

Occupational Fatalities Involving Hispanic Workers in the Construction Industry

Christopher A. Janicak

Department of Safety Sciences, Indiana University of Pennsylvania, Indiana, USA

Email: cjanicak@iup.edu

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ABSTRACT

This study examined occupational fatality cases involving Hispanic workers that occurred from 2005 to 2009 in the United States. During this period, approximately 26 percent of all fatalities in the construction industry involved Hispanic workers resulting in significantly greater odds for Hispanic workers of being the victim of an occupational fatality due to falls and contact with objects. These increased odds also occurred across most age groups. Prevention measures presented include focusing efforts on construction industry trades that employ younger Hispanic workers and expose them to fall and contact with objects hazards.

Keywords: Occupational Fatalities; Hispanic Workers; Construction Industry

1. Introduction

From 2003 to 2010, the employment of Hispanic workers in the United States has steadily increased from approximately 1.7 million workers in 2003 to approximately 2.0 million workers in 2010 [1,2]. In 2003, Hispanic workers accounted for approximately 12 percent of all workers. In 2010, they accounted for approximately 14 percent of all workers. By 2050, the Census Bureau estimates that the Hispanic population will consist of one out of every four Americans [3].

A number of studies have found Hispanic workers are at a greater risk of an occupational fatality than their non-Hispanic counterparts [4]. In 2009 for example, across all industries, Hispanic workers experienced approximately 4.0 deaths per 100,000 full-time equivalent workers versus a rate of 3.5 deaths per 100,000 full-time equivalent workers for white workers and 3.1 deaths per 100,000 full-time equivalent workers for black or African American workers [5].

Certain industries employ a larger percentage of Hispanic workers in the United States than others do. The industries that employ the greatest percentage of Hispanic workers include agriculture and forestry (29.7%), construction (23.5%), and landscape services (38.9%). Hispanic workers have been identified as working in some of the more dangerous occupations within these industries [6,7]. The construction industry also accounts for the largest number of fatal occupational injuries involving Hispanic or Latino workers [8]. Goodrum and Dai [6] determined that with the increase in the Hispanic

population working in the construction industry, significant differences in injuries, illnesses and fatalities exist when comparing Hispanic workers to non-Hispanic workers. Wendelboe and Landen [9] found Hispanic workers are most often killed on the job in construction as the result of a fall. This finding most likely correlated to the types of work activities Hispanic workers more likely to complete such as working from heights compared to non-Hispanic workers.

In addition to the inherent hazards present in occupations most often filled by Hispanic workers, studies have found additional underlying reasons for the increased fatality rates. These reasons include language barriers, lack of adequate training and knowledge of how to perform the job task, and a lack of proper equipment, procedures and training provided by the employer [10].

Across all industries, over the past decade, occupational fatalities involving Hispanic workers decreased from a high of 990 fatalities in 2006 to 682 in 2010 [11]. In 2010, fatal work injuries involving Hispanic or Latino workers were down 4 percent [12]. However, while the fatality rates for Hispanic workers have been improving overall, there is still much room for improvement, particularly in the construction industry. The number of fatalities experienced by Hispanics in the construction industry is more than double the number of fatalities experienced by Hispanic workers in the next closest industry, transportation [8].

While a number of studies have identified increased risks for Hispanic workers to be victims of occupational fatalities in the construction industry, this study will fo-

cus on the age of the Hispanic worker and the events that resulted in the fatality. This study will provide further insight as to the contributing factors that keep the construction industry as the leading industry for fatalities involving Hispanic workers.

2. Methods

Data from the Census of Fatal Occupational Injuries (CFOI) was used in this analysis. ¹For a fatality to be included in CFOI, the decedent must have been employed and receiving some form of compensation at the time of the event and present at the site of the incident as a job requirement [13]. The period under analysis was from January 1, 2005 to December 31, 2009. For each case, data included the industry employed in at the time of the fatality, their ages, Hispanic origin, and the event that resulted in the fatality. Cases belonging to the construction sector as coded using 2002 North American Industrial Classification System (NAICS) were selected for examination. Fatality victims of 16 years old and older were included in the analysis. Employment figures from the Bureau of Labor Statistics' Current Population Survey (CPS) were used to calculate the fatality rates. Fatality cases for which Hispanic origin was unknown were removed from the analysis.

Descriptive statistical summaries were calculated for the demographic variables. These variables include the age of the worker, Hispanic origin, the industry the victim was employed in, and the fatality event. The descriptive statistics provide an overview of fatalities involving Hispanic workers and a detailed summary of the deaths involving Hispanic workers in the construction industry.

Odds ratios, confidence intervals, and significance tests were performed on the variables under examination in this study following the multinomial logistic regression procedures described by Norusis [14]. The odds ratios compare fatalities involving Hispanic workers to fatalities involving non-Hispanic workers.

3. Results

From January 1, 2005 to December 31, 2009, there were 26,996 fatalities in the United States reported by the Census of Fatal Occupational Injuries. Of the death cases with an identified ethnicity of the victim, 4357 cases (16 percent) involved people of Hispanic origin (See **Table 1**).

Using the employment data from the CPS, the fatality rate for Hispanic workers was significantly greater than non-Hispanic workers (Difference in rates = 0.8, Significance Score = 0.06, $p < 0.05$) (See **Table 2**). The fatality

¹Note: This research was conducted with restricted access to Bureau of Labor Statistics (BLS) data. The views expressed here do not necessarily reflect the views of the BLS.

rate for non-Hispanic workers was 3.6 deaths per 100,000 person-years versus 4.4 deaths per 100,000 person-years for Hispanic workers.

3.1. Hispanic Fatalities in the Construction Industry

Approximately 34 percent of all fatalities involving Hispanic workers occurred in the construction industry accounting for the largest percentage of Hispanic fatalities (See **Table 1**). Fatality rates for Hispanic and non-Hispanic workers in the construction industry were only significantly different from one another (See **Table 3**). The fatality rate for Hispanic workers was approximately 10.9 deaths per 100,000 compared to 10.0 fatalities per non-Hispanic 100,000 workers. Significance testing determined the rate for Hispanic workers was significantly greater than that for non-Hispanic workers (Difference in Rates = 0.9, Significance Score = 0.16, $p < 0.05$).

3.2. Fatality Rates by Event in the Construction Industry

Table 4 summarizes the fatality rates by major event category. Fatal falls were identified as the leading fatality event in the construction industry for Hispanic workers with approximately 4.4 fatalities per 100,000 employed persons. However, for non-Hispanic workers, the leading death rate occurred with transportation fatalities with 3.7 fatalities per 100,000 employed persons.

3.3. Odds Ratios by Event in the Construction Industry

A multinomial logistic regression procedure was performed to determine the odds of being Hispanic based upon the fatality event for workers who died in the construction industry. Two events were found to be significant. Dying due to contact with objects compared to the reference category assaults and violent acts, had increased odds in which the fatality victim was Hispanic by a factor of 1.57 (95% C.I. = 1.08, 2.82, $p = 0.019$). Dying from a workplace fall had increased odds in which the fatality victim was Hispanic by a factor of 1.92 (95% C.I. = 1.33, 2.75, $p < 0.001$) (See **Table 5**).

3.4. Fatal Falls Involving Hispanic Workers in the Construction Industry

Examining falls in detail, from 2005 to 2009, 599 fatalities involved Hispanic workers while 1,299 fatal fall victims were identified as being non-Hispanic. Hispanic workers fatality rate for deaths due to falls in the construction industry was slightly higher than that for non-Hispanic workers (See **Table 6**). The fatality rate for

Table 1. Occupational fatalities by hispanic origin and industry, 2005-2009¹.

Industry	Hispanic or Latino Origin		Non-Hispanic	
	N	Percent	N	Percent
Agriculture, Forestry, Fishing and Hunting	421	9.7	2715	12.1
Mining	140	3.2	668	3.0
Utilities	19	0.4	222	1.0
Construction	1471	33.8	4180	18.7
Manufacturing	327	7.5	1654	7.4
Wholesale Trade	149	3.4	853	3.8
Retail Trade	195	4.5	1513	6.8
Transportation and Warehousing	449	10.3	3751	16.7
Information	21	0.5	274	1.2
Finance and Insurance	21	0.5	169	0.8
Real Estate and Rental and Leasing	61	1.4	312	1.4
Professional, Scientific, and Technical Services	35	0.8	369	1.6
Administrative and Support and Waste Management and Remediation Services	534	12.3	1380	6.2
Educational Services	23	0.5	399	1.8
Health Care and Social Assistance	39	0.9	623	2.8
Arts, Entertainment, and Recreation	57	1.3	411	1.8
Accommodation and Food Services	137	3.1	645	2.9
Other Services (Except Public Administration)	134	3.1	786	3.5
Public Administration	118	2.7	1441	6.4
Other	6	0.1	30	0.1
Total	4357	100.0	22,395	100.0

Note: ¹Fatal injury data were generated by the author with restricted access to BLS, CFOI microdata.

Table 2. Occupational fatality rates by hispanic origin in all industries, 2005-2009¹.

Hispani Origin	Fatality Frequency	Percent	Person-Years of Exposure	Rate (Deaths per 100,000 person-years)
Hispanic	4357	16.2	98,589	4.4
Non-Hispanic	22,395	83.3	618,854	3.6
Total	26,752	100.0	717,443	3.7

Note: ¹Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata..

Table 3. Occupational fatalities by hispanic origin in construction, 2005-2009¹.

Hispanic Origin	Frequency	Person-Years of Exposure in 1,000's	Rate (Deaths per 100,000 person-years)
Hispanic	1471	13,493	10.9
Non-Hispanic	4180	41,985	10.0
Total	5651	55,478	10.2

Note: ¹Fatal injury data were generated by the author with restricted access to BLS, CFOI microdata.

Table 4. Fatality rates by event in the construction industry, 2005-2009 CPS annual averages per 100,000 employed persons^{1,2}.

Event	Hispanic	Non-Hispanic
Contact with Objects	2.1	1.8
Falls	4.4	3.1
Harmful Substances	1.5	1.9
Transportation	2.3	3.7
Fires and Explosions	0.2	0.3
Assaults and Violent Acts	0.3	0.5

Notes: ¹Some event categories were omitted due to no data or data that do not meet BLS publication criteria; ²Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

Table 5. Odds ratios by event group in construction^{1,2}.

Event	Odds Ratio	95% C.I.	Sig.
Contact with Objects	1.57	(1.08, 2.82)	0.019
Falls	1.92	(1.33, 2.75)	0.000
Harmful Substances	1.40	(0.95, 2.06)	0.085
Transportation	1.04	(0.72, 1.51)	0.835
Fires and Explosions	1.12	(0.65, 1.91)	0.691
Assaults and Violent Acts	1.00		

Notes: ¹Some event categories omitted were due to no data or data that do not meet BLS publication criteria. ²Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

Table 6. Occupational fatalities rates due to falls by hispanic origin in the construction industry, 2005-2009¹.

Hispanic Origin	Frequency	Person-Years of Exposure (In 1,000's)	Rate (Deaths per 100,000 person-years)
Hispanic	599	13,493	4.4
Non-Hispanic	1299	41,985	3.1
Total	1898	55,478	3.4

Note: ¹Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

non-Hispanic workers was 3.1 deaths per 100,000 person-years versus 4.4 deaths per 100,000 person-years for Hispanic workers. Comparing the rate for Hispanic workers to that for non-Hispanic workers, the fatality rate for Hispanic workers was significantly greater than that for non-Hispanic workers (Difference in Rates = 1.3, Significance Score = 0.16, $p < 0.05$).

The worker's age was examined to determine the role it plays in fatal falls when comparing Hispanic workers to non-Hispanic workers. The age groups in the table were determined using the available CPS employment data categories for Hispanic workers. The fatality rates due to falls were greatest for Hispanic workers in the 16 - 19 years old group with 7.0 fatalities per 100,000 person-years and 8.7 fatalities per 100,000 person-years for the 55 and over age group (See **Table 7**).

A multinomial logistic regression procedure was performed to determine the odds of being Hispanic for members of the various age groups of workers who died from falls in the construction industry. The odds of being Hispanic and involved in a fatal fall were significantly greater for workers in all but one age category (See **Table 8**). The age groups with the greatest increased odds of the victims being Hispanic were the younger age groups. For example, fall victims aging 16 - 19 years old compared to victims of 65 years old or older, had increased odds of being Hispanic by a factor of 10.36 (95% C.I. = 4.48, 23.97, $p < 0.001$). Hispanic workers in the 20 - 24 years old age group had increased odds of being the

victim of a fall related death in the construction industry by 17.34 (95% C.I. = 8.50, 35.38, $p < 0.001$). Hispanic workers in the 25 - 34 years old age group had increased odds of being the victim of a fall related death in the construction industry by 10.71 (95% C.I. = 5.58, 20.56, $p < 0.001$). The significant increased odds of being a Hispanic worker and the victim of fatal fall were present in all age categories.

3.5. Contact with Objects Fatal Events in the Construction Industry

As identified previously, Hispanic workers have significantly greater odds of suffering an occupational fatality due to contact with objects than non-Hispanic workers. During this analysis period, Hispanic workers suffered 287 fatalities and a rate of 2.13 fatalities per 100,000 person-years of exposure to 760 fatalities for non-Hispanic workers and a rate of 1.81 fatalities per 100,000 person-years of exposure (See **Table 9**). Comparing the rate for Hispanic workers to that for non-Hispanic workers, the fatality rate for Hispanic workers was significantly greater than that for non-Hispanic workers (Difference in Rates = 0.32, Significance Score = 0.16, $p < 0.05$).

An examination of the fatality rates comparing Hispanic workers to non-Hispanic workers, the fatality rates were higher for Hispanic workers across all age groups (See **Table 10**).

Multinomial logistic regression odds ratios identified

Table 7. Fatal fall rates by hispanic origin and age group¹.

Age Group	Hispanic Workers		Non-Hispanic Workers	
	Frequency	Rate (Deaths per 100,000 person-years)	Frequency	Rate (Deaths per 100,000 person-years)
16 - 19	24	7.0	24	2.6
20 - 24	82	4.7	49	1.4
25 - 54	425	4.0	860	2.8
55 and over	65	8.7	366	5.5
Total	599	4.4	1299	3.1

Note: ¹Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

Table 8. Logistic regression odds ratios by age group in construction, fatal fall events, 2005-2009¹.

Age Group	Odds Ratio	95% C.I.	Sig.
16 - 19 years Old	10.36	(4.48, 23.97)	0.000
20 - 24 years Olds	17.34	(8.50, 35.38)	0.000
25 - 34 years olds	10.71	(5.58, 20.56)	0.000
35 - 44 years olds	5.35	(2.79, 10.27)	0.000
45 - 54 years olds	2.60	(1.35, 5.01)	0.004
55 - 64 years olds	2.22	(1.12, 4.41)	0.022
65 and older	1.00		

Note: ¹Fatal injury data were generated by the author with restricted access to BLS, CFOI microdata.

Table 9. Occupational fatalities rates due to contact with objects by hispanic origin in the construction industry, 2005-2009¹.

HispanicOrigin	Frequency	Person-Years of Exposure (In 1,000's)	Rate (Deaths per 100,000 person-years)
Hispanic	287	13,493	2.13
Non-Hispanic	760	41,985	1.81
Total	1,047	55,478	1.89

Note: ¹Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

Table 10. Hispanic fatal contact with objects rates by age group¹.

Age Group	Hispanic Workers		Non-Hispanic Workers	
	Frequency	Rate (Deaths per 100,000 person-years)	Frequency	Rate (Deaths per 100,000 person-years)
16 - 19	9	2.64	14	1.51
20 - 24	48	2.74	55	1.54
25 - 54	208	1.95	528	1.71
55 and over	22	2.95	163	2.45
Total	287	2.13	760	1.81

Note: ¹Fatal injury rates were calculated by the author with restricted access to BLS, CFOI microdata.

significantly greater odds for Hispanic workers to be the victims of fatalities due to contact with objects than non-Hispanic workers did. These greater odds for Hispanic workers were present in the younger age categories (See

Table 11). The increased odds ranged from 3.30 (95% C.I. = 1.07, 10.19, $p = 0.039$) times greater for the 16 to 19 years old age group to 4.47 (95% C.I. = 1.91, 10.47, $p = 0.001$) times for the 20 to 24 years old age group.

Table 11. Odds ratios by age group in construction, contact with objects events, 2005-2009¹.

Age Group	Odds Ratio	95% C.I.	Sig.
16 - 19 years old	3.30	(1.07, 10.19)	0.039
20 - 24 years old	4.47	(1.91, 10.47)	0.001
25 - 34 years old	3.43	(1.54, 7.65)	0.003
35 - 44 years old	1.89	(0.845, 4.25)	0.121
45 - 54 years old	1.18	(0.517, 2.67)	0.700
55 - 64 years old	0.59	(0.230, 1.50)	0.267
65 and older	1.00		

Note: ¹Fatal injury data were generated by the author with restricted access to BLS, CFOI microdata.

4. Discussion

The purpose of this study was to identify the factors that increase the odds of Hispanics being the victims of occupational fatalities in the construction industry. During 2005 to 2009, there were over 5,600 occupational fatalities in the construction industry with over 1,400 fatalities involving Hispanic workers. These deaths in the construction industry accounted for over one third of all occupational fatalities involving Hispanic workers. Hispanic workers in the construction industry suffered a disproportionately higher number of occupational fatalities than their non-Hispanic counterparts.

Examining the fatalities in the construction industry by the event, the fatality rates for falls and contact with objects events in the construction industry were significantly greater for Hispanic workers than non-Hispanic workers. The fall related deaths involving younger Hispanic workers were due to falls from roofs and scaffolds. Cranes, building materials, and soil from excavations were examples of sources that resulted in the greatest frequency of fatalities due to contact with objects events involving Hispanic workers.

The age of the worker was a key characteristic that differentiated Hispanic workers from non-Hispanic workers. Hispanic workers in the younger age groups had significantly greater odds of being the victim of a fall related death in the construction industry. When examining fatalities due to falls in the construction industry for workers 16 to 19 years old, the odds are over 10 times greater for the victim to be Hispanic than non-Hispanic. Younger Hispanic workers also had increased odds of being the victim of an occupational fatality due to contact with objects than non-Hispanic workers. These increased odds occurred for all age groups up to 34 years of age.

Along with these increased odds, Hispanic workers had significantly higher fatality rates for fatal falls and fatal contact with object events. These higher fatality

rates could be due to a number of reasons including lack of training and a lack of the use of fall protection. An underlying factor may be an increased exposure to fall hazards and contact with object hazards. Younger Hispanic may be more likely to complete work tasks that expose them to these hazards.

To prevent fatalities involving Hispanic workers in the construction industry, there are a number of actions that employers can take. Recognized methods include the use of personal fall protection equipment, use of excavation protection systems, and employee training.

Protecting workers from falls is also regulated by the Occupational Safety and Health Administration (OSHA). The OSHA fall protection standards in the construction industry stipulate the control measures that must be implemented and situations that require the implementation of fall protection measures. OSHA also has regulations designed to protect workers from accidents and injuries that resulted in many of the contact with objects fatalities. For example, there are regulations designed to protect workers from accidental cave-ins while working in excavations, thus preventing the fatalities due to contact with soil. There are additional standards designed to protect workers from accidental contact with cranes and excavation equipment which also accounted for a number of these fatalities.

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