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Analytical Study of Casualties in the Construction Industry in Nigeria with A View to Provide Remedial Measures: Case Study of Lagos State

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ABSTRACT

The construction industry plays a major role in the country's economic development through its contribution to the gross domestic product (GDP), the creation of employment and production of facilities and assets required for production in other sectors. Many people have met their ultimate death in construction sites in Nigeria while others have become permanently crippled from construction-related injuries. Based on the above premise, this paper conducts the analytical study of casualties in the construction industry in Nigeria. Deaths, injuries, near misses, amputees were the factors considered for the study over a period of 15 years (2001-2015). The data collected from the Nigerian Institute of statistics from 2001 to 2015 was analyzed. Causes of deaths and injuries were also considered in the analysis. Overall results obtained show that 2015 has the highest number of wounded people, lives lost, and amputees. A fatality rate 0f 90.8% in 2015 was obtained compared to the remaining 14 years. The following causes of fatality were found to be common: Excavation collapse, trapped by moving parts of machine, electrocution and contact with overhead power lines. Safety procedures were offered.

Keywords: Casualties, Construction, Deaths, Injuries, Safety.

1. INTRODUCTION

Construction industry is an essential part of the economy in any country and often seen as a driver of economic growth. Nigerian workers across all sectors of the economy recently have become more endangered and prone to accident which ranges from minor to fatal, as some have lost their lives right in the line of duty, while some have lost vital organs, therefore rendered permanently incapacitated. In fact, increasingly more people die at work than at wars. The issue of safety and health at workplace which once occupied a major place in the program and plan of employers is now treated with levity. One of such cases that could not be forgotten in a hurry was the fire incident that razed a plastic factory in Ikorodu, Lagos in 2002 when many workers were roasted to death at night because the Chinese owners of the company locked the workers in the factory and went to sleep at their highly secured residence guarded by policemen (Ahmadu, 2003).

On April 28, 2010, Nigeria joined the rest of the world to mark, World Day for Safety and Health at work which is an international annual campaign, jointly agreed to by the International Labor Organization, ILO, and social partners to promote safe, healthy and decent work annually on the exact date (Alberto, 2011). There is no gainsaying that only the living can work and earn wages; hence the event is part of the global strategy and health directed at advocacy, awareness, creation and boosting of the political policies for safety and health at work. It was revealed during last year's celebration that a global estimate of 2.3 million occupational fatalities occur annually while some billions of capital losses have been recorded in Nigeria between April 28, 2012 and April, 2017.

Investigation has equally revealed that not less than 200 cases of industrial accidents occur in the workplace in Nigeria daily with an equally high rate of fatalities (Alberto, 2011). It was discovered that no fewer than 400 workers have lost their lives in the power sector in the last two years while performing their official duties. In the maritime sector, it was also gathered that since the concessioning of the ports, over 100 cases of fatal industrial accidents have occurred with over ten deaths, numerous incapacitations and innumerable serious body injuries, two of such incapacitations presently are in National Orthopedic Hospital, Lagos (Alicja, 2012). In the manufacturing sector, the frequency of fatal industrial accidents is very alarming. While the sad thing

is that while managements and unions conceal cases of industrial accidents and secretly negotiate compensation where there are unions, the management simply dishes out worthless sums to the families of victims in both deaths and permanent disabilities. Some of the victims who have suffered major injuries like loss of their hands or legs are often dismissed after receiving tokens that the companies give out on 'compassionate' ground, because the Workman Compensation Act that is supposed to address issues of industrial accidents is as good as nothing. The alarming rate of the industrial accidents and the general lethargy of the employers in addressing the issue recently set journalists in labor world on a course to find a way to reduce the rate of industrial accidents through preventive measures as well as to create awareness on the rights of victims of industrial accidents. In a paper titled 'Safety at work: Issues and challenges,' Prof. Fajana of the University of Lagos said in his paper that it is estimated that at least 50 million Nigerians are at risk of occupational hazards (Avedano, 2012). He, however, noted that a properly-managed safety culture based on tested principles of workplace safety will produce employees who participate actively in training, developing and suggesting effective control measures and feel a sense of responsibility for their safety and safety of others.

In an urban context, health and safety accidents are relatively higher than rural areas due to the fact that high rise buildings remain predominant with the fast-growing complexities of wide construction projects to cope with and high demand for housing, offices, services and other infrastructures due to the high urbanization. The problem is not that the hazards and risks are unknown, it is that they are very difficult to control in a constantly changing work environment. The construction industry has therefore earned the reputation of being a dangerous or highly hazardous industry because of the inexplicably high incidence of accidents and fatalities that occur on construction sites around the world (Blackman, 2008). Similarly Sohail (1999) labels construction industry as very hazardous. Internationally, construction workers are two to three times more likely to die on the job than workers in other industries while the risk of serious injury is almost three times higher(Bran, 2014). A strong safety record enhances a company's reputation, makes it more competitive and helps to manage insurance costs over time. Promoting a successful safety culture, however, is a concerted effort that requires commitment and participation from the chief executive to project managers, superintendents, foremen and individual workers on the job site (Building biology, 2008). That commitment should extend to the selection of subcontractors who also embrace a strong safety ethic. Some of the hazards experienced on site are falls from height, motor vehicle crashes, excavation accidents, electrocution, and machines being struck by falling objects (Berstein, 2011). Fatalities can result in direct and indirect cost. Direct costs of construction fatalities are: medical bills, compensation benefits and property loss while the indirect costs are: time lost in attending burial ceremonies, time lost in fatality investigation, down time of damaged equipment and losses arising from site closure. Clearly, improving safety remains one of the greatest challenges facing the construction industry today. Although the issue of improving safety has been an industry need for decades, this is particularly an appropriate time to examine fatalities in construction industry.

2. AIM AND OBJECTIVES

The aim of this paper is to carry out analytical study of casualties in the construction industry in Nigeria thereby providing remedial measures afterwards.
To achieve the overall aim of the study, specific objectives are listed below:

- To obtain data on reported cases of casualties in the construction industry from 2001 through 2015 from the relevant agency.
- To determine the frequency, rates and causes of fatal injuries in the Nigerian construction industry for the period.
- To perform analysis based on the data obtained.
- To provide remedial measures.

3. METHODOLOGY

Data Sources

This study gathers information on work-related deaths from industries in Lagos state and variety of sources including reports from bureau institute of statistics. Administrative reports, media accounts, death certificates, and workers compensation reports to identify fatalities and confirm that they are work-related were used in this study. Follow-up questionnaire to validate that each death did in fact occur while working were administered. This study analyzes fatalities occurring between 2001 and 2015, which includes fatalities among workers employed by privately owned businesses; federal, state, and local were excluded.

$$\text{Fatality rate} = \frac{\text{Number of fatalities}}{\text{Number of workers}} \times 100$$

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For the analysis, the number of fatalities was divided by the workers and multiplied by 100 to obtain the rate of deaths.

4. RESULTS

Table 1: Fatalities showing casualties from 2001 to 2015

	Number of wounded people	% of wounded people	Number of lives lost	% of lives lost	Number of amputees	% of amputees	Number of near misses	% of near misses	Number of reported accidents	% of reported accidents	Casualty rate
2001	1	0.2	-	-	-	-	-	-	1	11.1	-
2002	-	-	-	-	-	-	-	-	1	11.1	-
2003	5	1.2	1	0.5	-	-	-	-	2	22.2	20
2004	8	1.9	2	1.0	1	2.4	1	5.9	3	33.3	50
2005	12	2.9	3	1.5	1	2.4	1	5.9	5	55.6	41.7
2006	17	4.1	10	4.9	-	-	-	-	4	44.4	58.8
2007	21	5.0	12	5.9	1	2.4	2	11.8	4	44.4	76.2
2008	26	6.2	15	7.3	-	-	-	-	5	55.6	57.7
2009	32	7.7	22	10.7	2	4.8	1	5.9	6	66.7	78.1
2010	38	9.1	18	8.8	2	4.8	1	5.9	6	66.7	55.3
2011	40	9.6	25	12.2	-	-	4	23.5	7	77.8	72.5
2012	45	10.8	20	9.8	2	4.8	3	17.6	8	88.9	55.6
2013	48	11.5	15	7.3	5	11.9	2	11.8	9	100	45.8
2014	59	14.1	22	10.7	13	30.2	2	9.5	15	166.7	62.7
2015	65	15.6	40	19.5	15	34.9	4	19.0	20	222.2	90.8
Total	417		205		43		21		96		

Table 1 shows that 2015 has the highest number of wounded people (65), 40 people lost their lives during construction work while 15 got amputated in the course of doing their job thereby having a fatality rate 90.8% for that year.

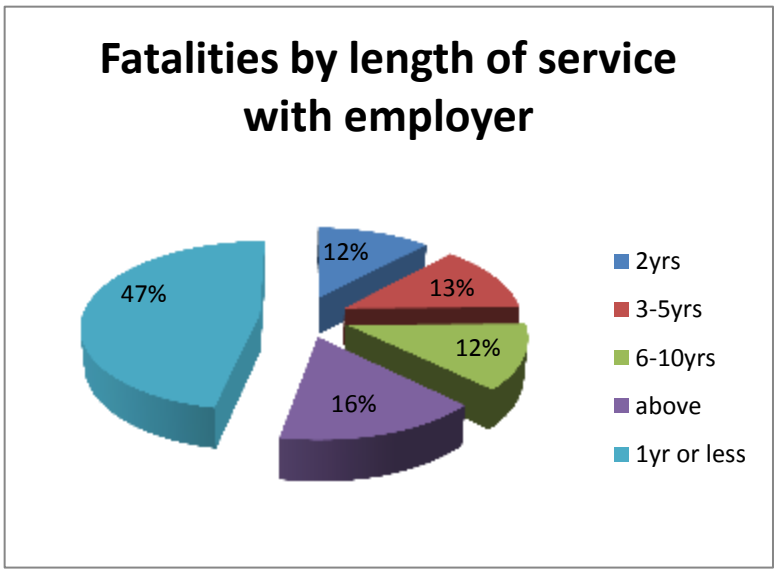

Figure 1: Fatalities by length of service with employer, 2001 to 2015

Figure 1 results showed that information on length of service with employer, of which 47% had worked for their employer for a year or less. This statistics could be as a result of inexperience or complacency on the job.

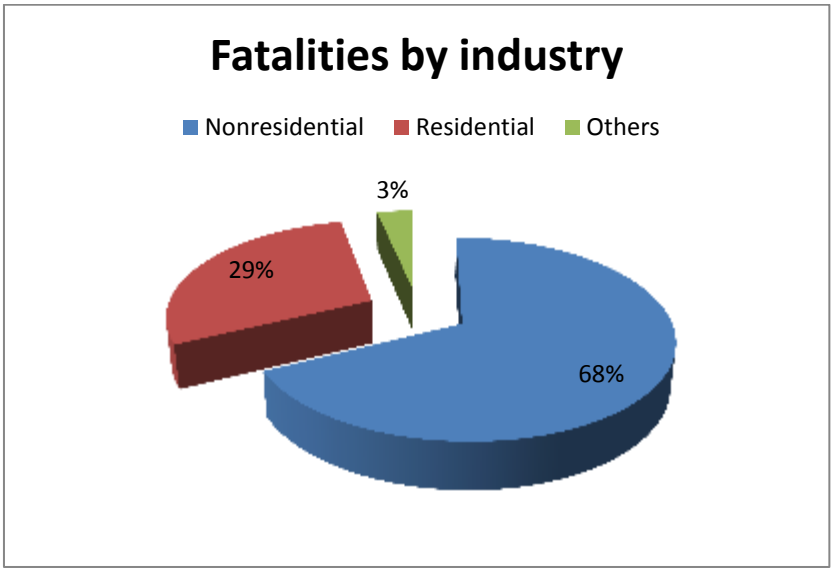

Figure 2: Fatalities by industry, 2001 to 2015

There were 4,777 fatalities in the construction industry from 2001-2015. Of these, 68% occurred in nonresidential construction and specialty trades and 3% were other construction and specialty trades [Figure 2]. The remaining 29% of construction fatalities occurred among workers employed in the home building industry. Of these 1,385 home building deaths, 482 occurred in residential construction and 903 were in residential specialty trades.

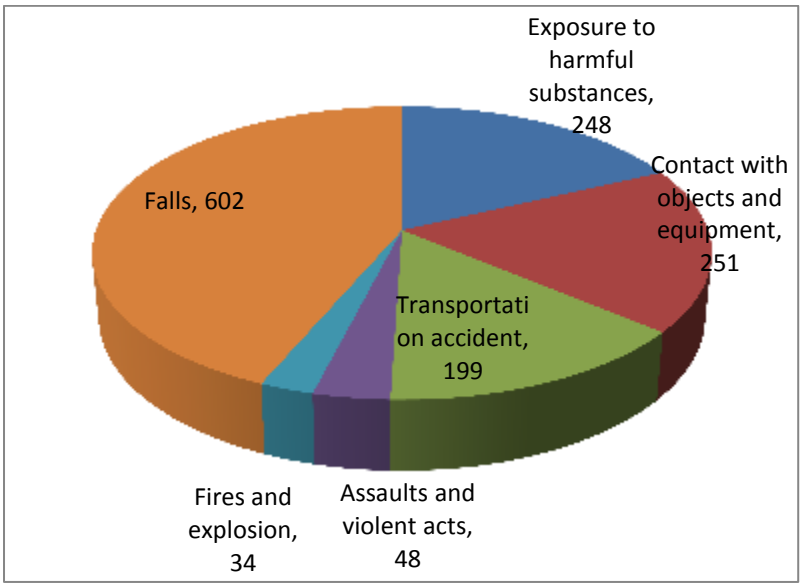

Figure 3: Fatalities by event or exposure, 2001 to 2015

The causes of fatal injuries in home building are shown in Figure 3. The most common event or exposure categories were falls, contact with objects and equipment, exposure to harmful substances or environments, and transportation accidents. Falls were the most common cause of home building fatalities (45%) [Figure 3]. Workers most often fell from roofs, ladders and scaffolding.

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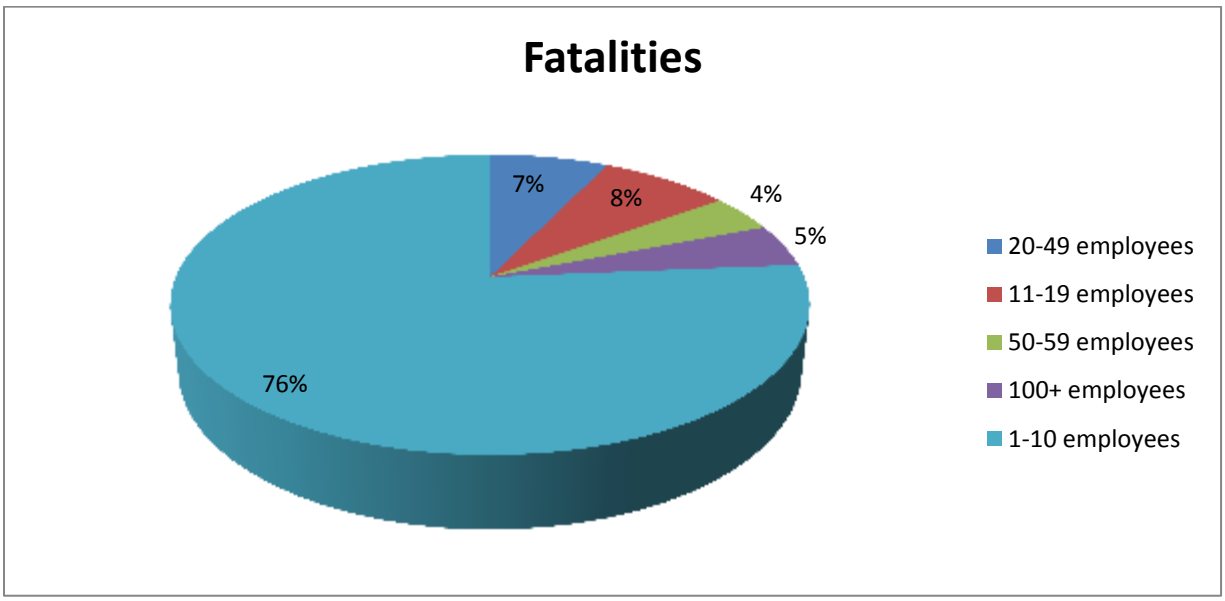

Figure 4: Fatalities by number of employees, 2001 to 2015

The size of the company was reported for (76%) of the deaths; more than three-quarters of these occurred in establishments with ten or fewer employees [Figure 4].

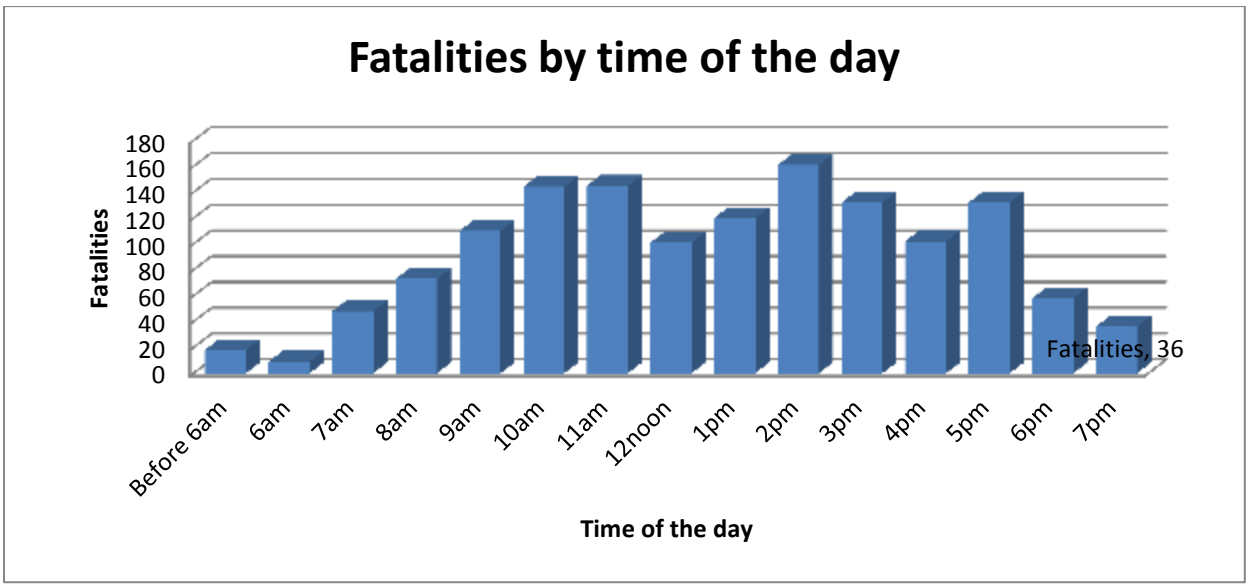

Figure 5: Fatalities by time of the day, 2001 to 2015

Most fatal accidents occurred between 9 a.m. and 5 p.m., with a peak at 2 p.m. [Figure 5].

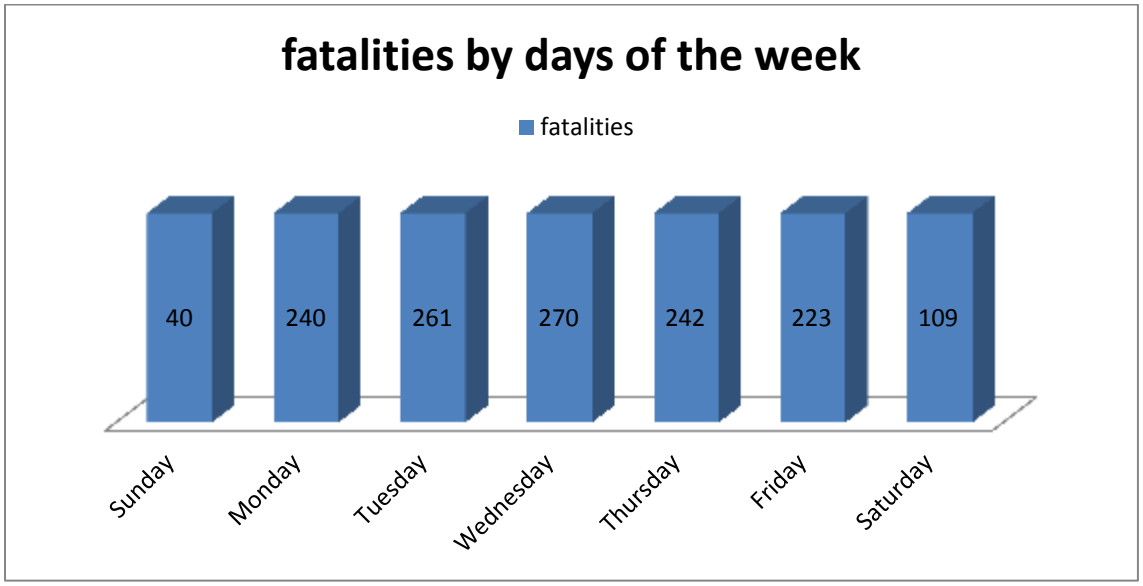

Figure 6: Fatalities by time of the day, 2001 to 2015

Fatalities were evenly distributed across the work week with fewer deaths on the weekends [Figure 6]. Deaths were most frequent in the midweek with a peak of 270 fatalities on Wednesday.

Table2: Home building fatalities by industry, 2001-2015

Number of fatalities	Industry
193	Family Housing contractors
150	Roofing contractors
113	Residential building construction
97	Site preparation contractors
86	Painting Contractors
73	Framing Contractors
57	electrical Contractors
49	Finish carpentry Contractors
48	Poured Concrete Foundation and Structure Contractors

Table 2 revealed that most fatalities occur by family housing constructor while the least is by concrete foundation and structure contractors

Table3: Home building fatalities by fall type, 2001-2015

Number of Fatalities	Event type
232	Fall from roof
135	Fall from ladder
89	Fall from scaffold
64	Fall (unspecified)
47	Fall from ground level

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12	Fall from no moving vehicle
9	Fall downstairs

The number of fatality by event type shows that fall from roof occur most times while the least is fall from downstairs

Table4: Home building fatalities by event type, 2001-2015

Number of Fatalities	Event type
62	Struck by falling object
41	Excavation
31	Caught in collapsing structure
640	Struck by flying object
10	Struck by swinging object
8	Caught in running equipment or machinery
6	Compressed or pinched by rolling, sliding, or shifting objects

5. SAFETY MEASURES

Fall protection

Workers: Workers should familiarize themselves with all potential fall hazards on a job site. Never work in an area where fall protection systems have yet to be installed. Workers using personal fall arrest systems should inspect them before each use to ensure they are working properly and are free of damage. The lanyard or lifeline should be short enough to prevent the worker from making contact a lower level in the event of a fall. This means taking into account the length of the lanyard, length of dynamic elongation due to elastic stretch and the height of the worker.

Employers: Employers are required to provide fall protection systems to protect their workers on walking or working surfaces with unprotected edges or sides that are six feet above a lower level. Fall protection can include guardrails, safety net systems and personal fall arrest systems. Guardrails are the only method approved that actually prevents falls from occurring. Safety nets and personal fall arrest systems prevent workers from falling a great distance.

Fall protection includes protecting workers from falling into holes such as elevator shafts and skylights as well as excavations. Employers are also required to protect workers from falling objects by requiring hard hats be worn by workers and by installing toe boards, screens or guardrails, erecting canopies or barricading the area to keep workers out.

Scaffolds

Approximately 65% of all construction workers perform work on scaffolds. Employees performing work on and around scaffolding are exposed to falls, electrocutions and falling object hazards.

Workers: Hard hats should be worn when working on, under or around a scaffold. Workers should also wear sturdy, non-skid work boots and use tool lanyards when working on scaffolds to prevent slips and falls and to protect workers below. Workers should never work on scaffolding covered in ice, water or mud. Workers are prohibited from using boxes, ladders or other objects to increase their working height when on a scaffold.

Workers should never exceed the maximum load when working on scaffolds. Never leave tools, equipment or materials on the scaffold at the end of a shift. Workers should not climb scaffolding anywhere except for the access points designed for reaching the working platform. Tools and materials should be hoisted to the working platform once the worker has climbed the scaffold.

If personal fall arrest systems are required for the scaffold you will be working on, thoroughly inspect the equipment for damage and wear. Workers should anchor the system to a safe point that won't allow them to free fall more than six feet before stopping.

Employers: All scaffolding should be designed, erected and disassembled by a competent person. A competent person should also inspect scaffolding before the start of work each day to ensure that it is safe for use.

Scaffolding should be erected on solid footing, fully planked and at least 10 feet away from power lines. Scaffolding should be erected with guardrails, mid rails and toe boards to protect employees working on, under and around scaffolding.

Stairways and ladders

Improper ladder use is one of the leading causes of falls for constructions workers resulting in injury or death. Reasons for ladder falls include incorrect ladder choice, failure to properly secure the ladder and attempting to carry tools and materials by hand while climbing.

Workers: Always maintain three points of contact while ascending and descending a ladder, that's both feet and at least one hand. Portable ladders should be long enough to be placed at a stable angle extend three feet above the work surface. Workers should tie ladders to a secure point at the top and bottom to avoid sliding or falling. Tools and materials should be carried up using a tool belt or a rope to pull things up once you've stopped climbing. Never load ladders beyond their rated capacity, including the weight of the worker, materials and tools.

Employers: A competent person should inspect all ladders before use each day. Defective ladders should be marked or tagged out and taken out of service until they can be properly repaired. Workers should be trained on ladder safety and know how to select the proper ladder for the job. All ladders on the construction site should conform to standards. This includes job-made ladders, fixed ladders and portable ladders, both self-supporting and those that aren't. If workers are using energized electrical equipment, ladders should have nonconductive side railings.

Fall protection training

Falls are the leading cause of fatalities in construction, accounting for nearly 40% of all worker deaths. Providing proper and ongoing training to workers can go a long way in reducing the number of falls suffered at the construction site.

Workers: Workers should be able to recognize the hazards of falling and know the procedures to follow to minimize hazards and prevent falls.

Employers: A competent person is required to provide training to all employees that might be exposed to fall hazards. Again, this should cover all employees because at some point nearly everyone on the construction site is exposed to a fall hazard of some type. Topics of the training program should include the nature of fall hazards present on the construction site, proper erection, inspection and maintenance of fall protection systems, use of fall protection systems and personal fall arrest systems and the role of the employee in safety monitoring and the fall protection plan.

Employers are also required to maintain certification records of fall protection planning for all employees. Retraining is required for changes that render prior training obsolete and instances where it is apparent that a worker has not retained enough knowledge from the training program to ensure their safety.

Personal, protective and life saving equipment

Workers: When wearing eye and face protection, workers should make sure that they don't interfere with their movements and fit snugly on their faces. Eye and face protection should be kept clean and in good repair. Workers should inspect face and eye protection before use to ensure it is free of cracks, chips and other damage. Eye and face protection that becomes damaged should be replaced immediately. Workers are required to wear head protection wherever there is the potential for being struck in the head, which is basically the entire time you are on the construction site. Possible scenarios include falling tools or debris, accidental nail gun discharge, contact with electrical hazards or swinging construction equipment. Workers should inspect their hard hat for any cracks, dents or any signs of deterioration. Hard hats should fit snugly on your head and not come loose during normal movements or work activities.

Employers: Employers are required to provide eye and face protection to workers free of charge. Employers should issue eye and face protection to workers based on an assessment of anticipated hazards. If workers have prescription lenses, employers are required to make sure that they have eye protection that incorporates the prescription or that can be worn over the corrective lenses

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without disturbing them. . Employers are not allowed to charge employees for the cost of head protection or require them to provide their own hard hat unless they do so voluntarily

Workers: Workers should be aware of potential fall hazards as well as what fall protection systems have been put in place to protect them. If workers are using personal fall arrest systems, they should inspect them for wear and ensure that all components are in good working order and that the harness properly fits.

Employers: Employers are required to install all required fall protection systems before any employees begin work. Employers should remember that they are also responsible for protecting workers from falling objects with either toe boards, canopies or guardrails. If using a safety monitoring system, the safety monitor should be a competent person who remains on the same walking or working surface and in visual sight and hearing distance from the worker they are monitoring. They should be able to identify fall hazards and warn workers when they are working unsafely or may be unaware of a fall hazard.

6. CONCLUSION

Although the fatality rate for residential construction workers is more than twice the all-industry rate, it is substantially lower than the fatality rate in the construction industry as a whole. Fatalities in the home building industry accounted for 29% of the total deaths in construction. Fatal injuries were most frequent among workers in new single-family housing construction, roofing contractors, and residential remodelers. Common occupations of fatally-injured workers were construction laborers, carpenters, roofers, and first-line supervisors or managers of construction trades.

Falls continue to be the leading cause of death in home building. Workers most often fell from roofs, ladders, and scaffolding. Other frequent causes of death were struck by or caught in, contact with electric current, and transportation accidents. The results also indicate that many fatalities occur in small businesses.

This study is the first comprehensive analysis of fatalities in the home building industry. Future research is needed to determine group-specific fatality rates and characterize trends in residential construction and specialty trade fatalities over time.

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