

# Evaluation of OSHA FATALITY INVESTIGATIONS

By Gavin F. Burdge, Miaocong Wu and Kile Veal

**U.S. WORKPLACE FATALITIES** continue each year at an alarming rate. According to Bureau of Labor Statistics' (BLS, 2018a) data, 5,147 occupational fatalities occurred in 2017. OSHA requires that employers provide a workplace free from recognized hazards that can cause death or serious injury. Unfortunately, not all workplace hazards that may contribute to fatal injuries can be recognized by employers. To identify fatality causes and to prevent future similar incidents, OSHA requires employers to report any worker fatality within 8 hours; "OSHA investigates all work-related fatalities in all covered workplaces" (OSHA, 2019a).

To better understand the profile of OSHA fatality investigations and to identify any gaps preventing the reduction of fatality rates, all work-related fatality investigation cases available on the agency's fatality inspection data website were analyzed for the calendar year 2017 (OSHA, 2019a). Especially, this study strived to assess the degree that OSHA exerts its efforts in workplace fatality investigations, as a whole and between different states. The authors have identified several interesting facts not previously widely or thoroughly discussed in the occupational safety literature.

## Distribution of OSHA Workplace Fatality Investigation Cases by State

Among 1,250 OSHA fatality investigations completed in 2017, 1,280 fatalities were recorded, with some incidents involving multiple fatalities. Figure 1 shows the distribution of these 1,250 investigations across the states. The top 10 states with the highest number of OSHA fatality investigations include Texas

(14.6% of all OSHA investigations), California (9.0%), Florida (7.2%), New York (5.0%), Illinois (3.9%), Georgia (3.7%), Ohio (3.6%), Pennsylvania (3.5%), Michigan (3.2%), and North Carolina (2.8%). These 10 states accounted for 56.4% of OSHA fatality investigations in 2017.

## Workplace Fatalities Investigated by OSHA vs. Those Reported by BLS

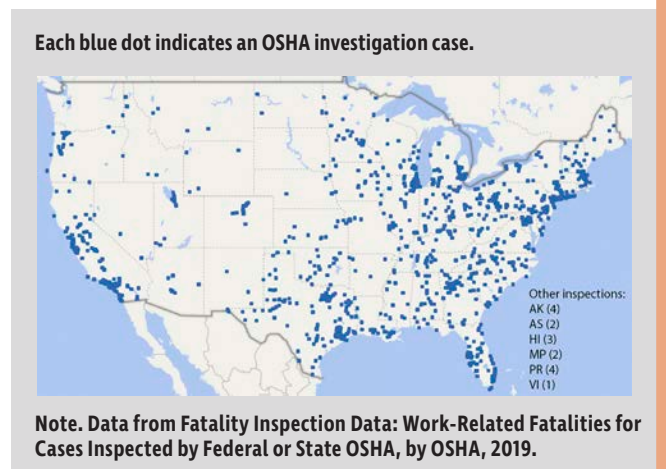
Surprisingly, only about one-quarter of all workplace fatalities reported by BLS have been investigated by federal or state OSHA. Analysis of data from 2014 to 2017 shows that only 24.6% of BLS-reported workplace fatalities were investigated by OSHA (Figure 2A, p. 40;  $p < 0.01$ ). This leaves about 75% of workplace fatalities uninvestigated, which is inconsistent with the statement that "OSHA investigates all work-related fatalities in all covered workplaces" (OSHA, 2019a). The discrepancy between OSHA fatality investigations and BLS-reported workplace fatalities can compromise OSHA's mission to identify workplace fatal causes, which might explain, in part, why workplace fatalities remain at such an alarming rate in the U.S.

Note that some fatalities due to medical conditions (e.g., heart attack) and those that occur while traveling on public

## KEY TAKEAWAYS

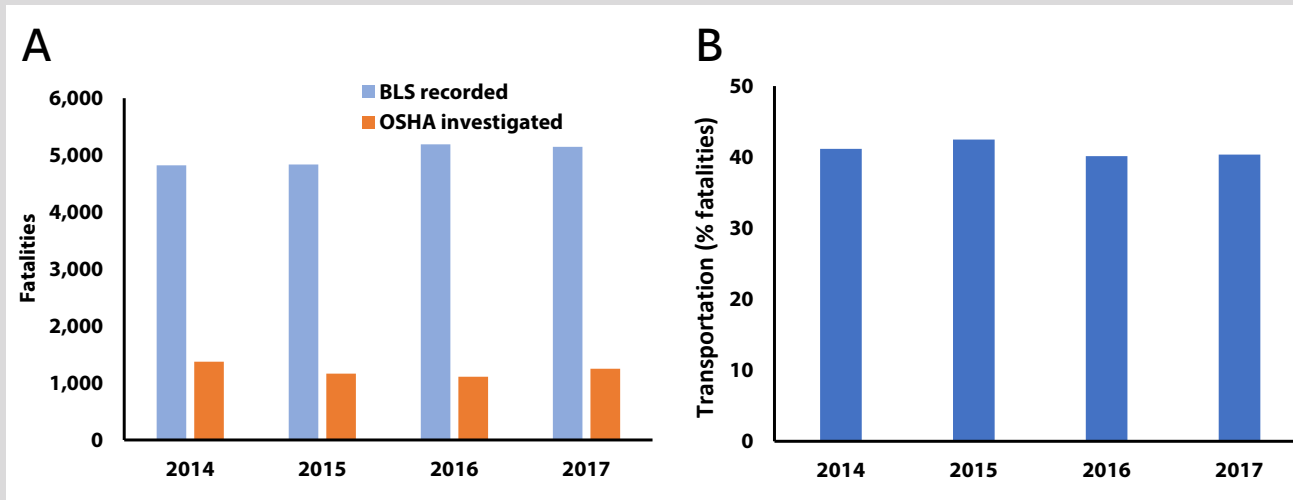
- A comparison of OSHA and BLS data about workplace fatalities that occurred from 2014 to 2017 shows that only one-fourth of BLS-reported workplace fatalities have been investigated by OSHA, although OSHA requires employers to report worker fatalities and states that "OSHA investigates all work-related fatalities in all covered workplaces."
- The ratio of OSHA fatality investigation cases between states with the federal plan and states with an OSHA-approved state plan is similar to that of BLS-reported workplace fatalities. However, the percentage of OSHA-investigated/BLS-reported workplace fatalities varies greatly between different states.
- Also, investigations by federal OSHA had higher penalties than that of state OSHA.

**FIGURE 1**  
**DISTRIBUTION OF 2017 OSHA FATALITY INVESTIGATIONS**



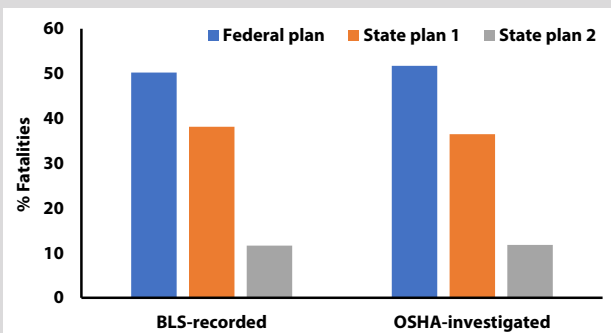
**FIGURE 2**  
**OSHA WORKPLACE FATALITY INVESTIGATIONS, 2014-2017**

OSHA only completed fatality investigations in about one-quarter of all workplace fatalities reported by BLS (Figure 2A). Transportation incidents that may fall under DOT, not OSHA, jurisdiction contribute to approximately 41% of BLS-recorded workplace fatalities (Figure 2B).



**FIGURE 3**  
**PERCENTAGE OF FATALITIES & INVESTIGATIONS AMONG STATES WITH DIFFERENT OSHA PLANS**

The percentage of BLS-recorded workplace fatalities and OSHA-investigated cases among states with different OSHA plans: Federal plan, OSHA-approved state plan covering all private and state and local government workplaces (state plan 1) or covering state and local government workers only (state plan 2).



highways where Department of Transportation (DOT) has jurisdiction will not have a complete OSHA investigation (OSHA, 2019d). However, an average of only 41% of BLS fatalities were attributed to transportation from 2014 to 2017 (Figure 2B) (BLS, 2018b). Among these transportation-related fatalities, up to 11.6% occurred on nonroadways (BLS, 2018b), which would not likely fall under DOT jurisdiction (FMCSA 2019) and would expectedly be investigated by OSHA. Therefore, OSH professionals and researchers should be aware that OSHA has only completed its investigations for one-quarter of all workplace fatalities, and should view

worker fatality databases with skepticism, as information may be incomplete.

More research is needed to understand why the significant difference exists between BLS-reported workplace fatality data and OSHA fatality investigation cases, whether OSHA has adequate manpower and resources to fulfill its responsibilities in fatality investigations, what quantitative criteria are needed for OSHA fatality investigations, and how government can allocate resources to protect workers at farms or other small businesses that are not covered under the OSHA fatality inspection program.

### Comparison of Fatality Investigations: States With Federal vs. OSHA-Approved State Plan

OSHA has conducted fatality investigations in 51 U.S. jurisdictions and five U.S. territories in 2017. Among 50 U.S. states and District of Columbia (DC), 784 fatality cases (63.3% of all cases) were investigated by federal OSHA, while 455 cases (36.7%) were inspected by state OSHA. In addition, 11 worker fatality investigations were conducted in the U.S. territories of Puerto Rico (4 cases), Guam (2), American Samoa (2), Northern Mariana Islands (2) and U.S. Virgin Islands (1). One question is whether a difference exists in fatality investigation rates between states with the federal plan (which includes 23 states and DC) and those with an OSHA-approved state plan.

OSHA-approved state plans are one of two types (OSHA, 2019c):

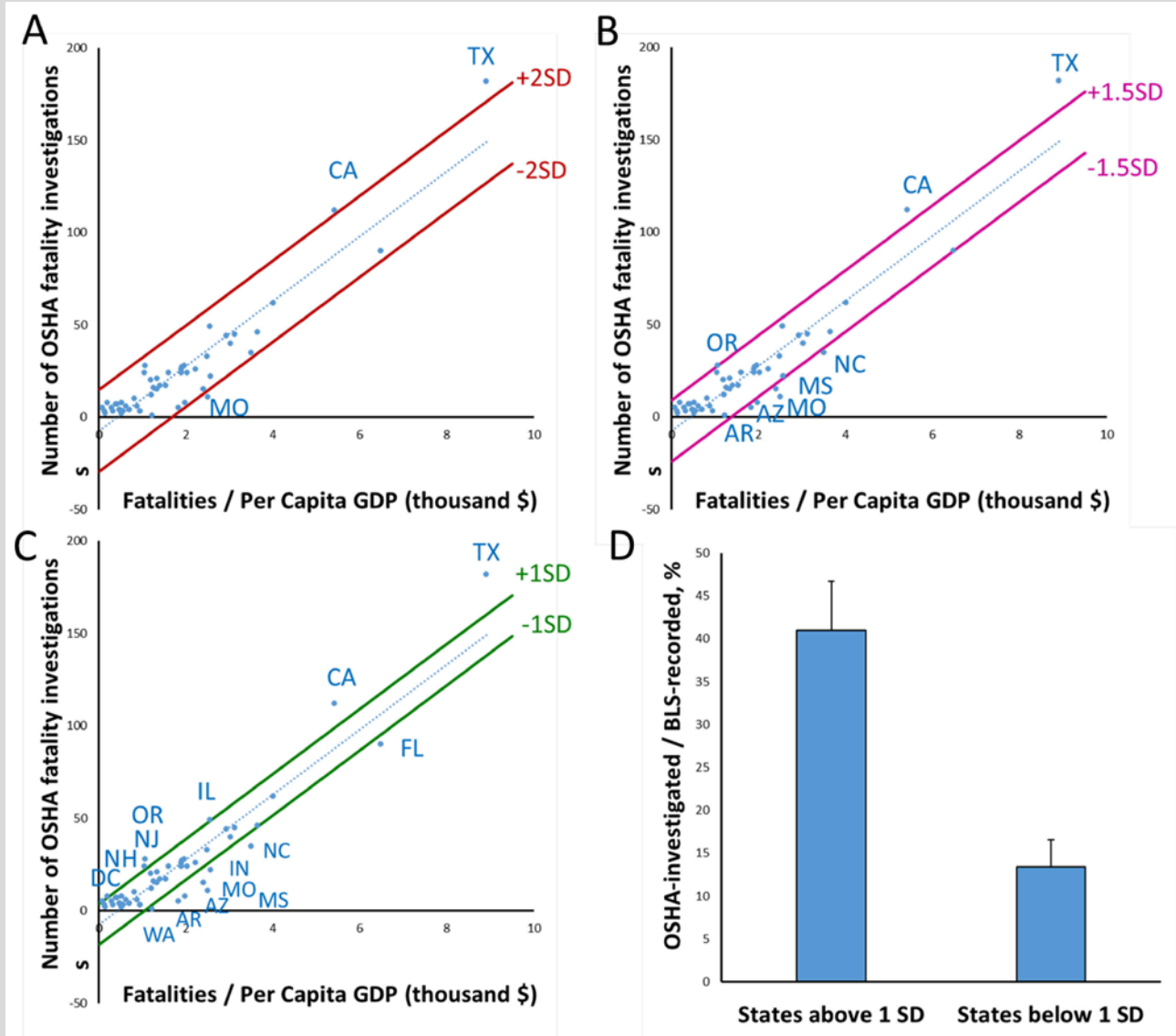
- 1) plans covering all private, and state and local government workplaces (which includes 22 states);
- 2) plans covering state and local government workers only (which includes five states).

As shown in Figure 3, states with the federal plan made up approximately 50.2% of the BLS-reported workplace fatalities in 2017, while states with state plan 1 and state plan 2 made up about 38.2% and 11.6%, respectively. Interestingly, the per-

FIGURE 4

## EVALUATION OF OSHA'S FATALITY INVESTIGATION EFFORTS IN EACH STATE

Evaluation of OSHA's efforts of fatality investigations in each state (Figure 4A, 4B and 4C). The ratio of BLS-recorded fatalities/per capita GDP for 2017 was chosen as a benchmark (X-axis). Each blue dot represents a state.



Note. Within  $\pm 1 SD$ ,  $\pm 1.5 SD$  or  $\pm 2 SD$  contains 68%, 86% or 95% of states, respectively. The difference of OSHA-investigated/BLS-recorded fatalities (%) between states above and below 1 SD,  $p < 0.01$  (Figure 4D).

centage distribution of OSHA fatality investigations in states with a federal plan, state plan 1 and state plan 2 is similar to that of BLS-reported fatalities among the three plans ( $p = 0.9$ ), suggesting a comparable investigation effort by OSHA between different plans.

### Difference in OSHA Fatality Investigations Between States

The number of OSHA-investigated workplace fatalities is dramatically different between states (Figure 1, p. 39). To determine whether OSHA's efforts in fatality investigations relative to the number of BLS-reported fatalities for those states

are comparable among different states, the authors considered several factors, including population, economic performance and per capita gross domestic product (GDP; BEA, 2019), in addition to BLS-reported fatalities (Figure 3 shows an overall consistency between the percentage of BLS-reported workplace fatalities and OSHA-investigated cases between different plans). Many studies suggest a significant correlation between economic factors and occupational fatality rates (Barth, Winker, Ponocny-Seliger, et al., 2007; Loomis, Schulman, Bailor, 2009; Palaz & Çolak, 2017), therefore, the ratio of BLS-reported fatalities/per capita GDP for 2017 was chosen

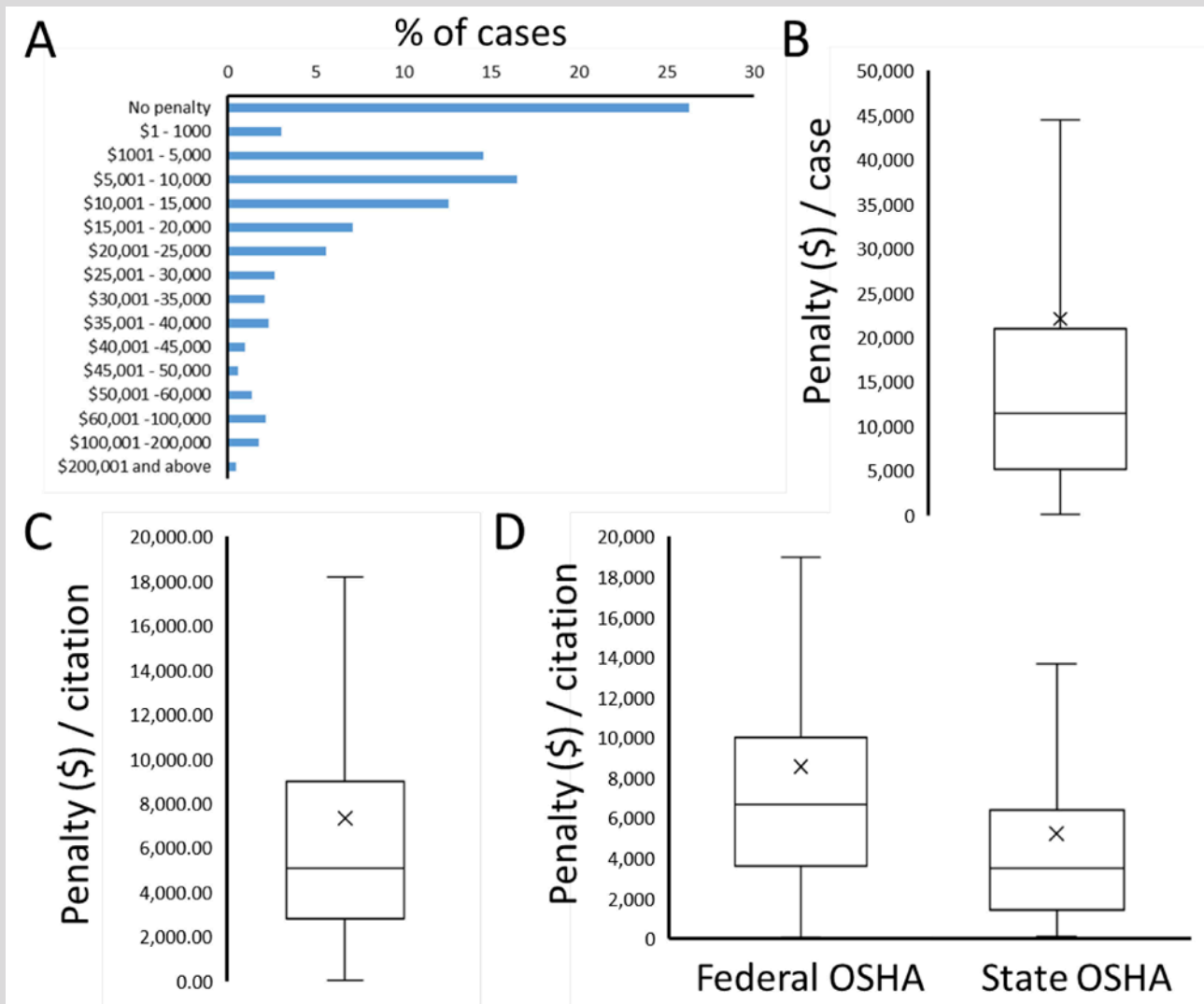
as a benchmark (Figure 4A through C). The higher number of fatalities/per capita GDP, the more OSHA fatality investigations are assumed.

Using 1, 1.5 and 2 SD, which covers about 68%, 86% and 95% of all states respectively, the researchers identified some outlier states that had more or less intensive fatality investigations (Figure 4, p. 41). For example, the cutoff using 2 SD showed that Texas and California had a greater fatality investigation rate, while Missouri had a lower fatality investigation rate when compared to the other 95% states (Figure 4A). By reducing to 1.5 SD, an additional state (Oregon) had a higher fatality investigation rate, while four additional states (North Carolina, Mississippi, Arizona and Arkansas) were found

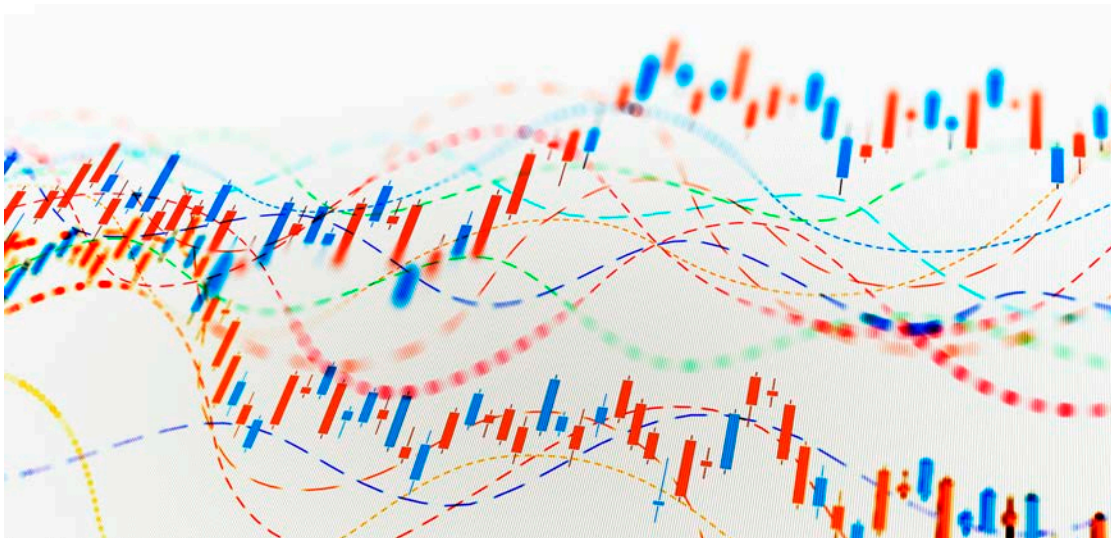
to have lower OSHA investigation rates (Figure 4B). When further reducing to 1 SD, additional seven states become outliers (Figure 4C). The ratio of OSHA-investigated fatalities/BLS-reported fatalities was significantly higher in those seven states above 1 SD than those eight states below 1 SD ( $p < 0.01$ ; Figure 4D). These analyses suggest that some states, such as Texas and California, have done a better job to investigate occupational fatalities than others. Additional research is needed to identify why OSHA conducted relatively more or fewer workplace fatality investigations in these states. Particularly under-investigated states, such as Missouri, may need more intensive fatality investigations, or OSHA may need to devote more resources to these states.

## FIGURE 5 OSHA PENALTY ON WORKPLACE FATALITIES

The percentage of OSHA fatality investigation cases in 2017 with and without penalty (Figure 5A). Penalty per OSHA investigation case (Figure 5B). Penalty per OSHA citation (Figure 5C). The difference of penalty per citation between investigations by federal and state OSHA,  $p < 0.01$  (Figure 5D).



Note. The box and whisker plot show the highest (top line), three quartiles (75, 50 and 25 percentiles, the box) and the lowest (bottom line) for penalty per case. The x indicates the average penalty.



**Gavin F. Burdge, M.S., CSP, CIH,** is an independent industrial hygienist and workplace safety researcher with more than 35 years' experience. He holds an undergraduate degree in biology from Hiram College and an M.S. in Environmental and Occupational Health from West Virginia University. Burdge is a professional member of ASSP's Central Pennsylvania Chapter and a member of the Society's Industrial Hygiene Practice Specialty.

**Miaozong Wu, Ph.D., CSP, ARM,** is the program coordinator of occupational safety management and assistant professor of safety science at University of Central Missouri. He holds a Ph.D. from Virginia Tech and an M.S. from Marshall University, and was awarded several NASA grants to investigate musculoskeletal disorders associated with space risk factors, including mechanical unloading (microgravity) and radiation. Wu is a professional member of ASSP's Heart of America Chapter and serves as Awards and Honors Chair of the Society's Academics Practice Specialty.

**Kile Veal** is an undergraduate student of occupational safety and 2019-20 President of Association of Student Industrial Hygienists at University of Central Missouri.

Although OSHA has done tremendous work to investigate workplace fatalities, more research is needed with more effort on fatality investigations to identify fatal causes and to reduce the workplace fatality rate, as only one-fourth of BLS-reported workplace fatalities have been investigated by OSHA.

### Evaluation of OSHA Violation Penalty Implementation

On Jan. 23, 2019, OSHA increased its penalty to \$13,260 per serious violation, and \$132,598 per willful or repeated violation (OSHA, 2019b). Surprisingly, 26.4% of the cases among the 1,250 OSHA fatality investigations in 2017 resulted in no monetary penalties (Figure 5A). Specifically, 292 cases had no violation citations and 37 cases with citations had no monetary penalty, including 27 cases with serious, willful or repeated violations.

The box and whisker plot in Figure 5B show the distribution of 921 investigation cases with penalties. Of these 921 cases, 67.2% had more than one citation per case, one case had up to 22 and another case had 19 citations, and the median number of citations per case was 2.9. Given the difference of penalty amounts (Figure 5B) and the variance of citations from each case, the researchers further calculated and compared penalties per citation. Figure 5C shows the statistical distribution of penalty per citation, where the mean and median penalties were \$7,442.88 and \$5,070.00 for each citation, respectively. To further understand the difference in penalty implementation by federal and state OSHA, the authors compared their penalties per citation and found significantly lower penalties for those fatalities investigated by state OSHA ( $p < 0.01$ ; Figure 5D).

### Conclusion

Although OSHA has done tremendous work to investigate workplace fatalities, more research is needed with more effort on fatality investigations to identify fatal causes and to reduce the workplace fatality rate, as only one-fourth of BLS-reported workplace fatalities have been investigated by OSHA. Relative to the number of BLS-reported workplace fatalities, the authors observed inconsistencies of workplace fatality investigations among states, and penalty implementation between federal OSHA and state plans. Further analyses and research on past and future years' data would provide a better picture and sound recommendations to OSHA for improving workplace safety and implementing compliance needed for reducing workplace fatalities. Also, more research is needed identifying why the number of BLS-reported fatalities is so much greater than the

number of fatalities investigated by federal or state OSHA. **PSJ**

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### Acknowledgments

Data collection by Burdge, Veal and Wu; data analysis by Wu and Burdge; manuscript preparation by Wu and Burdge.