

The Effect of the Current Recession on Craftworker's Accident/Injury Rate In Relation To Overtime

Mahlet G. Walelign, MCSM and Shima N. Clarke, Ph.D., PE
Clemson University
Clemson, SC

This study determines the association between the rate of accident/injury and the total number of hours worked during this time of recession and, ascertains the probability of workers underreporting occupational injuries. The hypothesis considered is that from all the different variables that may affect the lower risk of occupational injury among craftworkers, two probable reasons are: 1) the recession has resulted in lowered overtime worked by craftworkers which in turn directly affects the injury rate and 2) the feeling of insecurity craftworkers experience as a result of the economic downturn, have an effect on the probability of workers underreporting occupational accident/injury for fear of losing their job. Two survey instruments were sent to industry professionals and practitioners. Data was also gathered from Bureau of Labor Statistics by comparing fatal and non-fatal occupational injury rates between the years 2005 to 2009. The results of two surveys, one for the craft workers and another for safety directors/superintendents, show that both groups believe that there is decline in the amount of overtime worked, decline in accident/injury rate and craft workers do not under report accidents for fear of losing their job.

Key Words: Overtime, Accident/Injury rate, Recession, Construction industry, Craftworkers

Introduction

Construction has been considered to be one of the most hazardous industries in the United States for decades (Levine, 2008). Craftworkers incurred the most fatal injuries of any industry in the private sector and the non-fatal injury in construction ranked third (BLS, 2009). Studies by Folkard (2006) and Vasquez (2006) show that craftworkers' accidents and injuries are not traceable to a single factor but to multiple factors. Research has shown that excessive overtime has a significant impact on job accidents/injuries (Hanecke et al, 1998). A study conducted by Xiuwen Dong (2005) revealed that long work hours and irregular work schedules were significantly associated with a higher work-related injury rate. When craftworkers worked more than 40 hours per week or 8 hours a day, the injury risk increased slightly. The risk was almost double when craftworkers worked more than 50 hours per week. As the "Goldilocks model" of overtime in construction: not too much, not too little, but just right put it "the question is how much overtime a worker will work, rather than if he or she will work overtime" (Goldenhar et al, 2003). Furthermore, the current economic trend may have an effect on the probability of craftworkers underreporting occupational injuries due to fear of being stigmatized or fired. None of these studies have examined the influence of economic recession on overtime, health and safety. The objective of this study was 1) to determine the association between the rate of accident/injury and the total number of hours worked during this time of recession. 2) Ascertain whether the recession has an impact on the number of hours craftworkers worked, and 3) ascertain the probability of craftworkers underreporting injuries.

Methodology

A cross sectional study with an ex-post facto design was conducted for this research. After a literature search, two survey instruments were developed and pilot tested: one for safety directors/superintendents and another for craftworkers. The sample frame for the safety directors/superintendents comprised of 150 randomly selected general contractors and specialty contractors listed on the American Sub-contractors Association, (ASA) website directory. Another 40 survey instruments were sent to randomly selected craftworkers who were working for three different

construction companies on projects at Clemson University. Probability sampling was used for the safety director/ Superintendent Survey and non-probability sampling was used for craftworkers' survey.

Data was also gathered from Bureau of Labor Statistics by comparing fatal and non-fatal occupational injury rates between the years 2005 to 2009. The data extracted from BLS database included were the total number of hours worked per year, total number of employees per year and the rate of injury per year. To determine whether there was an increase or decrease in the number of hours worked by a single person, it was necessary to divide the total number of hours worked by the total number of employees. The data was then tabulated and plotted to ascertain the relationship between the number of hours worked by a single person and the rate of injury.

Research Limitation

First and foremost this study was concerned with the correlation between the amount of hours worked and the rate of accident/injury during the recession; hence it did not deal with the impact of other multiple variables which may influence the accident rate. Furthermore, due to time constraints, the sample frame for the craftworker's survey was limited to craftworkers who were working for three construction companies on jobs at Clemson University. In addition, for purposes of finding companies who self-perform work, the majority of survey instruments for safety director/superintendent were sent to the American Sub-contractors Association (ASA). For this research it was assumed that the recession started in 2007. Due to time constraints the researcher were only able to go as far back as 2005 to see if there is a change in the relationship between injury rate and the number of hours worked by craftworkers. At the time of the research the latest available data from BLS was for 2009.

Findings

From the 150 questionnaires sent out to safety director/superintendents, 32 were received; a 21.3% response rate. From the 40 surveys sent out to craftworkers, 27 were received; a 67.5% response rate. From the questionnaire for safety directors/superintendents: out of 32 respondents, 11 were safety directors with work experience ranging from 5.5 to 39 years and the other 21 were comprised of 7 presidents, 3 project managers/ supervisors, 1 CEO, 2 Branch managers, 3 superintendents, 3 risk managers, 1 Claim adjudicator, 1 human resource manager and 1 business developer; their work experience ranged from 5 to 35 years. The work experience for the on-site craftworkers at Clemson University ranged from 2 to 10 years.

The participants were asked to indicate in what way the recession affected the craftworkers. They were given six choices and asked to mark all that apply which is why the total percentage of responses do not add up to 100%. The results are summarized in Table 1.

Table 1

Effects of recession on craftworkers

	Increased job insecurity	Increased overtime	Increased work load	Decreased workload	Decreased overtime	Other
% of Safety dir./Sup.	71.9	6.3	21.9	43.8	78.1	0.0
% of Craftworkers	42.0	12.0	23.0	50.0	62.0	8.0

The participants were also asked to indicate their level of agreement on a 5 point Likert Scale with the following statements. The results are summarized in Table 2

Table 2

Safety directors/superintendent and craftworkers level of agreement with the following four statements

		SA	A	N	DS	SD
In the past year, there has been an increase in overtime for craftworkers	% of Safety dir./sup.	3.1	15.6	9.4	46.9	25.0
	% of Craftworkers	3.8	7.7	15.4	23.1	50.0
Due to the recession, people underreport the number of accidents they have experienced	% of Safety dir./sup.	3.6	15.6	9.4	40.6	28.1
	% of Craftworkers	8.0	12.0	16.0	32.0	32.0
One reason for craft workers not reporting accidents is fear of losing a job	% of Safety dir./sup.	6.3	15.6	28.1	34.4	15.6
	% of Craftworkers	16.0	8.0	28.0	40.0	8.0
In the past two years, the number of accident/injury among craftworkers have increased	% of Safety dir./sup.	6.3	9.4	25.0	50.0	9.4
	% of Craftworkers	4.0	0.0	12.0	44.0	40.0

Note: SA- Strongly Agree, A-Agree, N-Neutral, DS-Disagree, SD-Strongly Disagree

The combined weighted results of Table 2 are illustrated in Figure 1

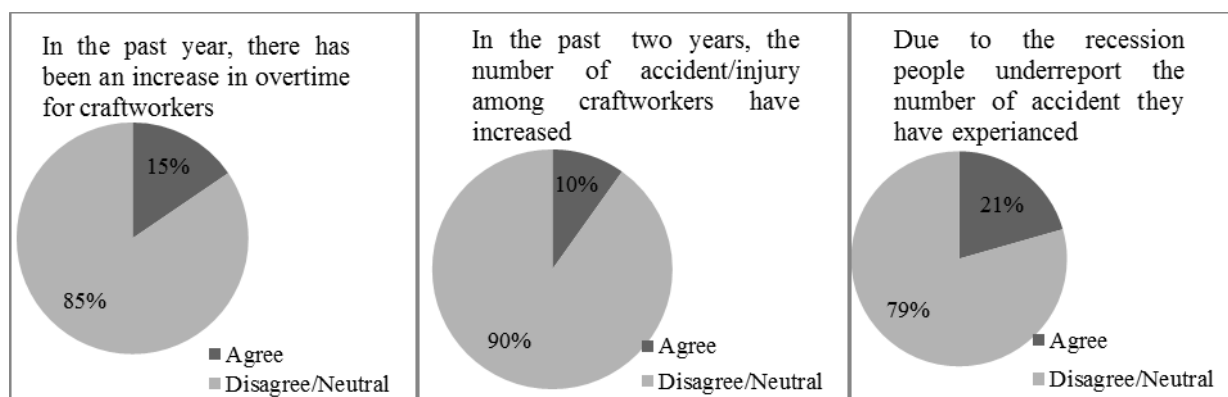


Figure 1: The combined weighted results for safety director/superintendents and craftworkers.

The participants were asked to indicate the average number of hours per week a typical craftworker worked. Table 3 shows the percentage of responses by the participants.

Table 3

Average number of hours worked per week by a typical craftworker

	< 40 hrs	40-45 hrs	45-50hrs	50-55hrs	55-60hrs
% of Safety dir/Sup.	6.3%	15.6%	28.1%	34.4%	15.6%
% of Craftworkers	0.0%	88.0%	4.0%	8.0%	0.0%

The craftworkers were then asked to indicate the number of consecutive days of overtime they worked per week. Table 4 shows the percentage of responses by the participants.

Table 4

Consecutive days of overtime worked by Craftworkers

	0Day	1Day	2Days	≥3Days
% of Craftworkers	72	16	12	0

Safety directors/superintendents were then asked if there is any association between the recession, overtime and accident/injury. 16 out of 32 responded to the question. Of which, 25% said that no matter what the economy is doing, as long as the company has an effective safety program, accidents and injuries will be kept to a minimum. They did not mention anything about the relation between recession and overtime. 12.5% said that there is an increased risk of accident /injury to craftworkers when working more than 50 hr. /week. 12.5% pointed out that the main reason behind the decline of accidents during the recession is the retention of more careful and skilled workers and the laying off of the less experienced craftworkers. 43.75% believed that excessive overtime results in accidents. The remaining 6.25% believed that there is no direct correlation between overtime and accident/ injury since there are so many variables that affect accidents.

The last question asked the participant how many hours per week is ideal for craftworkers to work without affecting their safety and health. Table 5 shows the percentage of responses by the participants.

Table 5

The number of hour/week craftworkers can work without affecting their safety

	40-45 hrs/wk	45-50 hrs/wk	50-55 hrs/wk	55-60 hrs/wk	Over 60hrs/wk
% of Safety dir./sup.	7.69	84.62	0.00	0.00	7.69
% of Craftworkers	29.17	33.33	4.17	2.08	1.25

Data from Bureau of Labor Statistics (BLS)

The data collected from BLS shows that during the current recession, the construction industry experienced a significant setback in the number of fatal and non-fatal occupational injuries. Notably, employment or hours worked declined materially which is a reasonable explanation as to why the decline in injury occurred. Working long hours has been a common practice for construction workers. When the total number of hours worked declined, chances are there is less overtime involved. The data from BLS is summarized in Table 6 and illustrated in Figure 2.

Table 6

Number of employees, total number of hour(hrs.) worked by a single person and injury rate

Year	No of Employees	Total Hrs Worked	Hrs Worked by a Single Person/Yr	(Fatality+Non-Fatality) Rate
2009	7,439,000	13,383,000,000	1,799	16.4%
2008	8,667,000	16,407,000,000	1,893	16.5%
2007	9,535,000	18,393,000,000	1,929	18.0%
2006	9,507,000	18,522,000,000	1,948	19.2%
2005	9,145,000	17,878,475,000	1,955	19.2%

(adopted from Census of Fatal and non-fatal Occupational Injuries and total hrs worked Summary, 2005, 2006, 2007, 2008, 2009)

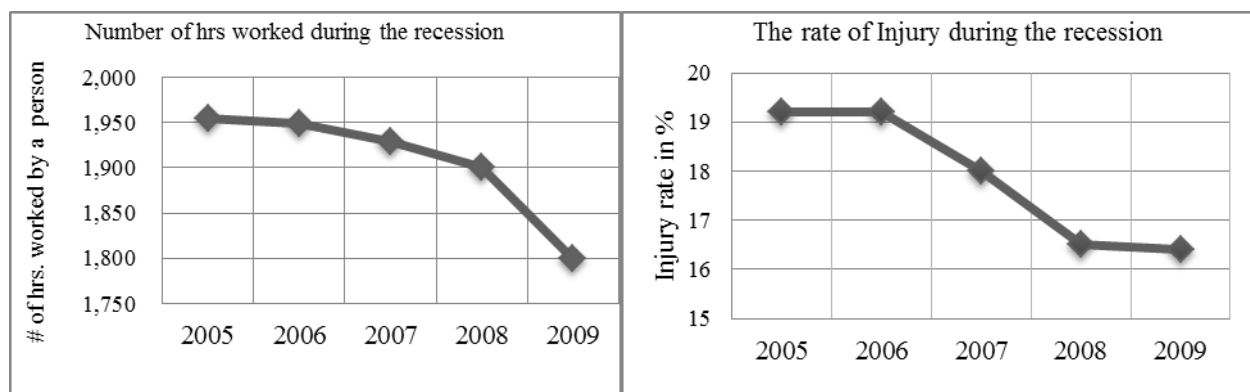


Figure 2: Total number of hours worked by a single person and the rate of injury during the recession

Analysis

A one tail T-test was conducted for the Likert scale questions in Table 2 to determine the statistical significance between sample distribution mean and population mean. The statistical analysis is presented below.

With respect to the amount of overtime worked during the recession:

Null hypothesis (Ho): Ho =3; the recession has resulted in increase in the amount of overtime worked.

Alternative hypothesis (HA): HA >3(one tail): The recession has not resulted in increase in the amount of overtime worked

Population mean =3

Sample mean=3.75

T-calculated =3.82

The critical value =1.69

Since the calculated value is greater than critical value, reject Null hypothesis, and conclude that the recession has not resulted in an increase in overtime worked. As the sample distribution mean is significantly different from population mean, we can infer the results to the population.

With respect to people underreporting the number of accident they experienced during the recession:

Null hypothesis (Ho): $H_o = 3$; the recession has resulted in underreporting of accident.

Alternative hypothesis (HA): $H_A > 3$ (one tail); the recession has not resulted in underreporting of accident

Population mean = 3

Sample mean = 3.69

T-calculated = 3.16

The critical value = 1.69

Since the calculated value is greater than critical value, reject Null hypothesis and conclude that the recession has not resulted in increased overtime worked. As the sample distribution mean is significantly different from population mean, we can infer the results to the population

With respect to the number of accident/injury among craftworkers in the past two years:

Null hypothesis (Ho): $H_o = 3$; in the past two years, the number of accident/injury among craftworkers has increased.

Alternative hypothesis (HA): $H_A > 3$ (one tail); in the past two years, the number of accident/injury among craftworkers has not increased.

Population mean = 3

Sample mean = 3.47

T-calculated = 2.61

The critical value = 1.69

Since the calculated value is greater than critical value, reject Null hypothesis and conclude that in the past two years, the numbers of accident/injury among craftworkers have not increased. As the sample distribution mean is significantly different from population mean, we can infer the results to the population.

Correlation between the Number of Hours Worked and the Rate of Accident

The correlation between the number of hours worked and the rate of accidents is illustrated in Figure 2. The Pearson's product coefficient (r), which reveals the magnitude and the direction of the relationship, is 0.8503. This indicates a strong linear relationship between these two variables (Cooper and Schindler, 2003).

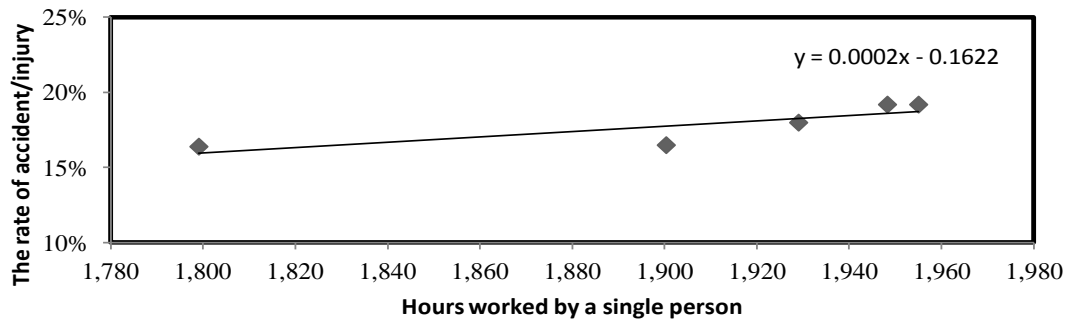


Figure 2: The correlation between the number of hour worked by a single person and the rate of accident from 2005 to 2009

Conclusions

The survey results and the comparison of fatal and non-fatal occupational injury rates show that the amount of overtime worked and the accident rate has declined simultaneously. Therefore, the correlation between declining accident/injury rate and declining number of hours worked is an asymmetrical relationship. This illustrates that the change in the independent variable (number of hours worked) is responsible for the change in the dependent variable (Accident /injury). Furthermore, scatterplots of these two variables demonstrate that there is a strong linear relationship between them. The results of this survey coupled with previous research findings show that working extended overtime increases the rate of accident/injury.

The researcher hypothesized that due to the insecurity that the recession may impose on people, there is a possibility that craftworkers underreport accidents they have experienced for fear of losing their job. However, only 21.9% of the safety director/superintendents and 19.23% of craftworkers agree with this hypothesis. It can thus be concluded that the hypothesis considered was incorrect. Even if the recession has increased craftworkers insecurity, they do not underreport accident for fear of losing their job.

Recommendations

Overtime is a culture of the construction industry, so it is unrealistic to completely eliminate it. Both management and craftworkers want a certain amount of overtime. Most craftworkers want to work some overtime to make enough money to support their lifestyle and save money for the non-boom times where they may not be able to work due to weather or other reasons whereas managers want overtime to complete jobs on-time (Goldenhar et al., 2003). However, workers, managers, companies, professional associations and government bodies should be aware of the dangers of working extensive overtime and work on possible countermeasures that might be implemented to minimize if not eliminate working extensive overtime in order to accomplish the goal of zero accident.

For further research, it is recommended to conduct a similar study gathering more data and including a more diversified sampling frame. Although this study examined the correlation between working overtime and accident/injury rate, it is recommended that multiple variables be included to evaluate their impact on the rate of accident /injury. For instance, further research seems to be needed on the effect of retaining skilled craftworkers, whenever there is a layoff, on the rate of accident during the recession.

References

Cooper,D and Schindler,P. (2003). *Business Research Methods*. New York: McGraw-Hill.

Folkard S. and Lombardi, D.A. (2006). Modeling the Impact of the Components of Long Work Hours on Injuries and “Accidents”. *American journal of industrial medicine*, 49, 953–963.

Goldenhar et al. (2003). The “Goldilocks Model” of Overtime in Construction: not too much, not too little, but just right. *Journal of safety research*, 34, 215-226.

Hanecke, K., Tiedemann, S., Nachreiner, F., and Grzech-Sukalo, H. (1998). Accident risk as a Function of Hour at Work and Time of Day as Determined from Accident Data and Exposure Models for the German Working Population. *Scandinavian Journal of Work and Environmental Health*, 24 Suppl. 3, 43-48.

Huang, X.Y.and Hinze, J. (2003). Analysis of Construction Worker Fall Accidents. *Journal Of Construction Engineering and Management-ASCE*, 129 (3), 262–271.

Kines, P. (2002). Construction Workers’ Falls through Roofs: Fatal versus Serious Injuries, *Journal of Safety Research*, 33, 195– 208.

Levine L. (2008). Worker Safety in the Construction Industry: The Crane and Derrick Standard, *CRS Report for congress*.

United States Department of Labor, Bureau of Labor Statistics (BLS) (2009). *National census of fatal occupational injuries*. URL [WWW document]. <http://www.bls.gov/news.release/pdf/cfoi.pdf>.

Valdes-Vasquez, R. (2006). *The Correlation between Safety Training Program Attributes and Safety Performance Metric for General Contractors in North and South Carolina*.Masters thesis, Clemson University, SC.

Xluwen, D. (2005). Long Work Hours, Work Scheduling and Work-Related Injuries among Construction Workers in the United States, *Scandinavian Journal of Work Environ Health*, 31(5),329–335.