

# Fall Prevention Training To Hispanic Construction Workers of Southern Nevada.

**Pramen P. Shrestha, Ph.D., P.E., Vedaspati Joshi, MSCM, and Nancy N. Menzel, Ph.D.**

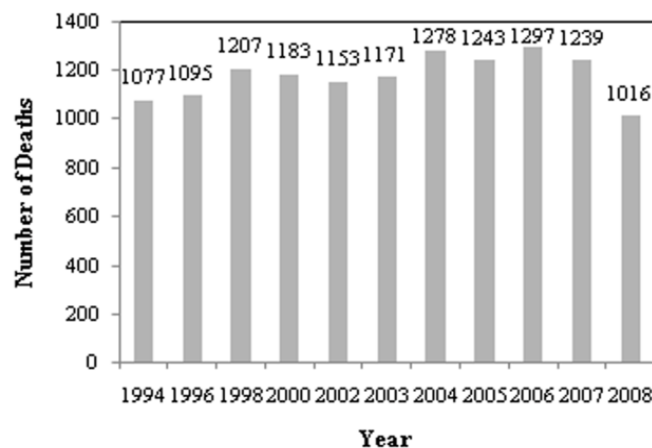
University of Nevada at Las Vegas

During the last decade, the number of Hispanic workers more than tripled in the construction industry. Most of these Hispanic workers are laborers, usually untrained; they are subjected to more severe and hazardous working conditions, and have a higher rate of injury and illness than Non-Hispanic Whites. Hispanic workers in Nevada also have a higher fatality rate as compared to the fatality rate of whole country. Hence, the Hispanic workers should be trained to reduce the fatality rate. The specific aim of this study is to 1) design, deliver, and evaluate an effective fall prevention training program; 2) produce English and Spanish curricular materials for dissemination, including the training approach; and 3) measure the impact of training on workers' self-reported behavior at the job site. Through these aims, the risk of occupational injury or death from falls will be reduced. This study recommends training Hispanic workers in their native language, using practical methods that involve role-playing. This paper will discuss the materials and methods used in the training as well as the results of the impact study of the training that was conducted with the trainees by means of telephone interviews.

**Key Words:** Falls, Personal Fall Arrest Systems, Construction, Hispanic, Fatalities.

## Introduction

At present, the construction industry is a large employment industry, providing over 10 million jobs in the United States from 2003 to 2009. As employment remains high in this industry, deaths and injuries in the construction industry are also higher than previous years. Statistical data from the U.S. Bureau of Labor show that there were over 1000 deaths from work-related injuries in the construction industry each year, from 1994 to 2008 (see figure 1).



*Figure 1:* Number of deaths from injuries in construction, 1994-2008.

Source: U.S Bureau of Labor Statistics, 1992-2008, Census of Fatal Occupational Injuries.

Falls from elevation is one of the main reasons of high fatality in the construction industry. In a recent report from the Center of Construction Research and Training (2010), entitled "Work-related fatal and nonfatal injuries among U.S. Construction Workers, 1992-2008", examined data of construction industry fatalities from Census of Fatal

Occupational Injuries (CFOI); this report found that falls constituted over 32% of the total number of fatalities. Data from the Occupational Safety and Health Administration (OSHA) shows that majority of fatal falls occurred while working on roofs, ladders, scaffolding, staging, and steel structures. In the past five years, falling from roofs and ladders constituted the greatest number of fatalities related to falls. Deaths and injury from falls are a long-standing and continuing problem in construction, responsible for at least one third of the construction deaths in the U.S. from 2004– 2008 (see table 1). Nevada has exceeded the national percentage in each of those years.

**Table 1**  
*Construction Fatalities due to Falls in Nevada and U.S.*

<b>Year</b>	<b>Fatal Fall (% of Total) Nevada</b>	<b>Fatal Falls (% of Total) U.S.</b>
2008	5(42%)	348(34%)
2007	8(38%)	447(37%)
2006	7(39%)	433(35%)
2005	6(46%)	394(33%)
2004	9(60%)	445(36%)

Sources: Nevada Division of Industrial Relations and US Department of Labor, Bureau of Labor Statistics, 2004 – 2008.

Falls also account for a significant percentage of lost-time injuries as well, with Nevada close to the national percentage most of the previous four years, 2004 - 2007 (see table 2). These statistics clearly show that there is an inevitable need to reduce fatal and non-fatal injuries due to falls, and one effective way is by means of training.

**Table 2**  
*Construction Lost Time Injuries Due to Falls In Nevada and U.S.*

<b>Year</b>	<b>Falls, Percent of Total, Nevada</b>	<b>Falls, Percent of Total, U.S.</b>
2007	22%	20%
2006	20%	22%
2005	22%	22%
2004	27%	22%

Sources: Nevada Division of Industrial Relations and US Department of Labor, Bureau of Labor Statistics, 2005 – 2007.

Geographically, Hispanic workers are found to be more concentrated in the southwestern United States; in 2007, 40% of the construction workers in Nevada were Hispanic (CPWR, 2009). Besides the high concentration, Hispanic workers in Nevada also have a higher fatality rate as compared to the fatality rate of whole country (see table 3). Southern Nevada experienced a residential and commercial building boom from 2005 to late 2007; however, when the current recession began, construction stalled in Nevada, as in the rest of the country. In the U.S., construction employment has fallen by 1.3 million since the start of the recession (BLS, 2011). Among those who lost jobs, Hispanic construction workers have been affected disproportionately. However, these employment challenges also represent an opportunity to attract underemployed workers to participate in fall prevention training classes in preparation for the next increase in construction job demand. Available to all construction workers in Southern Nevada, this training focuses on Hispanic construction workers.

**Table 3**  
*Fatality Rate of Hispanic Workers in Nevada and in the U.S.*

<b>Year</b>	<b>% of Total Nevada</b>	<b>% of Total U.S.</b>
2009	25.00%	15.39%
2008	31.71%	15.42%
2007	16.90%	16.56%
2006	24.49%	16.95%

Source: U.S. Department of Labor, Bureau of Labor Statistics, Census of Fatal Occupational Injuries, 2006-2009.

This paper is based on the Fall Prevention Training program provided under Occupational Safety and Health Administration (OSHA) Susan Harwood Training Grant Program. The primary goal of this training program was to train Hispanic construction workers in their native language, and improve their safety knowledge and reduce occupational injury or death from fall in Southern Nevada.

## **Literature Review**

### ***History of Accidents/Incidents Relating to Fall***

Accidents, incidents, illness, injuries, and fatalities are caused due to unsafe acts and conditions at the workplace (Kraemer, 1990). Many U.S. workers are exposed to fall hazards at their jobs regardless of industry or occupation. According to the National Institute for Occupational Safety and Health (NIOSH), between 1980 and 1994, falls from elevations stood fourth on the list of leading cause of occupational fatalities. During this period 8,102 deaths due to fall from elevation was recorded, which accounted for 10% of all fatalities and an average of 540 deaths per year (NIOSH, 2000). According to a study by Dong et al. (2005), construction employment surged by 44% from 7.0 million to 10.1 million between 1992 and 2003. At the same time, deaths and injuries increased by 22%, from 963 to 1,171 (see figure 1). During this time frame, the construction sector accounted for a disproportionate share of work-related deaths in the United States. For instance, in 2003, only 7% of the workforce was construction workers; however, this segment suffered 21% of nations' 5,575 work-related deaths. 4,234 construction workers died due to falls from 1992-2003, which accounts for 31% of work-related deaths in the industry. Out of 4,234 deaths due to falls, falls to lower levels caused 4,124 deaths. Falls also were the second-most common cause of non-fatal occupational injuries and illnesses involving days away from work. From 2003 to 2008, approximately one-third of the fatal falls in construction were due to falls from roofs, followed by ladders, and scaffolds/staging. Altogether, falls from roofs, ladders, and scaffolds caused about two-thirds of all fatal falls in construction. On the other hand, falls on the same level were the leading cause of non-fatal falls in construction (Dong et al., 2010).

### ***Target Population***

This training program mainly targeted the Hispanic population involved in occupations that had higher number / rate of fatalities and injuries. A study conducted by NIOSH revealed that in the last decade, the number of Hispanic workers doubled among all U.S. industries, and more than tripled in construction. Though Hispanic employment has reduced since then, it still accounts for 30% of the U.S construction workforce in 2008 (CPWR, 2009). The majority of the Hispanic workers is involved in labor intensive work, and is subjected to more severe and hazardous working conditions. Between 2003 and 2008, 40% of work-related deaths among Hispanic construction workers were caused by falls; 80% of these workers were foreign-born (Dong et al., 2010). Typically, Hispanic construction workers are young; have poor literacy; lack English-speaking abilities; and are employed in low-skill, high-risk occupations (CPWR, 2008; Jorgensen et al., 2007; Dong & Planter, 2004; Kouyoumdijan et al., 2003; Anderson et al., 2000).

A laborer – which is the entry job for most foreign-born Hispanics (Brunette 2004) -- has one of the highest risks of death (Dong & Platner, 2004). According to data from the U.S. Department of Labor, in 2006, 23% of construction injuries involving days away from work occurred to Hispanic workers, an increase from 18% in 2004. These numbers illustrate the occupational health disparities with adverse outcomes for Hispanic construction workers, and indicate the need to address these disparities by using strategies that will be successful in reducing the human and economic costs of these workplace incidents.

## Method

### *Curriculum Development*

Development of health and safety resources that target Spanish-speaking workers is very difficult, because Spanish-speaking workers require resources that are linguistically and culturally appropriate. In this training, the educational materials first were developed in English and then translated into Spanish, as shown in figure 2. The English curricular materials were prepared by faculty members of the Construction Management Program and School of Nursing, at University of Nevada Las Vegas, because they have a great deal of experience in construction safety. While preparing the training materials, existing sources were used, for example, the Electronic Library of Construction Safety and Health (eLCOSH); in addition, original material also was created, where necessary.

The written materials were developed to a fifth-grade literacy standard, and contained many graphics, in accordance with Brunette's recommendations (Brunette, 2005). These materials were developed in English and reviewed by Labor Union and industry personnel. Then the material was translated to Spanish and then sent to OSHA for review. Upon approval by OSHA, the training materials were reproduced in paper format as well as in DVD format. In addition, a wallet card was developed in both English and Spanish that highlighted important fundamentals for fall protection so that each worker could have it with them at their jobsite.

The quality of the translated material directly depends upon the translation method that is adopted. English materials were translated into Spanish by native Spanish-speaking students who had a good knowledge of safety and construction sites. During the translation process, OSHA Dictionaries (English-to-Spanish) were used as well as other resources, including The Wiley Dictionary of Civil Engineering and Construction: English-Spanish/Spanish-English; Construction Spanish; Constructionary, Second Edition: English-Spanish/Spanish/English by the International Code Council; and the R.S. Means English/Spanish Dictionary for Construction. After the translation process, the material was pilot tested, after which the materials were sent to OSHA for review.

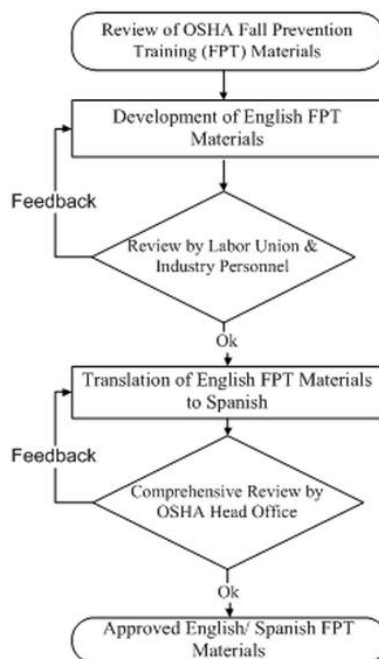
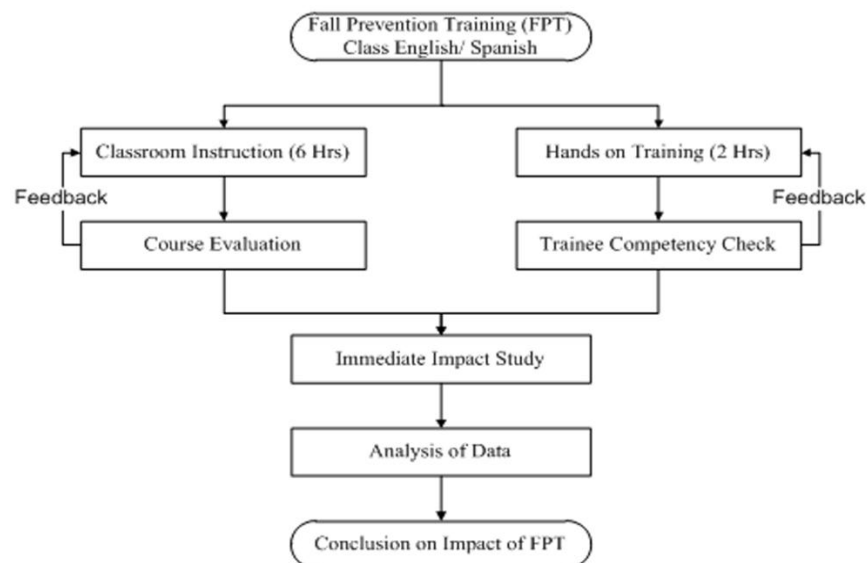


Figure 2: Flow Chart of Curriculum Development

## *Training Approach*

Access to minority worker populations is difficult due to literacy, language, and other socio-cultural and legal barriers. The traditional lecture-based safety training approaches are also often ineffective to this population. Therefore, this training used an innovative approach to providing fall prevention training by role-playing. During focus groups with Hispanic construction workers in Southern Nevada, they expressed a desire for practical, role playing based learning for specific situations (Menzel & Gutierrez, 2010). Many foreign-born Hispanic laborers are unfamiliar with formal lecture-based classes, and have learned their trades through hands-on apprenticeships or tutoring by mentors; therefore, this training used role-playing as one of its primary teaching strategies. Training that used role-playing has been proved to be effective in the past (Wojcik et al., 2003).

The trainees are given more opportunities to have interaction about the material, and ask questions to the instructors. They were also given opportunity to evaluate the class and the instructor. The participants of the training are also involved in hands-on practice. In this training, participants practiced skills under standardized conditions, for instance, with a “supervisor” telling the worker to hurry up. In the class the instructor formed a group in which some workers act like they are working and some participants act like they are supervisor. The instructor told them a scenario to do the job without wearing PFAS. The instructor checked how they behaved in this situation. At the conclusion of this exercise, instructors also evaluated skill competency of the trainees. Figure 3 shows the process used to train construction workers regarding fall prevention and the impact study of the training under Susan Harwood Training Grant. The trainees were contacted to conduct the follow up interview to determine the impact of the training.



*Figure 3: Training and Impact Study Process*

## **Results and Findings**

At the time when this paper was written, 181 Hispanic workers had been trained. Data collected for the course evaluation, trainee competency, and follow-up interviews have been analyzed, and are presented below.

### *Results of Course Evaluation*

All the trainees were asked to fill out course evaluation forms; however, 167 out of 181 trainees completed the forms. The evaluation form comprised of five questions regarding the course content and the instructors' abilities. It also had a Comments section to provide suggestions for improving the class. The analysis of the evaluation forms showed that the class was effective in all categories mentioned in the evaluation forms. Table 4 shows the analysis

of the class evaluation data. All five questions asked in the form had high ratings; this reinforces the applicability of the course content to the trainees' work and the ability of instructors to teach.

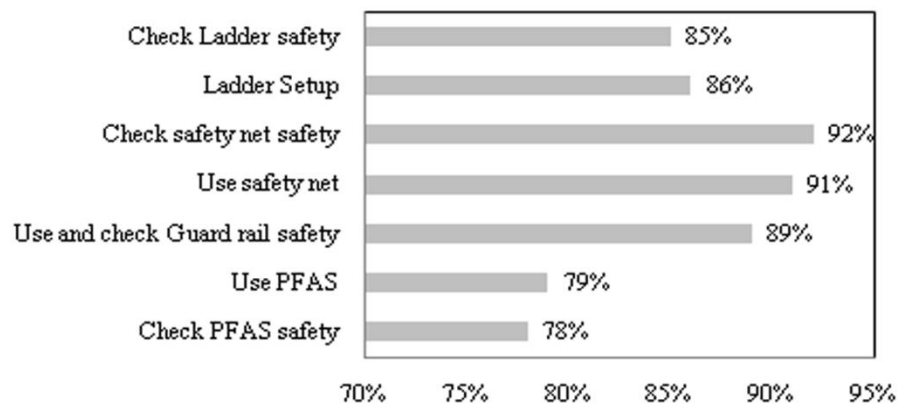
According to the comments, most of the trainees appreciated the effort of providing the training, and many thought that the training met their expectations. Also, the trainees anticipated that University of Nevada Las Vegas would provide more training like these in the years to come. The participants were satisfied with the subjects matters covered in the class and also with the videos shown. Even though the course offered hands-on training, few trainees requested an actual site visit. Many trainees thought that 8-hours training were long; however few said that the class time should be increased to cover the topics in more detail.

**Table 4**  
*Results of Course Evaluation Form*

Questions	Response (N=167)					
	Minimum	Maximum	Mean	Median	Mode	Std. Deviation
To what extent did the training increase your knowledge about dangers of falls on the job?	2	5	4.68	5	5	0.56
To what extent did the training improve your knowledge of how to identify and prevent risks of falls on the job?	2	5	4.68	5	5	0.53
To what extent training improve your skills in preventing falls on the job?	2	5	4.68	5	5	0.53
To what extent did the instructors answer your question or concerns in a complete and courteous manner?	2	5	4.72	5	5	0.54
To what extent were the instructors well prepared to teach?	2	5	4.78	5	5	0.48

### ***Results of Trainee Competency Assessments***

The 169 workers were evaluated in using Personal Fall Arrest Systems (PFAS), guard rails, safety nets, and ladders, and were assessed and graded as 'competent' or 'incompetent'. The result of workers' competencies showed that about 80% of the trainees were competent to use above-mentioned safety equipment (see figure 4). However, the results also show that some of the trainees did not know the safety systems for fall prevention.



*Figure 4: Results of Trainee Competency Assessment*  
***Results of Follow up Interview***

Follow-up interviews were made eight weeks after the completion of the training. Interviews were conducted to only those trainees who provided consent to participate in the research. One hundred forty eight trainees provided the consent to participate in the phone interview; however, successful telephone interviews were made to 101 trainees, a success rate of 68%. The trainees were asked to identify the most useful topics covered in the class in the context of their job. From their responses, it was found that the trainees had diverse opinions about the usefulness of various topics. General information about the fall prevention system (39%) was ranked most important, and Safety Net (4%) was ranked the least important topic covered. The results are presented in figure 5. This shows that most of the trainees found the general information about the fall prevention training very useful to them. They also found PFAS and portable ladders topics very useful. During the training, the instructors gave the hands-on-training to the trainees related to PFAS and portable ladders.

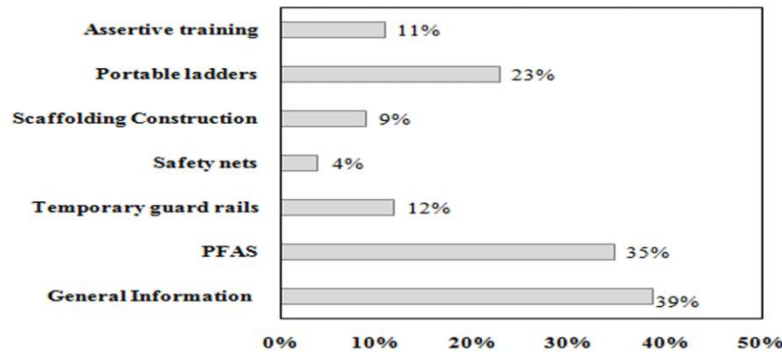


Figure 5: Comparison of usefulness of fall prevention training topics

The trainees were asked whether they avoided fall accidents due to the knowledge they gained from the training; 71% positively responded this question. Figure 6 shows some of the other questions asked the trainees during the interview; their responses were tabulated in percentages. 87% made changes to their fall prevention behavior, 84% of the trainees were involved in a job that required fall prevention knowledge and skills, and 97% of trainees improved their fall prevention knowledge and skills. The trainees were able to avoid 206 possible fall hazards since the training, and only 1 trainee fell at work after the training.

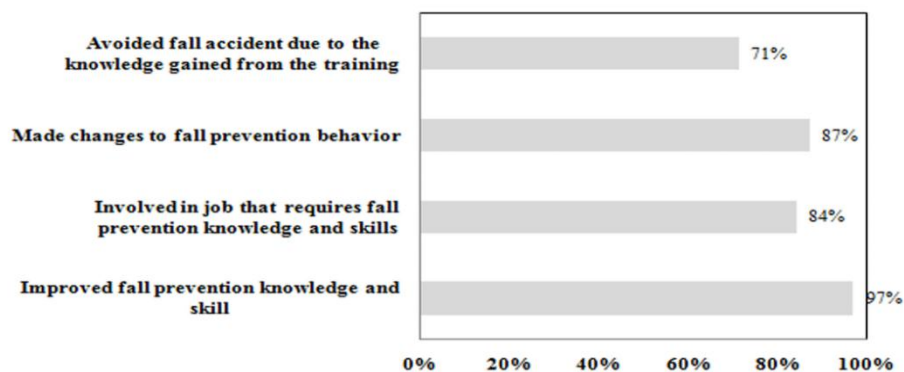


Figure 6: Impact of fall prevention training

## Conclusions

Every year, organizations and corporations provides several hours of health and safety training for employees and workers. These training should be effective enough to reduce injuries and illness. The primary goal of this training was to train Hispanic construction workers, improving their awareness about fall hazards and providing the knowledge and skills needed to use safety equipment to prevent falls. According to the feedback of the trainees, the training was found to be effective. On the whole, trainees found the topics included in the training to be very

important, and rated highly the ability of instructor to teach. It can also be concluded that the training was successful in providing valuable information to the Hispanic construction workers of Southern Nevada. The training had a positive impact on the trainees because the majority of the participants improved their fall prevention knowledge and skills, and felt they were changed to avoid falls after the training. The training program achieved its goals.

### Acknowledgement

The authors want to acknowledge OSHA for providing the Susan Harwood Training Grant to develop and conduct this training. We also would like to thank all the construction industry personnel, labor union, and OSHA officials who gave constructive feedback during the curriculum development. Finally, we appreciate the participation of construction workers of Southern Nevada in this training.

### References

- Anderson, J.T.L., Hunting, K.L., & Welch, L.S. (2000). Injury and employment patterns among Hispanic construction workers. *Journal of Occupational and Environmental Medicine*, 42 (2), 176–186.
- Brunette, M. (2004). Construction safety research in the United States: targeting the Hispanic workforce. *Injury Prevention*, 10(4), 244.
- Brunette, M. J. (2005). Development of educational and training materials on safety and health: Targeting Hispanic workers in the construction industry. *Fam. Community Health*, 28(3), 253.
- Bureau of Labor Statistics. (2011). *Employment Situation Summary*. [WWW document] URL [dhttp://www.bls.gov/news.release/empsit.nr0.html](http://www.bls.gov/news.release/empsit.nr0.html). “(2011, March 15)”
- CPWR. (2009). "Hispanic Employment in Construction." *CPWR – The Center for Construction Research and Training*, Silver Spring, MD.
- Dong, X., & Platner, J.W., (Jan 2004). Occupational fatalities of Hispanic construction workers from 1992 to 2000. *American Journal of Industrial Medicine*, 45(1), 45-54.
- Dong, X., Wang, X., & Daw, C. (2010). Fatal and Nonfatal Injuries among Hispanic Construction Workers, 1992-2008 Rep. No. 2, *CPWR – The Center for Construction Research and Training*, Silver Spring, MD.
- Jorgensen, E., Sokas, R.K., Nickels, L., Gao, W., & Gittleman, J.L. (2007). An English/Spanish safety climate scale for construction workers. *American Journal of Industrial Medicine* 50, 438–442.
- Kreamer, D.G. (1910, Fall). Management and enforcement of accident prevention. *Course No. OSH 192*, Murray, Kentucky.
- Kouyoumdijan, H., Zamboanga, B.L., Hansen, D.J. (2003). Barriers to community mental health services for Latinos: treatment considerations. *Clinical Psychology: Science and Practice* 10, 394–422.
- Menzel, N. N., & Gutierrez, A. P. (2010). Latino worker perceptions of construction risks. *American Journal of Industrial Medicine*, 53(2), 179-187.
- National Institute for Occupational Safety and Health. (2000). Worker Deaths by Falls. *Department of Health and Human Services, Center for Disease Control and Prevention*, Cincinnati, OH.
- Wojcik, S., Kidd, P., Parshall, M., & Struttman, T. (2003). Performance and evaluation of small construction safety training simulations. *Occupational Medicine*, 53(4), 279.