It May Cost an Arm and a Leg; Value on Workers and Occupational Fatality Rates in the U.S.

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Abstract

Background

The present study aims to observe how societal indicators of workers’ values at the state-level are related to health and safety outcomes, particularly major injuries and fatalities in the U.S. Underscoring workforce flexibility and workability over workforce stability and safety might be indicative of the worth of workers which can be associated with occupational safety and health concerns.

Methods

Multiple regression analysis was adopted to examine how the state-level indicators of values on workers in terms of 1) minimum wage, using the data from 2015; 2) average of workers’ compensations for the loss of an arm, hand, leg, or foot in 2015 were prospectively associated with occupational fatality rates in 2016 and 2017. Socioeconomic contextual variables such as education level, GDP per capita, income gap, and population at the state-level were controlled for.

Results

The present study showed that state-level quantitative indicators of how workers are valued at work, namely minimum wage and workers’ compensation benefits, were significantly and negatively associated with fatality rates in the following year. Workers’ compensation benefits were significantly and negatively associated with fatality rates two years later, implying the lasting effect of this particular type of indicator of values on workers.

Conclusions

The present study illustrates the gap in how workers are valued across the U.S.. The study speaks to the importance of fostering culture where workers are adequately valued, cared about, and protected to prevent and curtail occupational fatality.

Background

Workers’ value imposed by policies and practices might be associated with the amount of occupational effort and resources used to protect workers. In the context where workers are more valued, more attention will be given and greater quantity and quality of safety protections will be offered for their safety and health. In the context where workers are less valued, they might suffer from greater workplace hazards and extreme outcomes such as occupational fatality rates due to lesser safety protections.
A key motivation for not providing adequate safety education and training is to reduce organizational resources such as saving time and money [1, 2]. Even while adhering to federal safety and health standards (e.g., improving safety environments, providing safety equipments), organizations may divert organizational resources away from safety and health practices in order to focus on positive business outcomes (e.g., increasing productivity, meeting deadlines). In fact, many organizations emphasize organizational success over matters of safety [3] such that workers can be exposed to hazards they were previously safeguarded against.

Sensemaking theory [4] contends that people rationalize and give meaning to their experiences based on pertinent contextual information. It helps explain how people develop a consensus on values and beliefs which can be used as plausible reasons for their behaviors in a given context. According to sensemaking theory, people develop shared perceptions on which behaviors and practices are acceptable or not acceptable throughout the ongoing process of retrospective assessment of social norms/standards and common practices.

Haas and Yorio [5] reframe the sensemaking model in terms of risk assessment and state that sensemaking can be viewed as a risk management process which allows everyone in the workplace to identify hazards, communicate risks, and are able to respond to them accordingly. Sensemaking begins with an observation of organizational cues and workplace behaviors by employees. If any disparity is noted, employees engage in enactment of addressing this disparity by aligning behaviors to the organizational cues or devaluing, overlooking, and annulling the cues. Behaviors that are reinforced or not penalized would be retained and referenced to as the base of an organization's policies and procedures. This process applies to employers as well such that they can make sense of an adequate level of managerial standards in promotion of occupational safety and health by observing societal norms and common practices of appraising workers’ value. As long as their current practices do not incur any notable backlash from governing authority and organizational members, policies and procedures of their organization would be maintained. In turn, organizations tend to reinforce and solidify their cultures through a series of attraction, selection, and attrition processes [6, 7].

The present study posits that the specific standards and practices of the 50 United States on workers’ value can lead employers to have a certain sense as to the value of their workers. Specifically, we focus on minimum wage and workers’ compensation benefits.

In the U.S., workers are not equally valued across states and it can exacerbate occupational safety and health disparity. When it comes to specific economic indicators representing how workers are valued such as minimum wage and workers’ compensation benefits, notable discrepancies exist. These societal indicators of workers’ value at the state-level are more meaningful to organizations and employers when it comes to sensemaking than other relevant individual-level factors (e.g., salary) and organization-level factors (e.g., occupational accident insurance). Minimum wage and workers’ compensation benefits are readily benchmarked as the officially institutionalized bottom line of developing policies, regulations, and procedures by organizations and employers Meanwhile, the salary of employees and occupational
accident insurance are determined in consideration of individual employees’ (e.g., ability, age, qualification) and organizations’ characteristics (e.g., size, revenue, type of industry).

Among the many indicators of the values on workers, minimum wage was chosen because it is a set value and oftentimes the basis of the calculation of labor cost [8]. Also, all 50 states of the U.S. have jurisdictional guidelines for minimum wages. A number of socioeconomic factors are associated with minimum wages. Low minimum wage might be indicative of affordability of labor as well as easiness to find substitutes when incumbent workers become unavailable or lose their workability. Moreover, low minimum wage itself has been noted as potential occupational safety and health hazards because of its impact on suboptimal access to quality medical care [9, 10, 11].

A report by Oxfam [12] found that in Washington D.C., a full-time minimum wage job pays $14 an hour ($29,120 annually) and the same job in Virginia pays $7.25 an hour ($15,080 annually). When accounting for cost of living for a family of four, Washington D.C.’s minimum wage accounts for 44.1% of a living wage while Virginia’s minimum wage only accounts for 26.1% of a living wage. The minimum wage also reflects the state’s attitude towards an employee’s right to negotiate their wage. Additionally, minimum wage can reflect a state’s protection policies towards workers. Washington D.C., ranked first on worker protection, implemented policies including protection from sexual harassment, paid sick leave, and leave for non-family medical leave act (FMLA) workers. Meanwhile, Virginia ranks last in the U.S. on worker protection, only having a policy that mandates equal pay across gender and race.

In the present study, we focused on 2015 minimum wage data [13] to match it to another indicator of values on workers, workers’ compensation benefits. When a state had double standards for minimum wage depending on the size of business, we centered on the smaller amounts of minimum wage. In this data, minimum wages were $2.00 in Oklahoma (for small employers) and $9.47 in Washington (national mean = $7.62, SD = 1.37).

Another indicator of values on workers considered in the present study are workers’ compensation benefits. Workers’ compensation is a form of insurance providing financial resources to cover lost wages, medical costs, and ongoing care expenses to injured workers in the course of employment. The employers are the policy holders of workers’ compensation insurance. There is no federal oversight of workers’ compensation programs, which are regulated by each state [14]. The American Public Health Association [14] found that many employers believe the incidence rate of injury has plateaued or declined, implying that hazardous work conditions are no longer a meaningful threat to workers. This results in the belief that workers’ compensation is an unnecessary financial burden to employers, which should be mitigated. To avoid this burden, companies can misclassify workers and underreport payroll in order to get a lower premium [15]. Despite the workers’ compensation cuts and the consistently decreasing costs of workers’ compensation, self-insured employers argue that high workers’ compensation costs will not attract economic growth and in order to stay competitive, workers' compensation benefits costs must stay relatively low [14, 15]. In sum, workers’ compensation is necessary to protect workers, but more adequate amounts of workers’ compensation benefits pose
greater financial burden to employers. As a result, the amount of workers compensation benefits can imply the value on workers over competing business demands.

The average of workers’ compensation benefits for a permanently injured hand, arm, leg, or foot (for damage to body part and future lost wages) were $40,205 in Alabama and $568,027 in Nevada (national mean = $157,944, SD = 97,767) and is illustrated for each of the four individual body parts in Figure 1. A ProPublica article [15] detailed an example of these issues with two workers living and working in different states. Workers A and B lived and worked in two different states, separated only by 75 miles. While trying to clear a piece of machinery that was clogged, worker A slipped and fell hands rst into the machinery. The machinery tore his left arm off which had to be amputated. Worker B who worked for an automotive supplier was operating a piece of machinery, lost his balance, and fell. The machine crushed his hand so severely, it had to be amputated. Worker A received a lump sum of $45,000 in worker’s compensation, while Worker B receives benefits until he returns to work or for as long as he lives with a total value that could exceed $740,000. Even though both workers were seriously injured and permanently disabled due to an occupational accident, it is not uncommon for people to end up receiving strikingly different amounts of workers’ compensation benefits. The state’s differing value of workers created a large disparity of the workers’ compensation received.

People make decisions in consideration of situational cues on acceptable and desirable behaviors [16]. Accordingly, local governments, organizations, and employers may interpret minimum wage and workers’ compensation benefits as specific situational cues regarding “value on worker” and use this info to leverage human resources to achieve industrial and economic progress. If workers are inadequately valued, it does not violate common sense to treat workers as expendable commodities [17].

Hypotheses

The present study aimed to explore how minimum wage and workers’ compensation benefits are associated with fatality rates across 50 U.S. states. To this end, the following hypotheses were examined:

Hypothesis 1-A. Minimum wage is significantly and negatively associated with fatality rates in the following year.

Hypothesis 1-B. Average workers’ compensation benefits for major body part loss is significantly and negatively associated with fatality rates in the following year.

The relationships between the two indicators of value on workers and fatality rates were examined across a two-year interval, instead of a one-year interval, to replicate the findings from the previous hypotheses and examine the lagged effects of the said indicators of value on workers.

Hypothesis 2-A. Minimum wage is significantly and negatively associated with fatality rates two years later.
Hypothesis 2-B. Average workers’ compensation benefits for major body part loss is significantly and negatively associated with fatality rates two years later.

Methods

The present study utilized seven state-level variables (n = 50) categorized into three groups including key-study, contextual, and control variables. Key-study variables were 1) minimum wage in USD units ($), using data from 2015; 2) average of workers’ compensations for the loss of an arm, hand, leg, or foot in 2015.

Minimum wage We used the 2015 minimum wage data from the U.S. Department of Labor [13]. The 2015 minimum wage data had a range of $2.00 (Alabama) to $10.50 (District of Columbia) with a mean of 7.67 (SD = 1.34). For states with different minimum wage standards for large and small employers, we used the minimum wage standards that had the smallest value. In fact, a sizeable portion of workers are hired through small businesses in 2017 in Minnesota (47.8%), Montana (65.2%), Nevada (42.0%), Ohio (46.0%), and Oklahoma (52.8%), while 47.5% of the private workforce in the U.S. was employed by small businesses [18].

Average of workers compensations for the major body part loss The four body parts – arm, hand, leg, and foot – were chosen to be the focus for looking at average workers’ compensation for a few key reasons. These four body parts are major body parts that are commonly injured during work and the amount of workers’ compensation for the loss of other body parts is generally highly correlated with the workers’ compensation for the loss of the four chosen body parts (e.g., correlations with the workers compensation for the loss of eye ranged from .88 to .95). Also, data was available in all 50 states for all four of these body parts (i.e., the amount of workers compensation for the loss of eye info was not available from 10 out of 50 U.S. states). The average of the workers’ compensation benefits for the loss of the four major body parts can be indicative of overall amount of financial support from the employer for workers who are permanently disabled and lost workability due to their work.

The data for all four body parts was obtained from a ProPublica article by Groeger, Grabell, and Cotts [19]. ProPublica calculated the maximum benefit injured workers can receive for the total loss or amputation of various parts by researching the law for all 50 states and following each state's provided formula. The maximum benefit was determined by taking a 100-percent loss of each body part for a worker who earned enough to qualify for the state’s current maximum compensation rate. In cases where states assigned higher values for amputations, or if the injury occurred on a dominant hand, the highest value was used [20].

Contextual variables were 1) education level defined by the % college degree earned in 2015; 2) GDP (gross domestic product) per capita in 2015. These variables were included because they can respectively serve as the proxy of job type (i.e., more/less protected) and the gauge of economic development level of a region (see Fig. 2). A combination of both education and GDP per capita offers a useful snapshot about the primary industries in a particular state. For instance, Alaska has a low education level, but high GDP,
which is reflected in its major industries being high risk with high return (e.g., natural resource
development, fishing, and logging). Massachusetts has a high education level and GDP with its major
industries being low risk with high return (e.g., healthcare, education, and finance). Mississippi has low
education levels and GDP with its major industries being high risk with low return (e.g., agriculture and
retail). Also, it is worth noting that minimum wage might be influenced by standard of living in the state
while it oftentimes is reflected by GDP per capita [21].

Additionally, control variables for the present study were 1) income gap, represented by the Gini index
from the national data from 2010; 2) population information according to the national census data from
2010. These variables were included because they can respectively serve as the surrogate of suboptimal
distributional justice inducing socioeconomic pressure and compromised safety and health outcomes
[22, 23, 24] as well as the availability and cost of labor as suggested by demand-supply model [25, 26].

Multiple regression analysis was conducted to examine the prospective relationship between these six
variables and occupational fatality rates, operationalized as the number of workers killed at work per
100,000 workers. The analysis was conducted first using occupational fatality rates data in 2016 [27] and
it was replicated using occupational fatality rates data in 2017 [27].

Results

Descriptive statistics and correlations of the study variables are presented in Table 1. As summarized in
Table 2 and Fig. 3, both workers’ compensation benefits (B = − .43 × 10−5, SE = .21 × 10−5, \( \Delta R^2 = .04 \)) and
minimum wage (B = − .35, SE = .17, \( \Delta R^2 = .04 \)) in 2015 were significantly and negatively associated with
fatality rates in 2016. Put differently, when workers compensation benefit was $100,000 greater in one
state than in another, the fatality rate was smaller by .43. Also, when minimum wage was one dollar
greater in one state than in another, fatality rate was smaller by .35. Note that the national average of
fatality rates in 2016 was 4.34 (see Table 1). These findings supported the Hypotheses 1-A and 1-B and
can be seen in Fig. 4A. Also, education level was negatively associated with fatality rates (B = − .28, SE
= .05, \( \Delta R^2 = .28 \)) while GDP per capita was positively associated with fatality rates (B = .12 × 10−3, SE
= .28 × 10−4, \( \Delta R^2 = .18 \)).
Table 1  
Descriptive statistics and correlations among the study variables.

|                         | mean (SD) | 1     | 2    | 3    | 4    | 5    | 6    | 7     | 8     |
|-------------------------|-----------|-------|------|------|------|------|------|-------|-------|
| 1. Average WCB         | 172K (112K) | -     |      |      |      |      |      |       |       |
| 2. Minimum Wage        | 7.57 (1.32) | .12   | -    |      |      |      |      |       |       |
| 3. Education Level     | 29.08 (4.92) | .01   | .35* | -    |      |      |      |       |       |
| 4. GDP per capita      | 47106.70 (8934.92) | -.01  | .27  | .58**| -    |      |      |       |       |
| 5. Income Gap          | .46 (.02)  | .04   | .11  | -.04 | -.15 | -    |      |       |       |
| 6. Population          | 6163K (6848K) | .05   | .16  | .15  | .12  | .51**| -    |       |       |
| 7. Fatality Rates 2016 | 4.34 (2.07) | -.25  | -.38**| -.46**| .09  | -.32*| -.33*| -     |       |
| 8. Fatality Rates 2017 | 4.20 (2.00) | -.33**| -.25  | -.45**| .04  | -.22 | -.32*| .82** | -     |

Notes. ** p < .01; * p < .05; † p < .10; Average WCB = $ Average of workers’ compensation benefits for the loss of an arm, hand, leg, or foot in 2015; Minimum wage = $, data from 2015; Education Level = % college degree earned in 2015; GDP per capita = gross domestic product per capita in 2015; Income Gap = Gini index from the national data from 2010 (greater value indicates greater income gap); Population = National census data from 2010; Fatality Rates 2016 = the number of workers killed at work per 100,000 workers in 2016; Fatality Rates 2017 = the number of workers killed at work per 100,000 workers in 2017.

Workers’ compensation benefits ($B = −.62 \times 10^{-5}, \text{SE} = .22 \times 10^{-5}, \Delta R^2 = .09$) in 2015, but not minimum wage ($B = −.10, \text{SE} = .18 \times 10^{-5}, \Delta R^2 = .37 \times 10^{-2}$), was significantly and negatively associated with fatality rates in 2017 (see Fig. 4B). These findings supported the Hypotheses 2-A, but rejected Hypothesis 2-B. That said, it is worth noting that the trend of negative relationship between minimum wage and fatality rates was found consistently with the result of Hypothesis 1-B testing. When workers’ compensation benefit was $100,000 greater in one state than in another, fatality rate was smaller by .62. Also, when minimum wage was one dollar greater in one state than in another, fatality rate was smaller by .10. Note that the national average of fatality rates in 2017 was 4.20 (see Table 1). Also, education level was negatively associated with fatality rates ($B = −.27, \text{SE} = .05, \Delta R^2 = .27$) while GDP per capita was positively associated with fatality rates ($B = .10 \times 10^{-3}, \text{SE} = .30 \times 10^{-4}, \Delta R^2 = .13$).
### Table 2
Hypotheses testing results based on a regression analysis

|                          | DV = Fatality Rates in 2016 |       |       | DV = Fatality Rates in 2017 |       |
|--------------------------|-----------------------------|-------|-------|-----------------------------|-------|
|                          | $B$ (SE)                    | $t$-value |       | $B$ (SE)                    | $t$-value |
| (Intercept)              | 17.35 (5.60)                | 3.12** |       | 11.36 (5.97)                | 1.90† |
| **Study Variables**      |                             |       |       |                             |       |
| Average WCB in 2015      | $-0.43 \times 10^{-5}$ $(0.21 \times 10^{-5})$ | -2.03* |       | $-0.62 \times 10^{-5}$ $(0.22 \times 10^{-5})$ | -2.78** |
| Minimum Wage in 2015     | $-0.35$ $(0.17)$            | -2.12* |       | $-0.10$ $(0.18)$            | -0.57 |
| **Contextual Variables** |                             |       |       |                             |       |
| Education Level in 2015  | $-0.28$ $(0.05)$            | -5.48** |       | $-0.27$ $(0.05)$            | -4.87** |
| GDP per capita in 2015   | $0.12 \times 10^{-3}$ $(0.28 \times 10^{-4})$ | 4.36** |       | $0.10 \times 10^{-3}$ $(0.30 \times 10^{-4})$ | 3.42** |
| **Control Variables**    |                             |       |       |                             |       |
| Income Gap in 2010       | -15.04 (11.42)              | -1.34 |       | -4.46 (12.20)               | -0.72 |
| Population in 2010       | $-0.52 \times 10^{-7}$ $(0.35 \times 10^{-7})$ | -1.47 |       | $-0.65 \times 10^{-7}$ $(0.37 \times 10^{-7})$ | -1.76 |

**Notes.** Average WCB = $ Average of workers’ compensation benefits for the loss of an arm, hand, leg, or foot in 2015; Minimum wage = $, data from 2015; Education Level = % college degree earned in 2015; GDP per capita = gross domestic product per capita in 2015; Income Gap = Gini index from the national data from 2010 (greater value indicates greater income gap); Population = National census data from 2010; DV = Fatality Rates, the number of workers killed at work per 100,000 workers in 2016 ($R^2 = .60$) and 2017 ($R^2 = .51$).

### Discussion

The underlying premise of the present study is that if workers are easily replaceable due to lower cost of hiring and making up for workers’ serious injuries, then the workers are more subject to adverse working conditions leading to fatality. Put differently, underscoring workforce flexibility more than workforce stability would lead to greater occupational safety and health concerns. The present study showed that state-level quantitative indicators of how workers are valued at work, namely minimum wage and workers’ compensation benefits, were significantly and negatively associated with fatality rates in the following year. Workers’ compensation benefits were significantly and negatively associated with fatality rates two years later, implying the lasting effect of this particular type of values on workers indicator. These findings are in line with the study of Baines [28] showing how readily replaceable workers can be associated with organizations’ tolerance to unhealthy work environments. Within a culture of prevailing capitalism, in which safety was not put first over profits and workers are inadequately valued, injured and diseased workers are more likely to be considered expendable [29]. Concrete informational and regulatory indicators of how workers are valued can serve as critical situational cues providing reference points for
linking beliefs and ideas to broader networks of meaning and augmenting both employers’ and employees’ sensemaking processes about occupational safety and health [16, 30]. They project themselves onto the situation characterized by low minimum wage and insufficient workers’ compensation benefits. Subsequently, they observe the negative outcomes in their workplace such as improper safety leadership, training, and protections, and learn which organizational behaviors are acceptable [31]. This has consequences for both the employee and the employer, as workers can become acquiescent to deficient care and safety while organizations can become complicit regarding inadequate law and regulation.

Presumably, it is unrealistic to inflate minimum wage and workers’ compensation benefits arbitrarily in a short period of time. However, we can think about alternative protections for workers through social and organizational systems. For example, we may want to try to enhance the awareness of employers and employees regarding the inadequacy of the extant minimum wage and workers compensation benefits in protection of workers. Raising awareness on workers’ compensation benefits is important as it has been shown that those who are in more precarious employment situations are not only more likely to get injured and need access to workers’ compensation benefits, they are less likely to be aware of workers’ compensation and the assistance it provides [32]. Additionally, many past studies have shown that a large number of workers do not file claims even when they are aware of these benefits and qualify for them [33, 34, 35] and raising awareness could help workers receive needed protections such as workers’ compensation benefits.

Additionally, more prevention efforts can be made throughout the United States. There can be more collaborative efforts between organizations and government agencies to provide safety and health training/programs as well as access to occupational safety services (e.g., safety monitoring & hazard assessment). It has been shown that overtime, safety initiatives increase safety performance and reduce accidents, which in turn helps lower insurance costs for organizations [36]. Haley-Lock and Shah [37], describe that while employers are already minimally incentivized by public policy to participate in supportive employment practices, research has found that those who chose to participate in additional high involvement human resource management strategies helped reduce expenses related to turnover, hiring, and training. Potentially programs that promote better safety and health practices can help in a similar fashion. Public policy can put in place programs to incentivize employers to be more involved in the safety and health of their workers and provide resources to help these employers train and educate their workers on occupational safety. This can not only potentially reduce the number of workers who are killed/injured in the workplace, but also organization costs. Furthermore, policy makers can focus on strengthening current policies. There are policies in place that determine not only minimum wage and workers’ compensation benefits, but also occupational standards, workers’ ability to organize, and support the enforcement of safety and health standards in the workplace. Strengthening the current policies can help diminish the disparity between lower and higher income workers [38].

In fact, Stoffregen, Giordano, and Lee [39] examined occupational injury and fatality rates from the micro- and macro-level and has shown that the quality of health care systems and the quality of health care
systems' prevention efforts were associated with lower occupational fatality rates.Interestingly, greater overall quality of healthcare and greater quality of healthcare systems’ prevention efforts were associated with higher serious occupational injury rates. It is possible that this finding is due to the workers accessibility to care and/or their potentially greater perceived value as workers. In sum, safety policies, practices, and procedures that are in place to protect the workers could be an enhancing indicator for values on workers.

In addition to the key study findings, it is noteworthy that education was negatively associated with fatality rates while GDP per capita was positively associated with fatality rates. It is inferred that workers with greater education may have broader options for safer and healthier work opportunities [40, 41]. GDP per capita, which indicates the business efficiency (i.e., higher return per employee), may be associated with the priority of productivity over workers’ safety and wellness. Occupational fatality might be a costly toll of industrial and economic growth and efficiency. These findings regarding the two socioeconomic factors of GDP and education offer practical insights regarding the occupational safety and health policies and practices of state governments and employers. For example, states can have workers with overlapping vulnerabilities (i.e., lower education level and higher GDP) where employees are exposed to potentially greater occupational hazards. For these states, more focused and combined efforts from state governments and employers can be made to improve occupational safety and health. These efforts can focus on enhancing occupational safety and health awareness (by employers and employees) and ensuring adequate organizational resources and support for employees’ safety and health.

In order to extend the present study conducted at the state-level, a future study is needed to examine whether the minimum wages and workers’ compensation benefits at the state-level are indeed interpreted as values on workers at the individual-level across the samples of employees and employers. Also, to address the limitation of the study findings based on archival data, a more controlled experimental approach utilizing a series of likely scenarios of judgement and decision making in terms of occupational safety and health investment as well as provision of various financial supports including salaries and workers’ compensation benefits can be adopted.

Conclusions

The present study showed the gap in how workers are valued across the U.S.. Minimum wage and workers’ compensation benefits, which were chosen for the present study as the two state-level quantitative indicators of how workers are valued at work, were significantly and negatively associated with fatality rates in the following year. The significant and negative relationship between workers’ compensation benefits and fatality rates two years later was also found. The results suggest the lasting effect of this particular type of value on workers indicator. The study speaks to the importance of fostering culture where workers are adequately valued, cared about, and protected to prevent and curtail occupational fatality.

Abbreviations
Declarations

Ethics Approval and Consent to Participate
Not Applicable.

Consent for Publication
Not Applicable

Availability of Data and Materials
The datasets generated and/or analyzed during the current study are publicly available and accessible on the U.S. Department of Labor website, ProPublica, and U.S. Bureau of Labor Statistics, [https://www.dol.gov/; https://projects.propublica.org/graphics/workers-compensation-benefits-by-limb; https://www.bls.gov/iif/oshcfoi1.htm][13,18,26]

Competing Interests
The authors declare that they have no competing interests

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Authors’ Contributions
LK was the leader and a major contributor in writing of the manuscript with FF, SS, MA, & JL also being major contributors in writing the manuscript. JL analyzed and interpreted the data regarding the results of this study. All authors read and approved the final manuscript.

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