

The qualitative analysis was based on three variables: (1) Company or Individual Name (respondents); (2) Results or Activities Conducted; and (3) Recommended Improvements.

The majority of the 2014 data were analyzed following the 2014 Stand-Down; however some additional comparative analyses were conducted after receiving the 2015 data. In both years, the database was reviewed line-by-line prior to analysis in order to remove obvious duplicates and nonsensical responses. All analysis was done within an Excel database, using counting, sorting, and filtering.

For a portion of the 2015 Stand-Down, there was a technical problem in the OSHA certificate of participation database; 891 respondents were issued certificates, but the system did not save their responses to the six questions. At the request of OSHA these data were nonetheless included in our analyses. To do that, we calculated means for the quantitative variables (total number of respondents, number of respondents by location, number of respondents by construction sector, and number of participants) and interpolated these data using those means. The mean of each variable was converted to a percentage of the total number for that variable. Those percentages were then applied for the corresponding variables in the additional 891 responses, generating a total for each possible response that was then added to the original total.

3. Results

3.1. Quantitative analysis

The total number of respondents in 2014 (also the total number of stand-downs reported), was 4,882. The total number of respondents in 2015 (and the total number of stand-downs reported) was 3,759. The number of participants, however, increased from 770,193 in 2014 to 1,041,307 in 2015. This means that, on average, each stand-down event in 2015 included a larger number of participants.

3.1.1. Participation by type of construction

As shown in Table 1, the commercial construction sector made up over half the stand-downs in both 2014 and 2015, followed by other construction and non-construction. Government, residential, and highway construction comprised the lowest number of stand-downs in both years. In 2015, however, the percentage of participants reached in commercial construction dropped fairly drastically, and the percentage of participants in the government sector rose to 39%, despite making up only 7.5% of the total stand-downs.

3.1.2. Participation by region and state

Geographically, we focused on Stand-Down participation by OSHA region and by state. Tables 2 and 3 include regional numbers for both years, examined by total participation as well as by type of construction. In 2014, Region 4 (KY, TN, NC, SC, GA, AL, MS, FL) had the highest number of respondents (and the largest number of stand-downs), but Region 9 (CA, NV, AZ, HI, Guam, American Samoa) had the largest number of participants, primarily due to a very large turn-out in California. In 2015, Region 6 (NM, OK, AR, LA, TX) had the largest number of stand-downs based on a large number of respondents from Texas, but Regions 4 and 5 (MN, WI, MI, IL, IN, OH) had the largest number of

¹ The non-construction option differs from the other five sectors in that it implies no involvement in construction whatsoever.

Table 1
Participation in the National Safety Stand-Down by type of construction.

Type of construction	2015		2014	
	Number/percentage of stand-downs	Number/percentage of participants	Number/percentage of stand-downs	Number/percentage of participants
Commercial construction	1,933 (51%)	391,115 (38%)	2,498 (51%)	499,202 (65%)
Other construction	683 (18%)	88,094 (9%)	1,118 (23%)	134,718 (18%)
Non-construction	536 (14%)	117,876 (11%)	624 (13%)	80,588 (11%)
Government	282 (8%)	406,318 (39%)	198 (4%)	26,338 (3%)
Residential construction	224 (6%)	23,724 (2%)	275 (6%)	18,867 (2%)
Highway	101 (3%)	14,162 (1%)	169 (3%)	10,480 (1%)

Table 2
Analysis of 2015 stand-downs by OSHA region^a.

OSHA region	Total # of stand-downs (SD)	Total # of participants reached (Prtcptnt.)	Commercial construction (SD/Prtcptnt.)	Other construction (SD/Prtcptnt.)	Residential construction (SD/Prtcptnt.)	Non-construction (SD/Prtcptnt.)	Government (SD/Prtcptnt.)	Highway (SD/Prtcptnt.)						
1	183	20,514	81	10,768	30	2,781	16	951	43	5,164	5	73	8	777
2	304	31,447	151	19,730	72	6,528	20	1,402	37	1,750	18	1,933	6	104
3	478	242,000	229	22,274	89	7,246	21	5,559	95	9,627	28	191,516	16	5,778
4	615	230,025	349	44,683	80	5,838	32	3,955	80	11,278	58	162,370	16	1,901
5	560	76,953	339	41,669	110	8,456	38	2,136	50	22,866	10	807	13	1,019
6	674	158,383	296	43,656	148	43,507	22	969	110	51,466	77	17,134	21	1,651
7	189	29,261	86	12,223	14	964	31	2,505	43	6,875	2	5,212	13	1,482
8	173	14,474	115	10,703	40	2,963	8	180	8	326	1	98	1	204
9	398	49,983	212	23,462	67	4,833	25	5,130	46	5,172	44	10,471	4	915
10	127	20,305	54	5,124	24	1,186	10	96	13	696	23	12,872	3	331
INTL	58	167,962	21	156,823	9	3,792	1	859	11	2,656	16	3,832	0	0
Total	3,759	1,041,307	1,933	391,115	683	88,094	224	23,742	536	117,876	282	406,318	101	14,162

^a OSHA divides its local and regional offices by state, grouping states into one of ten distinct regions. Each region is made up of 4 to 8 states. A list of OSHA regions can be found on www.osha.gov.

participants. There were also an extremely large number of international participants in 2015, despite only 58 reported international stand-downs.

Figs. 1–4 show the amount of participation by individual state. In 2014, Texas had the largest number of stand-downs (n = 439), and the third largest number of participants (n = 40,438). California had the second largest number of stand-downs (n = 316), but the largest number of participants by far (n = 243,176).

In 2015, Texas again had the largest number of stand-downs (n = 414), and the third largest number of participants (n = 115,341). Virginia respondents reported only 63 stand-downs, but the largest number of participants at nearly 200,000 (n = 199,636). Similarly, Georgia respondents reported 103 stand-downs, but the second largest number of participants (n = 134,877). California and Florida also reported high stand-down numbers (n = 220 and n = 215 respectively).

3.2. Qualitative analysis

To determine the amount of overlap between 2014 and 2015 respondents, we compared the company/individual name category for both years. Five hundred ninety-eight respondents were listed in both years. There were 2,485 respondents that appeared only in the 2014 database and 1,492 that appeared only in 2015. It is important to note that these numbers are based only on the 2,868 responses from 2015 and do not include the additional 891 certificates.

Analyses were conducted for different topics based on descriptive data included in the comments and recommendations sections. The comments and recommendations sections were open-ended and not all respondents included descriptive data. Many responses, however, permitted acceptable estimated minimums, but not totals, for length

Table 3
Analysis of 2014 stand-downs by OSHA region^a.

OSHA region	Total # of stand-downs (SD)	Total # of participants reached (Prtcptnt.)	Commercial construction (SD/Prtcptnt.)	Other construction (SD/Prtcptnt.)	Residential construction (SD/Prtcptnt.)	Non-construction (SD/Prtcptnt.)	Government (SD/Prtcptnt.)	Highway (SD/Prtcptnt.)						
1	289	20,380	107	7,818	38	8,241	19	498	42	2,137	21	232	62	1,454
2	452	77,091	239	61,813	118	6,738	26	1,810	43	2,807	12	2,137	14	1,786
3	514	64,104	275	33,513	80	7,727	28	4,438	95	11,280	22	6,076	14	1,070
4	925	78,120	494	34,527	177	23,620	67	3,906	123	9,662	40	4,747	24	1,658
5	824	105,489	460	69,922	202	23,388	42	1,193	85	10,047	21	518	14	421
6	663	61,271	307	27,126	208	21,459	18	918	89	7,362	21	2,601	20	1,805
7	211	15,517	103	8,522	48	4,054	13	591	35	1,926	7	166	5	258
8	186	19,230	102	8,978	32	3,515	7	2,226	34	3,165	7	752	4	594
9	543	266,668	309	218,957	121	11,155	42	1,599	41	30,920	25	2,779	5	1,258
10	158	10,347	72	5,667	39	3,394	9	157	25	483	6	470	7	176
INTL	115	51,837	29	22,239	55	21,427	4	1,531	11	780	16	5,860	0	0
Total ^b	4,880	770,054	2,497	499,082	1,118	134,718	275	18,867	623	80,569	198	26,338	169	10,480

^a OSHA divides its local and regional offices by state, grouping states into one of ten distinct regions. Each region is made up of 4 to 8 states. A list of OSHA regions can be found on www.osha.gov.

^b Note: There is a discrepancy between the total number of stand-downs in the text (4,882) and the total listed here due to two of the respondents listing unidentifiable regions.

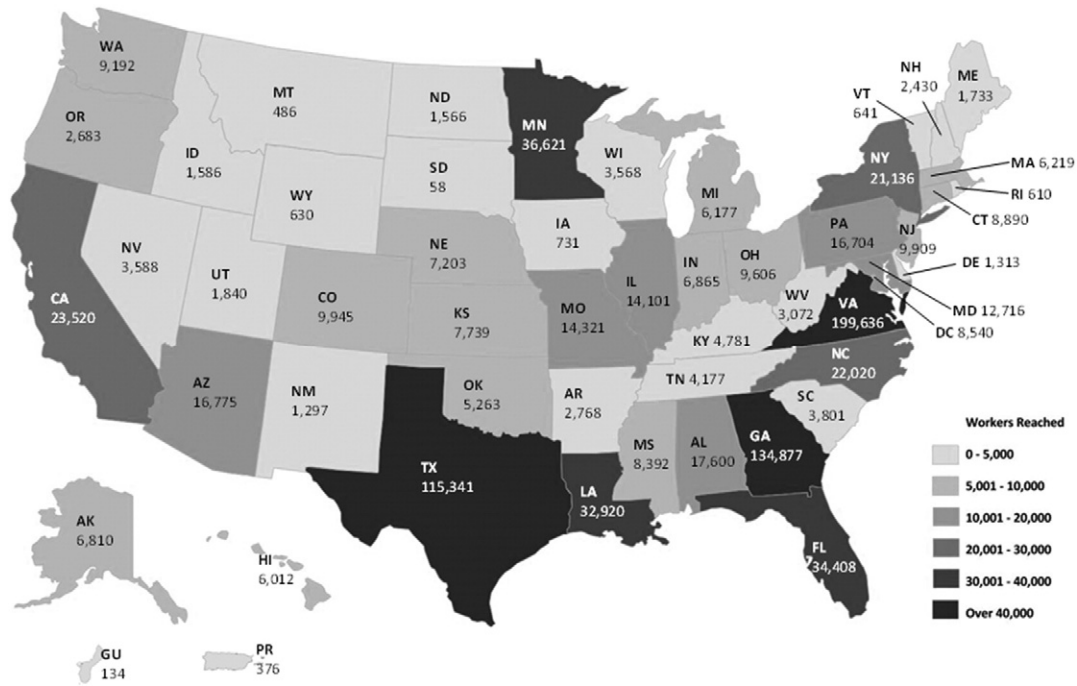


Fig. 1. Number of participants reached in National Safety Stand-Down by state in 2015.

and amount of participation, activities conducted, and other identifiable themes. In 2014, 3,271 respondents (67%) provided descriptive data and in 2015, 2,200 respondents (76.7%) did.

3.2.1. Length and amount of participation

The 2014 Stand-Down was five days long; 365 respondents participated for at least two of the five days, while 209 respondents indicated that they participated every day. The 2015 Stand-Down, on the other hand, was expanded to two work weeks (10 days). During those two weeks, 467 respondents participated on at least two separate days,

with 82 participating every day for one week, and 85 participating every day for two weeks. We also found that 409 respondents participated on more than one jobsite during 2014, and 449 respondents participated on more than one jobsite during 2015.

3.2.2. Activities conducted

We counted the activities reported by respondents who provided descriptions of their activities in the comments section, allowing us to determine which types of activities were most and least popular. As illustrated in Fig. 5, training, equipment inspections or audits, and

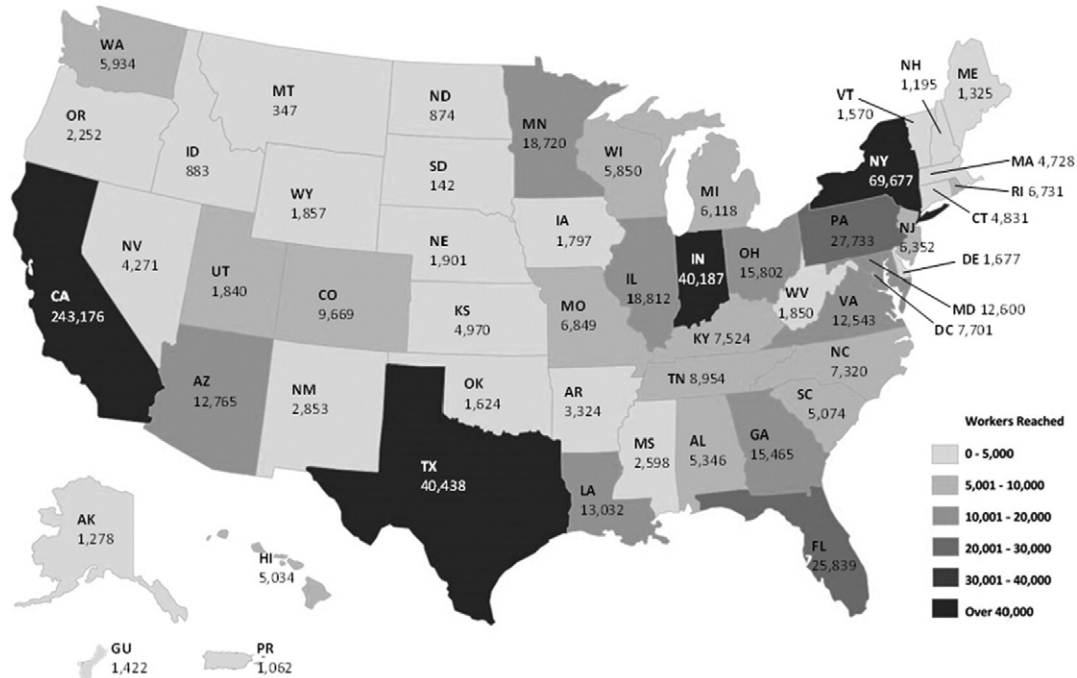


Fig. 2. Number of participants reached in National Safety Stand-Down by state in 2014.

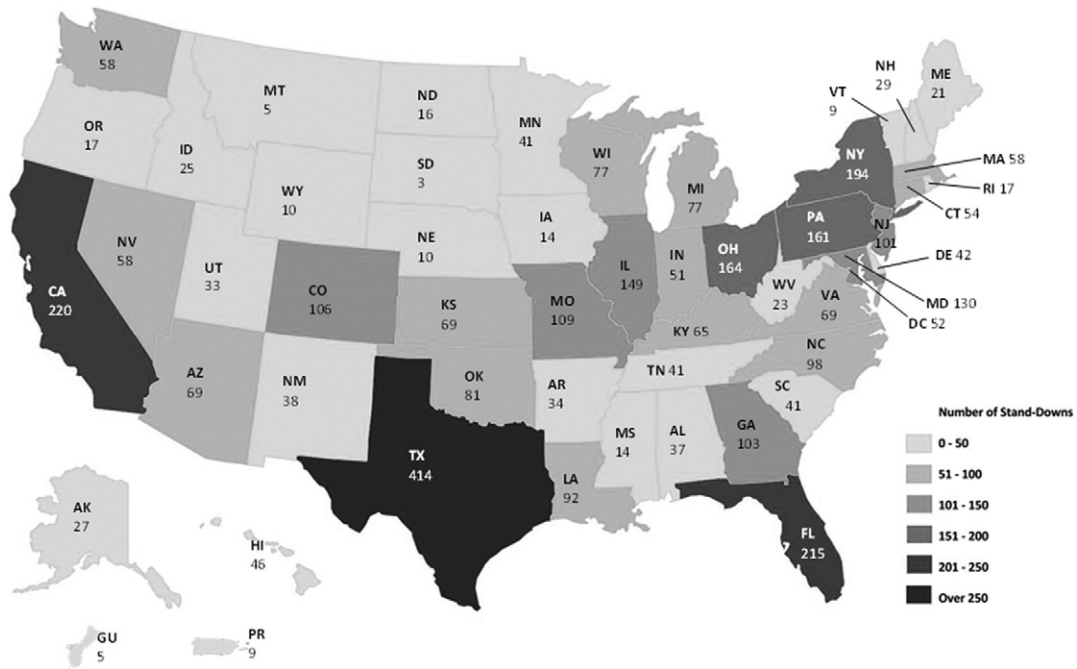


Fig. 3. Number of stand-downs by state in 2015.

toolbox talks were listed most often in 2015, while in 2014 meetings, training, and handouts were most popular.

The majority of the results following are not presented in tables due to the fact that they require additional description.

3.2.3. Characteristics of “small” stand-downs

One of the original goals of the Construction Falls Prevention Campaign was to reach small residential contractors and their workers, a subgroup that is notoriously difficult to reach in the construction industry. The term “small contractors” is defined differently based on type of construction, individual stakeholder or organization, and even context or situation. Our analysis of reach to small residential contractors

and their workers was complicated further by the fact that we had no data on company size. For the purposes of this analysis, we instead examined two different levels of Stand-Down participation—stand-downs that included 25 or fewer participants and stand-downs that included 10 or fewer participants.

In 2014, 49.74% of all respondents reported on stand-downs of 25 or fewer participants, and almost 58% of those were in residential construction. Similarly, in 2015, 43.9% of respondents reported on stand-downs of 25 or fewer participants, with over 51% of those occurring in residential construction. Reviewing the next level of participation, we found that in 2014, 29% of total responses were for stand-downs of 10 or fewer participants, but in 2015 that number was down to 23%. In

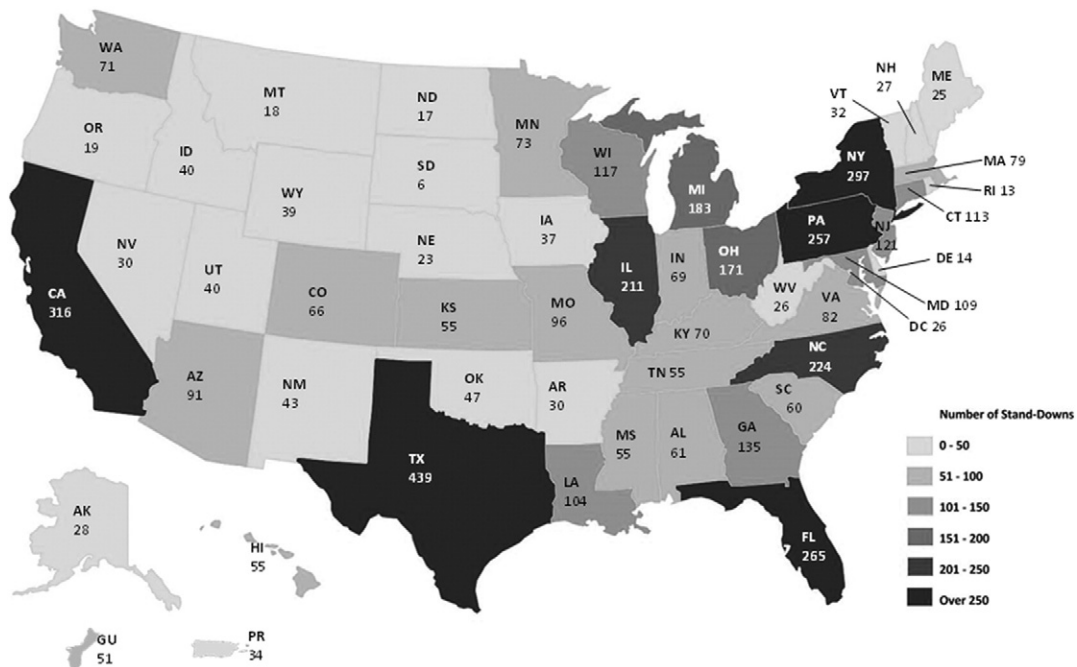


Fig. 4. Number of stand-downs by state in 2014.

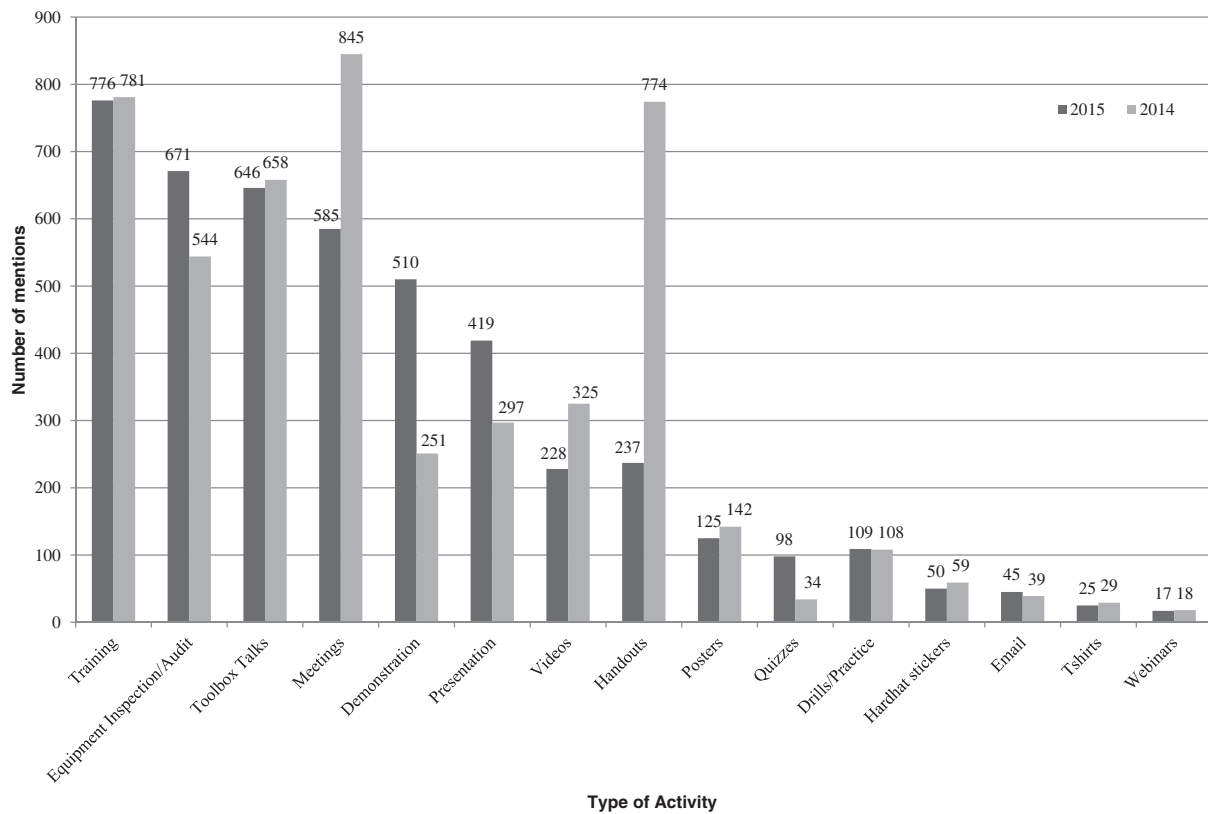


Fig. 5. Activities conducted during the 2014 and 2015 National Safety Stand-Downs.

both years, stand-downs of 10 or fewer participants made up just below 2% of residential construction responses (1.99% in 2014 and 1.90% in 2015).

Information in the comment section illustrated also that many smaller sub-contractors participated in stand-downs held by the general contractor of a jobsite, rather than hosting their own.

The activities conducted on smaller stand-downs did not differ substantially from those conducted on all other stand-downs; however, none of the stand-downs for 25 or fewer participants incorporated webinars. Based on the comments, smaller companies more often sent their employees to training courses conducted by others.

3.2.4. Additional themes

Based on comments, we realized that in both 2014 and 2015 respondents were incorporating training and awareness efforts for other hazards into their fall prevention stand-downs. Two groups used this approach. The first included companies whose employees face fall hazards as part of their regular work. These companies wanted a large focus on fall prevention, but also covered secondary hazards to take advantage of the time spent “standing down” with the entire crew. The second group included companies that do not have as many fall hazards. We received feedback from respondents working in shops and office environments who tailored the Stand-Down to fit their needs, but many in this second group were general industry or non-construction (e.g., mining or maritime) companies. While they incorporated information on slips, trips, and falls from lower heights, they did not need to focus on many of the fall-related issues affecting construction workers and others who work from heights. Furthermore, many general industry or non-construction respondents incorporated an element of equipment safety specific to their industry or jobsite into their stand-down. The secondary hazard that was most often addressed, however, was heat exposure (over 30 mentions in 2014 alone).

In addition to adapting Stand-Down and Campaign materials for their specific jobsite and introducing secondary hazards, many

respondents also took the initiative to create their own materials to suit their needs. Some created Stand-Down videos or training programs, while others created toolbox talks geared toward their current job. Respondents also demonstrated creativity in figuring out how to make their stand-down relevant to their workers. Many contractors and safety managers found ways to work in real-life examples of fatal falls that happened on one of their jobsites or nearby, demonstrating that it can happen to anyone at any time. Many also drove home the point of the Stand-Down by relating it to the workers’ goals and things they value the most—family and loved ones or activities that they would no longer be able to enjoy if they were injured from a fall. One company even pledged to donate to charities selected by the workers for every safe hour worked.

Another recurring theme in the comments in both 2014 and 2015 was that whole communities were participating in the Stand-Down together, coordinating their efforts and advertising “town-wide” or “city-wide” stand-downs. Sometimes this meant workers from different companies and jobs gathering in one place, but more often it simply meant holding as many companies as possible accountable for participation at once — all promising to devote a certain amount of time on their individual jobsites to the Stand-Down simultaneously.

Additional positive feedback from both 2014 and 2015 included praise of event marketing efforts and the materials made available by the Campaign partners. Approximately 20 comments in 2015 stated that employees were extremely engaged and excited about being part of a national event, and appreciated their bosses for holding it.

3.2.5. Respondent recommendations

Respondents were encouraged to include recommendations for improving the Stand-Down. The top recommendations in both 2014 and 2015 included: (1) rotate the Stand-Down topic; (2) better promote the Stand-Down; (3) change the term Stand-Down; (4) improve use of social media; (5) increase the number of materials in languages

other than English; and (6) increase on-site involvement of OSHA regional offices.

An interesting change from 2014 to 2015 involved support for the topic of fall prevention. In 2014 we received 131 comments suggesting that the Stand-Down topic rotate, despite the event being associated with the National Campaign to Prevent Falls in Construction. Some respondents recommended that the Stand-Down remain annual, but with a new topic each year, while others recommended holding multiple stand-downs a year, each focusing on a different construction hazard. While approximately 68 respondents still provided feedback that they would like to see new or additional topics in 2015, many remarked that there was still more work to be done in fall prevention and acknowledged that holding the same event year-to-year helps build momentum and gain recognition for the initiative both with contractors and their employees.

In 2014 one of the negative comments from at least 86 respondents was that there needed to be earlier promotion of the event. In 2015, however, the number of similar comments decreased to 17. Another concerning type of comment involved the term “stand-down.” We received a recommendation to change or clarify the term from over 10 respondents in 2014, but in 2015 there seemed to be less confusion surrounding the term as we only received one comment about it.

Additional recommendations received only in 2015 included: (1) keep the date and time-frame consistent; (2) change the materials from year-to-year; and (3) improve the OSHA Certificate of Participation and event posting website.

4. Discussion

Many construction stakeholders considered the 2014 Stand-Down successful. It reached not only residential construction, but to the entire industry and beyond, with many government agencies and members of general industry participating. The planners decided to continue the event, and the Stand-Down was repeated in 2015 as a two-week event, with even more participants than 2014. As mentioned earlier, there seemed to be more emphasis on and enthusiasm for participating in a national campaign in 2015 responses, suggesting that there might be growing name recognition for the Stand-Down as a national event. Based on the cumulative analysis, at the time of this article a 2016 Stand-Down is being planned and the event will continue indefinitely.

4.1. Use of results and feedback

All of the results reported have been instrumental in shaping the future of the Safety Stand-Down. The participation numbers for OSHA regions were extremely useful for identifying gaps in regional efforts. OSHA and its regional offices will use the information to plan promotional activities more effectively in the future. It is also possible, however, that the numbers vary not only by awareness of the Stand-Down, but also by the number of construction projects underway, and other work involving fall hazards in any state or region at the time of these events, the data for which we did not have access to.

The responses that described participant activities provided insight into how creative companies can be, and emphasized that the efforts need to include real-life examples and instructions on how to make the Stand-Down work for individual jobsites by adapting campaign materials.

The feedback received in 2014 influenced the design and promotion of the 2015 campaign, and the recommendations received in both years are being incorporated in the upcoming 2016 Stand-Down. Comments regarding the topic of the stand-down and whether or not to change it were seriously considered. Ultimately, OSHA, NIOSH, and CPWR decided to maintain the focus on preventing falls during the Stand-Down, however the large number of comments referring to contractors incorporating heat as a secondary hazard focus lead to the realization that due to the time of year, and the fact that OSHA also runs a National

Heat Campaign (U.S. Department of Labor) there is an opportunity to encourage participants to cross-promote in the future.

One of the big differences between 2014 and 2015 was the expansion from one week to two. Respondents offered mixed feedback on this change, with some appreciating the flexibility in scheduling within the two-week time frame offered, especially when holding stand-downs on multiple jobsites. Many, however, preferred the more concentrated effort of a one-week event. Based on this, future Stand-Downs will revert back to one week at this time.

Another difference between 2014 and 2015 was that the date of the 2015 Stand-Down was selected to coordinate with the safety weeks of both the American Society of Safety Engineers and the Construction Safety Executives. Each effort is supported by large but separate industry organizations. This led to changing the Stand-Down from June in 2014 to May in 2015. Respondents picked up on this change, and many recommended that the Stand-Down date be consistent each year. We also received positive feedback from respondents who appreciated that the Stand-Down overlapped with Safety Week. Based on these recommendations, planners decided to keep the first week in May as the date for 2016, which again coincides with Safety Week.

In 2014 comments regarding earlier promotion of the event led to planners disseminating information about the 2015 Stand-Down earlier in the year, compared to 2014, something that was much appreciated by respondents. While some respondents still mentioned that better promotion was needed in 2015, the majority was either on the lookout for the event after participating the previous year, or heard about it through marketing well in advance of the event.

The comments about increasing the use of social media are important. Construction industry partners are considering all options, including the potential for developing applications (apps) in smart phones.

4.2. Limitations

There are several limitations to consider in reviewing the data and our analyses. The first is that these numbers are based only on the OSHA Stand-Down certificate of participation database. In both 2014 and 2015 the total number of Stand-Down participants is much higher than the numbers reflected here. The United States Air Force Occupational Safety alone reported reaching over 650,000 military and civilian personnel on U.S. air bases domestically and abroad in 2014 and over 1.5 million in 2015. We do not have, however, the same information for those participants or others we know have participated and therefore have not included them in the analysis.

Another limitation is that some participants are not providing information through the database for several different reasons, including (1) lack of knowledge of the certificate; (2) lack of incentive or interest in receiving a certificate; and (3) fear of their information being used for regulation and compliance purposes. We also know that many respondents who received the certificate in 2014 did not print a new one for 2015. The certificate's value is that it recognizes participation, and respondents may not feel it is necessary to obtain one every year. This made it more difficult to gauge how many companies participated in both years, and likely contributed to the decrease in total respondents from 2014 to 2015. In the future efforts will be made to collect information from participants through interviews and outreach conducted by the non-regulatory Campaign partners such as CPWR.

The third limitation is in the 2015 data, and it concerns the gap in data collection. The consequence is that the results are an estimate of purported findings. The quantitative data would have been more accurate and the qualitative data would have been more robust had we had the information from the additional 891 certificates. However, when we remove the 891 certificates from our analysis, the results are still encouraging. With a total number of responses at 2,868, the total number of participants is 794,500. This number is still marginally higher than the 770,193 participants reported in 2014.

Yet another limitation on the data is that they are self-reported. We cannot know if the information provided by respondents is wholly accurate, and it also limited our ability to verify the total number of respondents and participants. For example, one contractor could have filled out two certificates for the same stand-down: one in his name and one in the company's name. In a case like that, the number of participants could have been counted twice. However, obvious duplicates with all identical responses and no differentiation between event days or jobsites were removed manually.

In addition to relying on self-reported data, our analysis is also limited by the structure of the certificate questions. Due to OSHA survey restrictions, only a certain number and type of questions could be asked. This prevented us from gathering the amount of detail we would have liked on topics such as company size. As mentioned previously, many comments included mentions of small subcontractors pairing together with larger contractors or training organizations to conduct stand-downs. This means that the number of participants recorded in the database is cumulative, and, therefore, higher than 10 or 25, and does not reflect accurately the size of the sub-contractor(s) at the stand-down who have fewer employees.

The self-reported nature of the data along with a lack of clearly defined response options also inhibited our assessment of the true reach of the Stand-Down. While we would like to be able to compare the number of participants to the total number of workers as reported in the Bureau of Labor Statistics (BLS) Census of Fatal Occupational Injuries (CFOI) statistics, the data we have are based on self-reports, and include categories that reach beyond construction and do not match up with categories reported in the CFOI data. For example, one of the industry type options on the OSHA Certificates is "government." Some respondents who selected this option are government employees who are not doing construction, but others are contractors working on government construction projects. Without more detailed information, we cannot distill only construction participants from the categories available on the certificate. The Stand-Down data collection also includes international data. Consequently, there is no way to determine an accurate denominator to assess a percentage of workers reached. As mentioned earlier, we also know that the data collected through the certificates is representative of only a fraction of participants, making any estimated percentage of workers reached even less accurate.

It is similarly difficult to assess impact, either on a larger national scale or on a smaller company scale. While we have CFOI data on falls and fall fatalities, final numbers usually lag by more than a year. Furthermore, causality, correlations, and impact on fall injuries and fatalities cannot be drawn from our body of data. It would be interesting to determine impact on a smaller, company-wide scale by following up with respondents about changes in fall-related injuries and fatalities; however, the confidentiality rules prevent us from doing so.

Regardless of these limitations, it is clear that the Stand-Down and the Campaign in general are reaching a large number of workers throughout the US and internationally. Beyond that, the Campaign partners and other industry stakeholders who have given input feel that promoting education and awareness of fall hazards and fall protection is an inherently worthwhile effort to pursue. It is simply the right thing to do.

5. Summary

Construction workers are suffering injuries and fatalities from falls at an alarming rate every year, despite the existence of adequate fall protection and fall prevention measures. OSHA, NIOSH, CPWR, and, other industry stakeholders agree that improving awareness and education is key to decreasing the number of falls. The National Campaign to Prevent Falls in Construction has just entered its fifth year attempting to address this, and the main event of the Campaign, the National Safety Stand-Down is in its third year.

This analysis along with anecdotal data shows that the 2014 and 2015 Stand-Downs combined have already reached over 3.5 million workers in all types of construction work as well as general industry (International Union of Bricklayers and Allied Craftworkers, 2016). The success of the Campaign and Stand-Down is owed largely to the coordination efforts of leadership at OSHA, NIOSH, CPWR, state departments of health, labor organizations, contractor associations, academia, and a number of other invested partners. These organizations are working together closely throughout the year to an extent that has not often been seen in the past and the result is a well-thought out and heavily promoted campaign that not only reaches every state in the United States, but has also been picked up internationally.

5.1. Practical applications

The data gathered through this process provide support for the continuation of the Stand-Down every year. They also provide feedback that enables improving the Stand-Down from one year to the next. The data have influenced the date and length of the Stand-Down, the materials available, and our marketing and promotional efforts, and will continue to do so.

In 2015 we received several recommendations to change the materials annually. All three organizations have made a significant effort to add additional fall-related materials and videos in both English and Spanish for 2016. The materials have also been influenced by the original goal of the Campaign, which was to reach small residential contractors and their workers. Planners selected ladders as an area of focus for 2016. Ladders, as opposed to other equipment such as scaffolds, are used extensively in residential construction as well as general industry, making the focus of the Stand-Down more accessible to those audiences. The Campaign materials were updated to include ladder photos and materials on ladder safety are being highlighted. Planners have also made a concentrated effort to increase small residential contractor and worker awareness of the event through networking and using research on hard-to-reach audiences.

In addition to informing our efforts on the Stand-Down and Falls Campaign in general, analyzing these qualitative data in conjunction with the other information received from participants as well as from organizations and stakeholders who are promoting the Stand-Down has provided a great deal of insight on how organizations can partner together to create a successful national campaign. This information can be used to replicate our efforts for other safety and health campaigns in the construction industry, and can even be used to influence efforts in industries outside of construction as well.

We recommend expanding the evaluation effort in future years in order to obtain more exact numbers of participation (rather than relying on just the OSHA database) and to conduct follow-up on impact with those who have participated. Additionally, it would be beneficial to find out why companies who heard about the campaign and did not participate made that choice. An interagency OSHA-NIOSH-CPWR Working Group is currently discussing the possibility of such an expanded effort.

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