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Fatal Occupational Injuries among Hispanic Construction Workers of Texas, 1997 to 1999

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ABSTRACT

Hispanic construction workers, particularly those born outside of the United States, are a growing segment of the Texas workforce and are increasingly the victims of on-the-job fatalities. This study examines occupational fatality characteristics among Hispanic construction workers utilizing records collected by the Texas Workers' Compensation Commission for the Bureau of Labor Statistics, Census of Occupational Fatal Injuries program. Of the 370 fatalities recorded from 1997 to 1999, 179 cases (46.5 %) involved Hispanic workers — 109 of who were born in a foreign country. The fatality rate for Hispanic construction workers was 23.5 per 100,000 workers compared to 21.2 for non-Hispanic workers. Many fatally injured Hispanic construction workers shared similar characteristics including: low skill level, young age and foreign birthplace. Hispanic workers employed as construction laborers, helpers, and roofers had the highest number of fatalities. Businesses with fewer than 10 workers employed forty-two % of all Hispanic decedents, and businesses with more than 100 employees comprised twenty % of fatalities. The leading causes of Hispanic fatalities were: transportation incidents, falls, and exposure to harmful substances.

Key Words: occupational fatality, construction, Hispanic workers, Mexican origin.

INTRODUCTION

The Hispanic minority is the fastest-growing population in the Texas labor market. It has been projected that by 2030 Hispanics will be the largest single ethnic group in the state's labor market comprising 45.6 % of the workforce (Murdock 1997). The construction industry employs more Hispanic workers than any other

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industry except agriculture and is one of the fastest growing and most hazardous industries in the state in terms of the number of occupational fatalities.

According to the Bureau of Labor Statistics Census of Fatal Occupational Injuries, the construction industry in Texas experienced the highest fatality rate of any industry during the 1980s (University of Houston 1993) and during the 1990s (TWCC 1993–2000). In addition, construction fatality rates were higher in Texas than in the nation as a whole during the 1990s (BLS 2000 a,b).

The hazardous nature of the construction industry coupled with the growing number of Hispanics comprising this industry's workforce raises questions about whether Hispanic construction workers face disproportionate occupational risks when compared to the construction labor force as a whole. The main purpose of this study is to identify specific case and demographic characteristics of occupational fatalities among Hispanic construction workers from 1997 to 1999. In order to provide a temporal framework for the case and demographic information, a general description of employment and fatality trends are provided for the period 1992 to 1999 (CFOI fatality data by ethnicity were not available in 1992).

This study demonstrates that a large number of fatally injured Hispanic construction workers shared similar characteristics: they were engaged in low-skilled, hazardous, and more physically demanding occupations; they were younger than their non-Hispanic counterparts; and a large proportion of them were workers of foreign origin — predominately Mexican born. In fact, a large number of Hispanic workers of Mexican birthplace (which represented 45.3 % of the total number of Hispanic fatalities) were returned to their home country for disposition — a possible indicator of a transitory and work-related residency in the United States.

It is evident that Hispanic workers constitute an at-risk segment of the Texas construction workforce, especially those in less-skilled occupations. This study provides an informational basis for the implementation of safety policies for this specific segment of the construction labor force and for the construction industry at large, regardless of worker ethnicity.

MATERIALS AND METHODS

The data presented in this study were gathered through the Bureau of Labor Statistics Census of Fatal Occupational Injuries (CFOI) program in cooperation with the Texas Workers' Compensation Commission (TWCC). CFOI identifies work-related fatalities through at least two independent source documents such as death certificates, newspaper clippings, employer questionnaires, autopsies, accident reports, and toxicology reports.

Construction industry employment data were obtained by special request from the Labor Market Information Department of the Texas Workforce Commission (TWC) and from the Bureau of Labor Statistics Current Population Survey (CPS). TWC employment data were only used for comparison of employment and fatality distribution by SIC subindustry divisions (construction subindustry employment totals were not available through BLS/CPS).

Employment data from the CPS *Geographic Profile of Employment and Unemployment* were used to develop construction industry fatality rates. To determine rates by occupation, employment figures were obtained from a CPS online query system

(BLS 2001b). To maintain reliability of employment estimates, rates were only calculated for aggregate occupational categories (in the CPS online system, relative error is greater when occupation categories are disaggregated). The following classifications were used in developing rates by occupation: "construction trades" (which includes skilled occupations such as painters, roofers, electricians, carpenters, etc) and "construction laborers" and "other handlers, equipment cleaners, helpers and laborers" (which are predominately unskilled or low-skilled occupations). The annual fatality rate was defined as the number of deaths per 100,000 employed construction workers. Technical explanation regarding rate calculations is provided in the appendix.

Case and demographic fatality data include deaths that resulted from traumatic occupational injuries that occurred in the private sector of the construction industry in Texas during the calendar years 1997, 1998, and 1999. For a fatality to be considered within the scope of the CFOI program, the decedent must have been employed (working for pay, compensation, or profit) at the time of the event, engaged in a legal work activity, or present at the site of the incident as a requirement of his or her job.

Included in the analysis were all cases that occurred in privately owned businesses that fell under Standard Industry Classification (SIC) group 15 "general building contractors", group16 "heavy construction, except building", and group 17 "special trade contractors". General building construction includes contractors and builders of residential, farm, commercial, or other buildings. Heavy construction contractors are primarily engaged in the building of highways, streets, bridges, sewers, or railroads. Finally, special trade contractors undertake building and non-building projects that include: painting (such as bridge, traffic lane, and residential house painting), electrical work (such as work on bridges, power lines, power plants, and house wiring), carpentry, plumbing, heating, roofing, and sheet metal work.

Case characteristic codes and titles were derived from the Occupational Injury and Illness Classification System (OIICS) developed by the Bureau of Labor Statistics and adopted as the national standard by the American National Standards Institute (ANSI Z-16.2). Worker occupation was coded using the 1990 Occupational Classification System developed by the Bureau of the Census.

According to CFOI guidelines, "Hispanic" is defined as any worker whose "origin is Cuba, Puerto Rico, Spain, Mexico, or the Spanish-speaking countries of Central or Latin America". "Origin" is defined as "the ancestry, nationality, lineage, or country in which the person or his or her ancestors were born before their arrival in the United States". CFOI collects data by White, Black and Asian race. A Hispanic worker could belong to any race. Only Hispanic and non-Hispanic ethnicity data were used in this study.

RESULTS

Occupational Fatalities in Construction, 1992–1999

Construction was a booming industry in Texas during the previous decade and Hispanic workers were an important component of the industry's workforce. According to annual estimates produced by the Bureau of Labor Statistics, civilian construction employment in Texas increased 44.9 % from 1992 to 1999 (BLS 1993–

2000). During the same period, the participation of Hispanic workers in the construction industry increased 12.6% (see Table 1) representing a greater increase than in any other industry. In addition, Hispanic workers constituted a relatively large percentage of the construction industry labor market. While Hispanics comprised 28.0% of total Texas employment in 1999, they comprised 46.5% of the construction industry workforce (BLS 2000).

From 1992 to 1999, more fatal occupational injuries were experienced in construction than in any other industry. While construction only employed an average of 6.0% of Texas' total private workforce, roughly 20.0% of the total work-related deaths occurred in this industry. Construction experienced 11.3% more fatalities than all other major industries combined during this time period.

According to data collected by TWCC, Hispanic workers experienced a greater percentage of occupational fatalities in construction than in any other major industry and accounted for nearly half (43.7%) of the occupational fatalities within the industry from 1992 to 1999. During this period, the average percentage of Hispanic fatalities in construction was only slightly higher than the percentage of Hispanic employment within the industry (42.4% compared to 43.7%).

Hispanic Construction Fatality Rates and Case and Demographic Characteristics, 1997 to 1999

Three hundred seventy work-related injury deaths were identified in the construction industry in Texas from 1997 to 1999 (107 in 1997, 143 in 1998, and 120 in 1999). During this 3-year period, almost half of the work-related deaths involved workers of Hispanic origin (179 cases).

Table 2 depicts the annual fatality rates for Hispanic workers, non-Hispanic workers, and all cases considered. Fatality rates relate the total number of construction job-related deaths to the annual average number of total workers facing that risk. For the period 1997 to 1999, the average fatality rate was 23.5 for Hispanic workers and 21.2 for non-Hispanic workers.

It should be noted that fatality rates among Hispanic workers could be inflated due to the fact that undocumented workers and Hispanic workers residing outside of the state may not be included in the employment figures used in rate calculations (Richardson 1995).

Table 1. Annual number and percent distribution of construction industry employed persons by Hispanic origin, Texas, 1992–1999.

Year	Total construction employment	Hispanic construction employment	
		Number	Percent
1992	396,312	134,400	33.9
1993	433,908	155,763	35.9
1994	456,560	208,932	45.8
1995	494,505	208,560	42.2
1996	434,600	195,288	44.9
1997	514,250	231,656	45.0
1998	568,229	258,720	45.5
1999	574,306	267,138	46.5

Source: U.S. Department of Labor, Bureau of Labor Statistics (BLS) Current Population Survey (CPS)

Table 2. Number, rate and percent distribution of construction industry fatalities by Hispanic origin, Texas, 1992–1999.

Year	Total fatalities		Hispanic fatalities			Non- Hispanic fatalities		
	Number	Rate	Number	Percent	Rate	Number	Percent	Rate
1997	107	20.8	48	44.9	20.7	59	55.1	20.9
1998	143	25.2	72	50.3	27.8	71	49.7	22.9
1999	120	20.9	59	49.2	22.1	61	50.8	19.9

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries.
Notes:
1. Employment data obtained from U.S. Department of Labor, Bureau of Labor Statistics Current Population Survey.
2. Fatality rates are per 100,000 workers.

Event or Exposure

The leading fatal events were similar for construction workers, regardless of ethnic background. The leading causes of death to construction workers (all ethnicities combined) were transportation incidents (26.8%), followed by falls (26.4%) and exposure to harmful substances — mainly contact with electric currents (25.4%) (see Table 3).

Differences between Hispanics and the industry at large were identified with the disaggregation of leading fatal event (OIICS) categories to the third and fourth digit level. The most important findings were as follows:

(a) The frequency of falls from roofs was higher among Hispanic workers than for the industry as a whole (68.6 % of falls involved Hispanic workers). Of the 24 falls from roofs involving Hispanic workers, 12 were roofers and 5 were structural metal workers;

(b) transportation incidents involving pedestrian workers struck by vehicles in roadways were more often associated with Hispanic ethnicity. Of the 19 total pedestrian transportation incidents, 12 involved Hispanic workers, 9 of who were construction laborers;

(c) Of the 12 construction workers who died as a result of being caught or crushed in excavation, 10 were of Hispanic ethnicity. Of these workers, 5 were laborers or helpers and 3 were in a nonclassified occupational category;

(d) Sixty-five percent (17 out of 26 total) of construction workers who were struck by objects and equipment were of Hispanic ethnicity. Seven of these Hispanic workers were construction laborers.

Industry

Table 4 displays employment and fatality figures for the industry groups within the construction Standard Industrial Code (SIC) division. Subindustry employment data were obtained from the Texas Workforce Commission and were not available by worker ethnicity. From 1997 to 1999, the general building contractors subindus-

Table 3. Number and percent distribution of construction industry fatalities by fatal event and Hispanic origin, Texas, 1997–1999.

Fatal event	Total fatalities		Hispanic fatalities	
	Number	Percent	Number	Percent
Transportation Incidents	99	26.8	48	26.9
Falls	98	26.4	43	24.0
Exposure to harmful substances or environment	94	25.4	41	22.9
Contact with objects and equipment	62	16.8	38	21.2
Fires and explosions	10	2.7	7	3.9
Assaults and violent acts	7	1.9	--	1.1
Total	370	100	179	100

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries.
Notes:
1. "Event or Exposure" was coded using the Occupational Injury and Illness Classification System.
2. Dashes indicate that data do not meet reporting threshold.

Table 4. Percent distribution of employment and fatalities by construction Standard Industrial Code and Hispanic origin, Texas, 1997–1999.

Construction industry (2 digit SIC)	Employment	Fatalities			
		Total workers		Hispanic workers	
	Percent	Number	Percent	Number	Percent
General Building Contractors (SIC 15)	22.1	42	11.4	20	11.2
Heavy Construction, except Building (SIC 16)	28.8	108	29.2	56	31.3
Special Trade Contractors (SIC 17)	49.1	220	59.5	103	57.5
Totals	100	370	100	179	100

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries.
Notes:
1. Industry classifications are based on the Standard Industrial Classification Manual, 1987 edition.
2. Employment data obtained from the Texas Workforce Commission, Labor Market Information Department

try (SIC 15) employed 22.1% of the construction workforce, but accounted for 11.2% of fatalities among Hispanic workers and 11.4 % of total construction fatalities. Heavy construction (SIC 16) accounted for 31.3% of total fatalities among Hispanic workers and 29.2% of total fatalities while employing 28.8% of the construction labor force. While the special trade contractor subgroup (SIC 17) had the highest percentage of fatalities (57.5% of Hispanic and 59.5 of total construction fatalities), this industry employed 49.1% of the total construction labor force. The disparity between fatality and employment percentages may indicate that the special trade contractor subindustry is the most hazardous in terms of occupational fatalities for both Hispanic and non-Hispanic workers, followed by heavy construction.

Establishment Size

Small Establishments — Fewer than 10 Employees

Hispanics and non-Hispanics working in small businesses experienced the highest number of fatalities. Establishments with fewer than ten employees employed 39.7% of Hispanic decedents and 44.0% of total decedents (163 total cases, 71 of Hispanic origin). Most of these small businesses belonged to the special trade contractor subindustry (80.3% of Hispanic cases and 72.4% of total cases were among special trade contractors).

The leading causes of Hispanic occupational fatalities in businesses with fewer than ten employees were: falls to lower levels (30.1%) followed by contacts with electric currents (16.7%), and pedestrians struck by vehicles (8.5%). Table 5 offers more detailed descriptions of the leading fatal events in small construction establishments.

Table 5. Number and percent distribution of construction industry fatalities in establishments with 1 to 9 employees by fatal event and Hispanic origin, Texas, 1997 to 1999.

Fatal event	Total fatalities		Hispanic fatalities		Percent participation Hispanic fatalities
	Number	Percent	Number	Percent	Percent
Fall to lower level	51	31.3	22	30.1	43.1
Contact with electric current	31	19.0	12	16.7	38.7
Pedestrian, non-passenger struck by vehicle, mobile equipment	12	7.4	6	8.5	50.0
Struck by object	11	6.8	6	8.45	54.5
Highway accidents	9	5.5	5	7	
Caught in or crushed in collapsing materials	13	8	5	5.6	38.4
Other	18	22.1	21	29.6	58.4
Total	163	100	71	100	43.5

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries.
Notes: 1. "Other" includes cases that do not meet reporting threshold.
2. "Event or Exposure" was coded using the Occupational Injury and Illness Classification System.

Large Establishments — 100 or More Employees

Establishments with 100 or more employees experienced the second highest frequency of total construction fatalities (22.2%), with deaths to Hispanic workers comprising 61.0% of the total fatalities. The fact that Hispanics experienced a higher percentage of fatalities in these establishments than the industry at large suggests that Hispanic workers either faced greater hazards or that they outnumbered non-Hispanics in larger companies.

Most of the large establishments that employed fatally injured workers belonged to the heavy construction industry. Hispanic workers in establishments with 100 or more employees suffered fatal injuries resulting from a different set of events than those occurring in small establishments. The primary fatal events were highway incidents (22.2%), pedestrians struck by vehicles (16.7%), and workers struck by moving objects (16.7%) (see Table 6).

Occupation

Information about the decedent's occupation describes the worker's job at the time of death. Within the construction industry are numerous occupations, which may be divided into two primary categories: skilled or specialized trades (such as painters, electricians, roofers, *etc.*) and low-skilled jobs (such as construction laborers and helpers). In addition to skill level required, construction occupations may also be classified according to their degree of risk exposure. According to a national study of hazardous jobs, occupations such as laborers, roofers and electricians were associated with a high level of risk (Toscano 1997).

Within low-skilled occupations, a larger percentage of Hispanics experienced fatalities when compared with non-Hispanics. More than one-fourth of the total construction fatalities (28.4%) were among construction laborers and helpers; and almost three-fourths of these fatalities (71.5%) were among Hispanic workers. In

Table 6. Number and percent distribution of construction industry fatalities in establishments with 100 or more employees by fatal event and Hispanic origin, Texas, 1997–1999.

Fatal event	Total fatalities		Hispanic fatalities		Percent participation Hispanic fatalities
	Number	Percent	Number	Percent	Percent
Highway Incidents	10	16.9	8	22.2	80
Pedestrian, non-passenger struck by vehicle, mobile equipment	8	13.6	6	16.7	75
Struck by object	7	11.9	6	16.7	85.7
Fall to lower level	9	15.3	5	13.9	55.6
Other	25	42.3	11	30.6	44.0
Total	59	100	36	100	

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries.
Notes: 1. "Other" includes cases that do not meet the reporting threshold.
2. "Event or Exposure" was coded using the Occupational Injury and Illness Classification System.

fact, construction laborer and helper deaths represented 41.9 % of the total number of Hispanic fatalities while they comprised only 15.7% of the total fatalities to non-Hispanic workers. On the contrary, Hispanic fatalities were underrepresented in many of the skilled construction occupation categories that recorded a high number of total industry fatalities (such as electricians, carpenters, supervisors, *etc.*). However, among the more skilled occupations, a large number of Hispanic fatalities were recorded in roofing and concrete finishing (see Table 7).

For the purpose of this study, experimental fatality rates by worker occupation were developed for Hispanic and non-Hispanic construction workers. In the specialized trades, the fatality rate per 100,000 workers was 13.3 and 18.1 for Hispanics and non-Hispanics respectively. However, the fatality rates among low-skilled construction workers again indicated a disproportionate share of Hispanic fatalities. From 1997 to 1999 the rate of fatalities for (laborers, handlers, equipment cleaners, and helpers) was 51.4 for Hispanics and 17.7 for non-Hispanics.

Although the rate for low-skilled Hispanic workers was alarmingly high, it is important to note that this figure could be drastically inflated as a result of employ-

Table 7. Number and percent distribution of construction industry fatalities by worker occupation and Hispanic origin, Texas, 1997 to 1999.

Occupation	Number of Fatalities		Percent participation Hispanic fatalities
	Total workers	Hispanic workers	
Roofers	19	16	84.2
Excavating and loading machine operators	5	4	80.0
Concrete and terrazzo finishers	8	6	75.0
Construction laborers	89	64	71.9
Helpers, construction trades	16	11	68.8
Construction trades, n.e.c	14	9	64.3
Brick masons and stonemasons	5	3	60.0
Structural metal workers	17	8	47.1
Painters, construction and maintenance	9	4	44.4
Specified mechanics and repairers, n.e.c	5	2	40.0
Plumbers, pipe fitters, and steamfitters	5	2	40.0
Carpenters	16	6	37.5
Electricians	25	9	36.0
Managers and administrators, n.e.c.	13	4	30.8
Welders and cutters	10	3	30.0
Truck drivers	17	5	29.4
Supervisors, n.e.c.	24	5	20.8
Operating engineers	5	1	20.0
Heating, air conditioning, and refrigeration mechanics	11	2	18.2
Other	57	15	26.3
Total	370	179	

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries
Notes: 1. Not elsewhere classified is represented by n.e.c.
2. "Occupation" was coded using the 1990 Occupational Classification System developed by the Bureau of the Census.

ment undercounting; the effect of Hispanic underreporting is likely to be significantly more pronounced in the low-skilled occupations due to the high number of undocumented workers suspected to comprise these jobs.

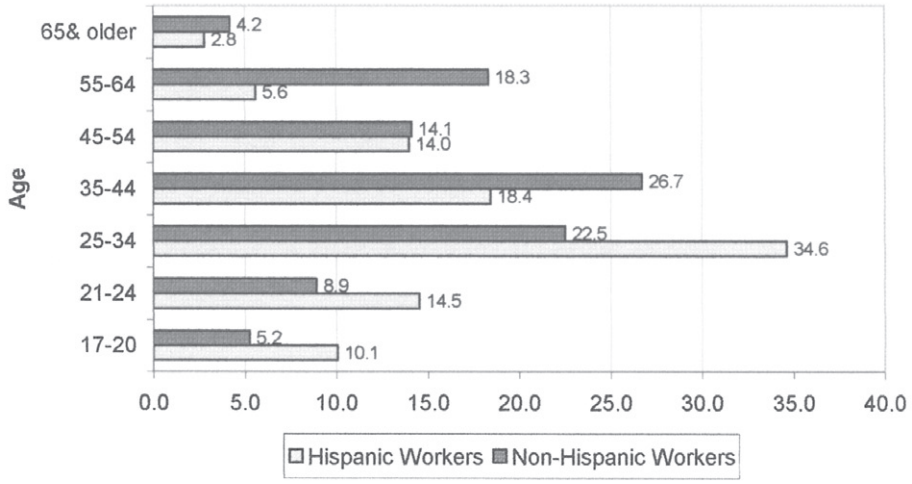
Gender and Race

From 1997 to 1999 males were the victims of almost all construction fatalities. Of the 370 construction fatalities only two were women workers. Both women died as a result of electrocution — one was of Hispanic origin.

In terms of race, White workers accounted for 95.5% of fatal construction injuries (included in this category are workers of Hispanic ethnicity who comprised 50.7 % of White fatalities). The remaining deaths occurred to non-Hispanic Black workers.

Age

Hispanic deaths in the construction industry were more likely associated with young age. Twenty-eight out of 370 construction fatalities involved workers 20 years of age and younger (7.5% of total construction fatalities), and 18 of them were Hispanic workers. The mean age at the time of death for Hispanic construction workers was 34.8, while the mean age for non-Hispanic decedents was 41.0. In addition, 59.2% of Hispanic decedents were younger than 35 years of age, compared to 36.6% of non-Hispanic decedents. As shown in Figure 1, the highest percentage of Hispanic fatalities occurred in the youngest age categories (17 to 34) while non-Hispanic fatalities comprised greater proportions in the older age groups (35 to 65 and older). Thirteen fatalities involved construction workers 65 years of age and older; only five of these fatalities were experienced by Hispanic workers.



Source: Texas Workers' Compensation Commission, Census of Occupational Fatal Injuries

Figure 1. Percent distribution of construction fatalities by age and Hispanic origin, Texas, 1997-1999.

Geographic Location

Generally, construction worker fatalities occurred in major urban areas. Indeed, 70.5% of all Hispanic worker fatalities that occurred in Texas during the period considered were concentrated in the state's five larger metropolitan areas: Dallas-Fort Worth Consolidated Metropolitan Statistical Area (CMSA) (35.5%), Houston-Galveston-Brazoria Metropolitan Statistical Areas (MSA) (19.5%), San Antonio MSA (8.5%), Austin-San Marcos MSA (4.5%), and El Paso MSA (2.5%) (Texas Department of Economic Development 2001). Interestingly, although 24% of the state's Hispanic population was located along the Texas/Mexico border at the time of the 2000 Census, only 6.1% of 1997 to 1999 Hispanic construction fatalities took place in bordering counties.

Foreign-Born Workers

Although information pertaining to citizenship status of deceased workers is not available through the CFOI program the CFOI database contains information on the birth country and country of disposition of those who died on the job. Such information may provide insight about Hispanic workers who may have been immigrants, and/or whose home country may have been other than the United States.

Construction workers of foreign (predominantly South American) birthplace recorded 32.4% of the total work related deaths from 1997 to 1999 (120 total). Seventy percent of total Hispanic construction decedents were born outside the country; out of 179 Hispanic decedents, 112 were born in Mexico, 4 in El Salvador, and 3 in Honduras.

Analysis of fatalities of foreign-born Hispanic workers revealed that Mexican-born decedents comprised almost half of the total number of construction laborer fatalities (see Table 8). Regarding workers' age at the time of death, no significant differences were found between Mexican-born decedents and Hispanic decedents as a whole. In fact, both groups registered a similar median age at the time of fatality (34 years), which, as mentioned previously, was considerably younger than that of non-Hispanics (41 years).

Table 8. Number and percent distribution of construction industry fatalities of Mexican-born workers by occupation, Texas, 1997 to 1999.

Occupation	Number	Percent
Construction Laborers	52	46.4
Roofers	9	8.0
Construction Trades, n.e.c.	7	6.3
Structural metal workers	6	5.4
Concrete and terrazzo finishers	4	3.6
Carpenters	4	3.6
Helpers, construction trades	3	2.7
Painter, construction and maintenance	3	2.7
Electricians	3	2.7
Others	21	18.8
Total	112	100.0

Source: Texas Workers' Compensation Commission, Census of Fatal Occupational Injuries
Notes: 1) Not elsewhere classified is represented by n.e.c. 2) "Occupation" was coded using the 1990 Occupational Classification System developed by the Bureau of the Census.

Although information pertaining to the deceased workers' country of disposition does not provide evidence of citizenship it may be assumed that if a worker's body is sent across the border after death, it is likely that he/she was an immigrant or temporary resident of the United States. This study found that the bodies of the deceased were sent outside the United States in almost half (45.3%) of the total Hispanic construction worker cases. (Information pertaining to disposition was not available in 21 cases, 13 of which involved workers of Hispanic origin.)

CONCLUSION

The increasing and pervasive growth of the Hispanic population and of its lower-skilled, non-English speaking workforce, coupled with the high growth rate of the construction industry present a daunting challenge for the occupational safety community for the nation as a whole, and for Texas in particular.

The construction industry has experienced growth of the Hispanic labor force as well as an increase in the numbers of fatalities to this population. During the period considered (1997 to 1999) the participation of Hispanic construction workers in Texas was more than double their participation in all other industries combined. In addition, the rate of fatalities for Hispanic construction workers in Texas during this period was slighter higher than that for the non-Hispanic segment of the industry (see Table 2). In other words, the percentage of fatalities experienced by Hispanic construction workers was larger than this ethnic group's share of employment in the Texas construction labor market. Nevertheless, Hispanic construction worker fatality rates may be inflated due to missing employment counts of undocumented workers and workers with out-of-state residency.

Regarding specific occupational risks to Hispanic construction workers, this study revealed an underrepresentation of fatalities in skilled occupations such as electricians, carpenters and managers and an overrepresentation of deaths among low-skilled laborers and helpers. In addition, the rate of fatalities by occupation among Hispanic construction workers indicated that Hispanics in low-skilled jobs faced disproportionate risks when compared to other ethnic groups; although the extent to which the rate was effected by the underreporting of undocumented workers cannot be measured without further study. Regardless, the construction laborer occupation category has historically experienced the highest frequency of fatalities by both Hispanics and non-Hispanics – indicating that employment within laborer occupations inherently increases a worker's risk of dying on the job.

Among Hispanics, it is clear that foreign-born (predominantly Mexican) lower skilled workers constitute a large number of the total number of deceased construction workers in Texas. The fact that many Hispanics were returned to their native country after a work related death might imply that many of these decedents experienced a transitory and work-related United States residency. If undocumented, temporary workers indeed represent a sizeable proportion of the Hispanic construction labor force — it is likely (due to low skill level, young age of workers, lack of experience and lack of English-speaking skills) that a large number of these workers obtain employment as construction laborers. Further research is needed to determine to what extent ethnic and residency factors are associated with placement of

Hispanic workers in lower skilled occupations and to what extent factors associated with this placement may increase fatality risk to Hispanic construction workers.

Knowledge about the Hispanic labor force and risks to Hispanic workers would also be enhanced by further study pertaining to: Hispanic undocumented worker representation among occupational classifications; the extent to which languages other than English are spoken in the workforce; differences in safety and employment training among Hispanic and non-Hispanic workers; length of employment and time on the job; work experience within occupations; and differences in wages.

Aside from identifying the need for continued research, findings from this study support the call for the development of safety policies targeting the reduction of injuries and fatalities among Hispanic construction workers, especially those employed in lower-skilled occupations. The data from this study can be used as an informational basis for the planning of construction fatality prevention efforts for Hispanics and the industry at large. Primary areas of concern include: pedestrian transportation incidents, falls from elevation and trench cave-ins; special trade contractor industries; construction laborer, helper and roofer occupations; small businesses with fewer than 10 employees; young workers; and construction in urban areas.

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APPENDIX: TECHNICAL NOTES ABOUT CALCULATION OF EXPERIMENTAL INDUSTRY AND OCCUPATION FATALITY RATES

Sources

Experimental industry fatality rates for Texas were obtained using fatality counts from CFOI and estimates of employed civilian workers from the Bureau of Labor Statistics Current Population Survey (CPS) for the period 1997–1999 (as published in the *Geographic Profile of Employment and Unemployment*–Tables 16 and 17). Because Table 16 (titled: States: Employment status of the experienced civilian labor force by industry, annual averages) does not provide employment information by ethnic origin, Table 17 (titled: States: Percent distribution of employed persons by sex, race, Hispanic origin, and industry, annual averages) was used to calculate the employment component, or, the denominator of the fatality/employment ratio. The percent distribution by industry data that is displayed in Table 17 can be calculated using data from Table 16. Differences due to rounding may appear.

Annual state fatality rates are also produced by BLS/CFOI using the CPS employment data. Figures produced by BLS may be different than those produced for this study due to the fact that BLS excludes self-employed and family workers from the construction fatality count, resulting in a smaller numerator and thereby reducing the rate calculations.

Because the *Geographic Profile of Employment and Unemployment* does not provide state employment data by Hispanic origin and specific occupation, employment data to produce fatality rates by occupation were obtained through special queries from the on-line BLS/CPS Federal Electronic Research and Review Extraction Tool (FERRET) http://ferret.bls.census.gov/cgi-bin/ferret.

Limitations

Both the numerator and denominator of the fatality/employment ratio refer to the same group of workers: employed civilian workers; age 16 and older; including self-employed and household workers. However, differences between the numerator and denominator used in the calculation of fatality rates for this study may still exist due to inherent differences between the collection methodologies of CFOI and CPS.

CPS estimates of the total number of employed persons for Texas may exclude workers with out-of-state residency, migrant workers, commuters, business travelers, and workers employed in inter-State transportation. On the contrary, the CFOI

totals include all fatal injuries occurring within Texas, regardless of the state of residency of the decedent worker.

CPS categorizes workers among industries according to their primary job, which may differ from the job held when fatally injured. CFOI categorizes decedents by the industry in which they were employed at the time of the fatal incident.

CPS employment data are based on a sample of employers rather than a complete count, while CFOI is a complete census of fatally injured workers in the state. The estimates of fatality/employment ratios therefore have relative standard errors. Standard errors of the CPS employment estimates are explained in "Explanatory notes and estimates of error" from the August 2001 issue of *Employment and Earnings*, available online at:

http://www.bls.gov/pdf/cpseetn.pdf.

While the undocumented workforce is not technically excluded from the CPS, it can be assumed that due to the survey's collection methodology (being a telephone, household survey) that a large number of undocumented workers are excluded from the employment counts. The fatality count includes all work-related deaths for which a required source document was obtained.

Construction industry employment data obtained from the *Geographic Profile of Employment and Unemployment* includes only incorporated self-employed workers; the fatality count includes all self-employed persons regardless of incorporation. Employment data by occupation obtained from the FERRET system include both incorporated and unincorporated self-employed workers.