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CAUSES OF ACCIDENTS IN CONSTRUCTION INDUSTRY OF PESHAWAR KHYBER PAKHTUNKHWA , PAKISTAN

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Abstract: *This research study seeks an understanding the causes of accidents in construction industry in Peshawar (the Capital of Khyber Pakhtunkhwa) and focuses on the role of management, human behaviors and projects nature. The paper presents the analysis of accidents in Peshawar Khyber Pakhtunkhwa along with accidents causation and injuries based on accident report extracted from government agencies of the Capital. The paper discusses the result of a survey with the individuals involved in construction projects in the vicinity, analyzes the accidents and ranks the causes of accidents in construction projects of Peshawar Khyber Pakhtunkhwa. The respondents were 54 workers ranging from the skilled tradesman to unskilled labor who were directly involved in the Contraction sector. A questionnaire was designed and used in the survey of the study that has three main parts; the first part identifies the condition of health & safety at construction site. The second part identifies the severity and nature of accidents. The third part identifies number of accidents in which 11 factors were identified and have been given to the survey respondents to state the level of influence or effect of each factor on accidents. The study analyzes some accidents have only a minor severity while others are disastrous. The results show that especially trade contractors working on low-budget, residential housing and commercial building projects are more susceptible to fall accidents. Recommendation is included in a paper to suggest a better application of policy and management action and procedure to improve the safety at construction sites and projects.*

Keywords- *Causes of Accidents; Peshawar Khyber Pakhtunkhwa; Safety at Construction Sites and Projects*

I. INTRODUCTION

Cost, time, quality and safety are important characteristics of every project. For the construction industry in Peshawar Khyber Pakhtunkhwa, there has been greater emphasis on the first three aspects at the expense of safety. Lack of adherence to safety requirements has led to increased exposure of workmen and the general public to risk situations on construction sites resulting in a high chance of occurrence of accidents. Accidents include not only direct physical injury to a person or damage to property, but also short and long term effects of incidents due to other exposures on sites that affect the workers' health and physical well-being. Over the last ten years or so the construction industry has thrived and as a result of the liberalization of the economy it attracted both local and foreign investors. Construction of new structures (office complexes, industrial zones with factories and warehousing facilities, infrastructure etc.) and upgrading or remodeling the existing structures has become the order of the day. Therefore, the question of safety in construction can no longer be ignored and deserves due consideration. However, in the recent past, fatal accidents have occurred due to the collapse of some structures at various sites in the Province and Country. These have been given wide publicity in the local and international media and have accordingly raised great concern and anxiety among the public. With the increasing construction activity prevailing countrywide, a study of the current safety practice in the construction industry was therefore warranted. This would enable the authors to establish the causes of accidents on construction projects from which strategies for improved safety practice would be developed. This is the main purpose of conducting this research. Based on occurred accidents, the technical weaknesses of the designs (such as poor use of codes, poor judgment because of lack of experience, etc.) were reduced by adding new requirements but after that it became apparent that many accidents still occurred and that the root causes of these accidents were hardly the result of technical failures but rather of the consequence of inadequate organizational issues (such as lack of adherence to standard health and safety rules or lack or poor communication within the company). Many studies for example (Hinze, 2008; Vredenburgh, 2009) have shown that health and safety improvements will only be achieved if workers change their behaviors and incentive schemes are implemented to motivate them. The Health and safety Executive (HSE, 2003) as _any unplanned event that results in injury or ill health of people, or damage or loss to property, plant, materials or the environment or a loss of a business opportunity. (Keng, 2004) is the potential of a substance, activity or process to causeharm. Hazards take many forms like chemicals, electricity and working from a ladder. A hazard can be ranked relative to other hazards or to a possible level of danger. Helander (2004) analyses 739 construction fatalities that occurred in the UK. He found that 52% occurred due to fall from roofs, scaffolds and ladders. Falling objects and material were involved in 19.4% of the deaths, and transportation equipment, (e.g. excavators and dumpers) were involved in 18.5%. Helander also found that 5% of construction accidents occur during excavation work. Hinze, J., Pedersen, C., and Fredley, J. (2007) reported that OSHA (the U.S. Occupational Safety and Health Administration) is a useful source of information related to the causes of serious injuries and fatalities. Jannadi (2008) conducted a sample survey of 86 safety officers and 173 workers from the

top 200 construction companies in the UK to identify the key factors in accident prevention. Jaselskis et al (2009) conducted quantitative and qualitative analysis of data related to companies and projects in the US to identify the factors considered being important for a good level of safety.

II. METHODOLOGY

Construction sites situated in Peshawar the Capital of Khyber Pakhtunkhwa were selected as research study area. Efforts were carried out in order to identify the existing accident reporting system implemented by the selected construction sites. Secondly, questionnaire survey was carried out in order to identify the causes of construction accidents and to establish a framework of critical causes for successful implementation of accident reporting system. Thirdly interview sessions carried out in order to identify the obstacles and barriers in the way of implementation of health and safety practices in the Construction Projects of Peshawar Khyber Pakhtunkhwa. Thus in this chapter the hypothesis and the research questions of the thesis are elaborated. Furthermore, the research methodology used to fulfill the stated research aims and objectives is explained and justified. Besides, in order to be able to make an effective contribution in the knowledge of the research area, the literature review proved a comprehensive grasp of existing knowledge. The literature review served two purposes. Firstly, the literature review helped in systematic reading of previously published and unpublished information relating to critical causes of accident under in the construction industry and secondly, it assisted in focusing the research and gave some insights into how to design the study more effectively.

Hypothesis

The main hypothesis underlying this Paper is based on the literature review undertaken and the fact that very little work deals with the safety and accidents in the Projects of Peshawar Khyber Pakhtunkhwa, an investigation on health and safety could make a substantial contribution and an addition to knowledge in their respective context. Much of the work presented in this thesis is drawn on the author personal industrial experience and observations which unfortunately is not covered by any published work. The second hypothesis is that management and health and safety are very closely linked and bear a lot of similarities and could be integrated into one management system. There are some issues associated with health and safety that are particular to the Projects in Peshawar Khyber Pakhtunkhwa. This is because the socio cultural and political influences have an impact on how health and safety aspects are perceived and applied. As mentioned the workforce is mainly drawn from many different Provinces of the Country, use many languages and have a variety of religious and cultural backgrounds. As Peshawar which is the capital of Khyber Pakhtunkhwa construction industry adjusts to a changing workforce, it needs to be aware of the implication and learn from other countries, such as the UK.

Justification of the Research and Methodology Adopted For Current Study

It became apparent form the extensive literature review that no such research has been previously conducted on investigating and exploring health and safety practices in construction Projects of Peshawar Khyber Pakhtunkhwa construction industry. On account of the nature of the research and its aim of obtaining data based on reality and also gathering more detailed information on why or how to do things better in the field of health and safety management, the current research applies both quantitative and qualitative methods for data collection. Therefore, the methodology adopted by the author consisted of a triangulation approach whereby qualitative and quantitative research methods are combined, thus taking advantage and strengths of each of the methods to minimize any weaknesses from each the methods. The two methods also complement to one another for providing and obtaining valuable and useful data and information and one of the methods does not fulfill the research need. The methods used for combining qualitative and quantitative methods in a research study are as under;

- Integrating methodologies
- Confirming, refuting, enriching, and explaining the findings of one approach with those of the other;
- Merging the findings of the two approaches into one set of policy recommendations.

The methods adapted to put health and safety management guidelines in place. The primary method uses the questionnaire and survey (quantitative) and the secondary method uses interviews and face-to-face discussions (qualitative). The methods and work are described as follows:

Quantitative Approach via Questionnaires

This method is used to collect the relevant data through questionnaires. The questionnaires are used to extract reports based on real facts, attitude, and other subjective situations. Two types of questionnaires were designed and distributed to the personnel who have directly involved in the Construction industries of Peshawar Khyber Pakhtunkhwa. The first one was a pilot questionnaire intended to investigate the need to develop health and safety management framework and to ensure health and safety procedures as observed in the work place of the Construction Projects in Peshawar. The second (main) questionnaire intended to look in depth as issues that arose from the pilot questionnaire and interviews.

Qualitative Via Interviews

This method requires the conduction of interviews aimed at understanding issues related to health and safety in construction Projects of Peshawar Khyber Pakhtunkhwa from specialized and in charged personnel working in the field. The qualitative research interviews aim for gathering information based on actual facts about certain issues and also looking for the exact meaning or clarifications of answers to standardized questions. In this research different interviews were conducted with the personnel directly involved in the construction industry. The first one was a pilot interview that gathered general information about the company and its health and safety policies, whereas the second interview was more in-depth looking at issues in more details and covering other aspects that were not covered by the pilot questionnaire or interview. Interviews can be helpful as follow-up to certain respondents to questionnaires for further examining of their responses. The questionnaires were carefully designed and distributed to potential construction industry managers from both public and private sectors in the Peshawar Khyber Pakhtunkhwa. Interview sessions were conducted with the key person of a construction company such as Safety Officer or Senior Site Engineer, Design Engineers, Managers, and small number of unskilled labors working at sites and in offices. Questionnaires were used to collect the general views of the construction professionals related to the causes of accident under reporting. Literature review and preliminary questionnaire and interviews with the relevant professionals were considered in developing the final questionnaire. These were distributed to the construction professionals at the selected construction sites/Projects in the vicinity. A questionnaire was designed with the objective of determining the more important variables that affect site safety; which included factors that help workers to adopt safe work practices. Overall the following questions were asked and required an answer as part of the research investigations:

- Are health and safety practices adequately applied in the Peshawar?
- How can they be improved and become an essential part of the construction strategy?
- What are the problems faced by the construction industry in the Peshawar as far as health is concerned?
- What is the employer commitment and concern to the implementation of occupational safety and health program?
- How well is the safety and health program implemented?
- What are the obstacles in implementing of safety and health program?
- Are health and safety committees exist in companies? If they exist, what is their importance?

Planning and Designing of the Surveys

The main aim of the survey (questionnaires and interviews) was to fulfill the stated aims and objectives of the research and to answer the research question. The planning and designing of the surveys was based upon the research objectives guided by the findings from the literature review. The familiarity, firsthand experience and knowledge by the author of the construction industry in the Peshawar Khyber Pakhtunkhwa were also important factors that helped in planning and designing of the survey questionnaire. In general terms, the questionnaire includes all techniques of data collection in which each person is asked to respond to the same set of questions in a predetermined order. Since each respondent is asked to respond to the same set of questions, it proves an efficient way of collecting responses from a large sample prior to quantitative analysis. However, questionnaires are not particularly good for exploratory or other research which requires large numbers of open-ended questions.

III. DATA COLLECTION AND RESULTS

Data collection

As mentioned earlier the interviews and questionnaires were developed to collect data for the study. The written questionnaires were either hand-delivered or post-delivered to participants. The target population of this study included contractor, consultant, client, and safety officers in construction industry of Peshawar Khyber Pakhtunkhwa. A total of 130 usable questionnaires were returned, checked, edited, coded and analyzed. The designations of the respondents were: upper management (20 per cent), middle management (48 per cent): safety personnel (17 per cent): technical staff (15 per cent). Upper management respondents comprised managing directors, directors, general managers and senior project managers. The middle management respondents were project managers and assistant general managers. Safety personnel consisted of safety managers, safety officers, safety supervisors and safety auditors. Technical staff refers to supervisors, site coordinators and clerk-of-works. The average working experience in the construction industry of the respondents is 12 years. The minimum and maximum working experiences are from 5 to 34 years respectively. In addition, 60 per cent of the respondents have more than ten years of working experience. The majority of the projects and the employees who were involved belonged to building construction projects with a concentration on residential buildings. Most of the projects are medium sized with good safety records (85 per cent of the projects surveyed noted minor accidents happened or very safe sites).

Results

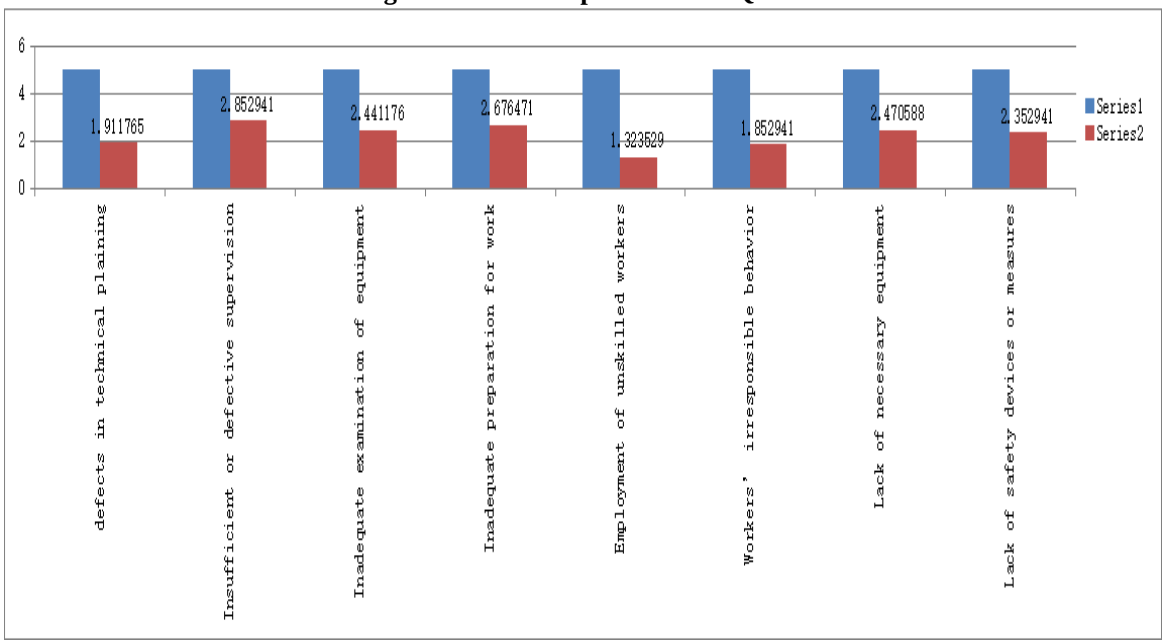
From a total of 55 members of staff available to complete the survey, only 37 responses were received while 67 per cent was return rate. The reason for failing to complete the questionnaire were mainly related to lack of time while the main reason behind it was that some senior members of staff thought the questionnaire impinged on the management function. The culture was identified using a climate survey questionnaire administered to all staff followed by serious meetings to

confirm the interpretation of the survey results and to provide them with an opportunity to offer solutions and suggestions for improving the organization.

Results of Opinion Based Questionnaire

Opinion Based Question For Data Collection	Mean Result	Likert Scale
Employment of unskilled workers	1.35	Strongly agree
Workers' irresponsible behavior	1.85	Agree
Defects in technical paining	1.91	Agree
Lack of safety devices or measures	2.35	Agree
Inadequate examination of equip	2.44	Agree
Lack of necessary equipment	2.47	Agree
Inadequate preparation for work	2.67	N/A
Insufficient or defective supervision	2.85	N/A

Figure: Result of Opinion Based Questionnaire



Results of Actual Site Based Questionnaire

Actual Site Based Question For Data Collection	Result	Total	Likert Scale
Insufficient or Defective supervision	3.05	5	N/A
Inadequate preparation for work	2.76	5	N/A
Inadequate examination of equipment	2.70	5	N/A
Defects in technical paining	2.67	5	N/A
Lack of safety devices or measures	2.28	5	Agree
Workers' irresponsible behavior	2.26	5	Agree
Lack of necessary equipment	2.26	5	Agree
Employment of unskilled workers	2.08	5	Agree

Figure: Result of Actual Site Condition

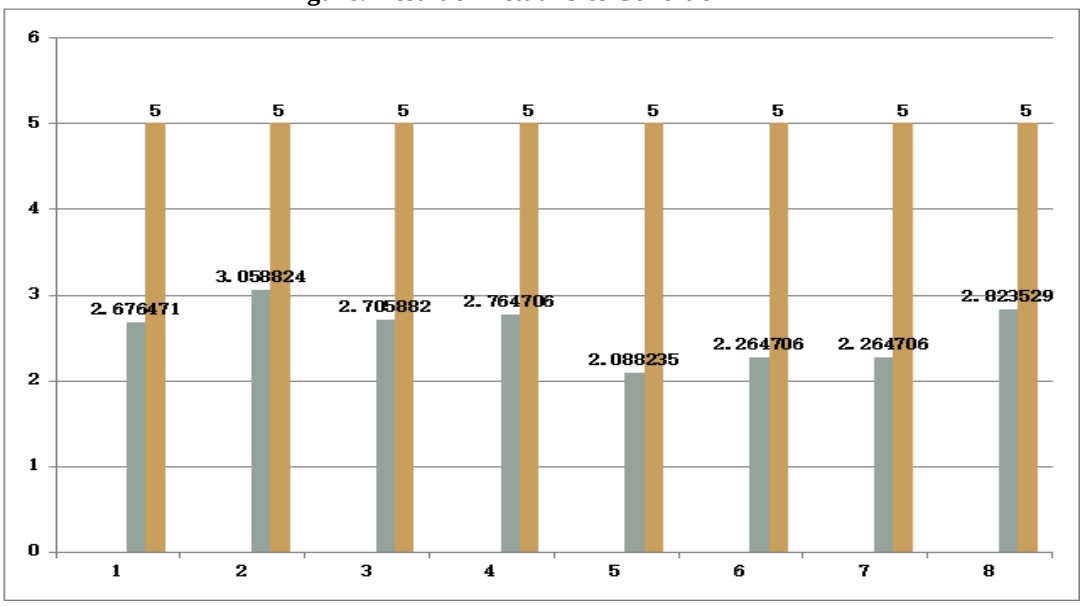
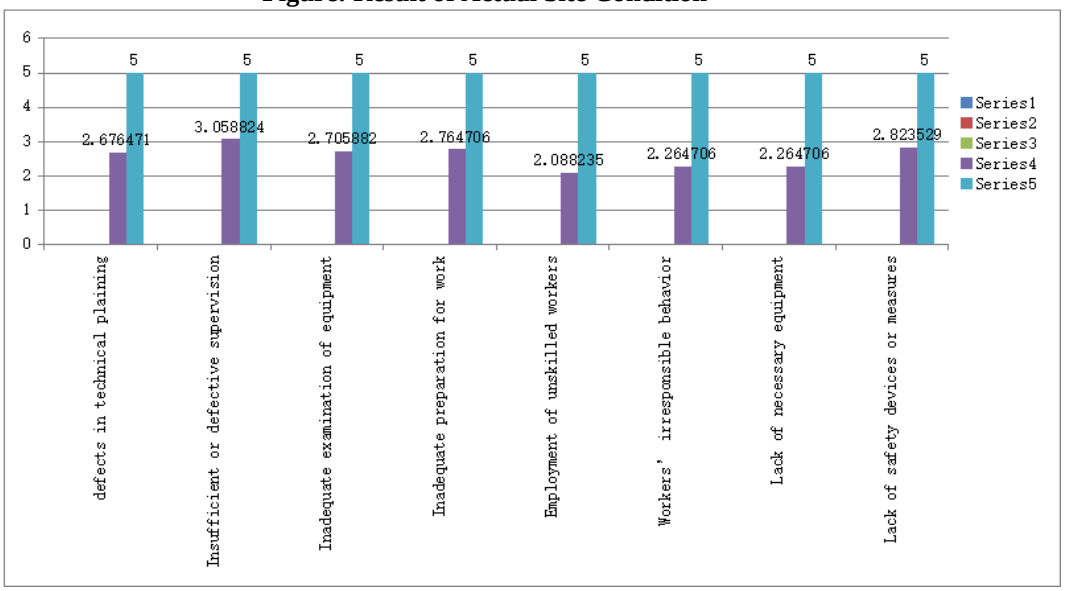


Figure: Result of Actual Site Condition



Result of Severity of accidents

Severity of accidents Questions	No of Deaths
Falling from heights	06
Falling of object,tools pieces of work	05
Fall of person from ladder	11
Unsuitable building materials	01
Faulty construction, collapse of walls	08
Contact with stationary objects, missed steps, etc	02
Contact with moving objects.	02
Contact with heat/ cold.	08
Contact with chemicals.	01
Exposure to or contact with electricity.	05
Lack of safety equipment	02
Total Deaths	51 Deaths

Severity of accident data result

Accidents	No's
Minor Injury	152
Critical Injur	130
Deaths	51

Figure: No of Accidents

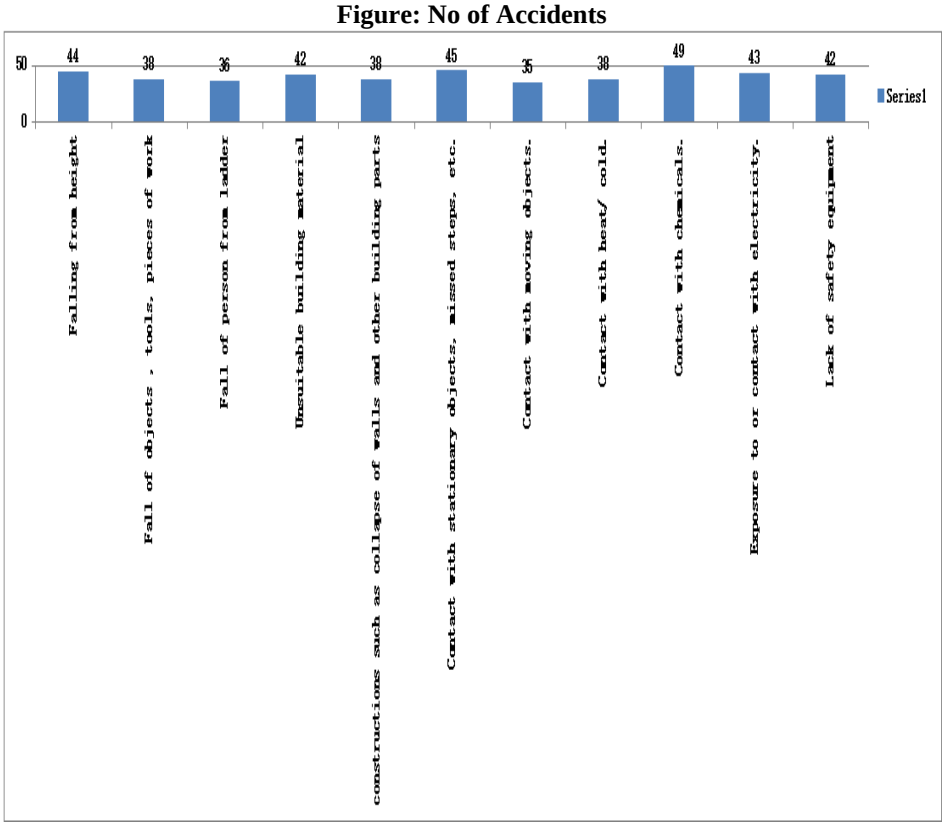


Figure: Details of Accidents

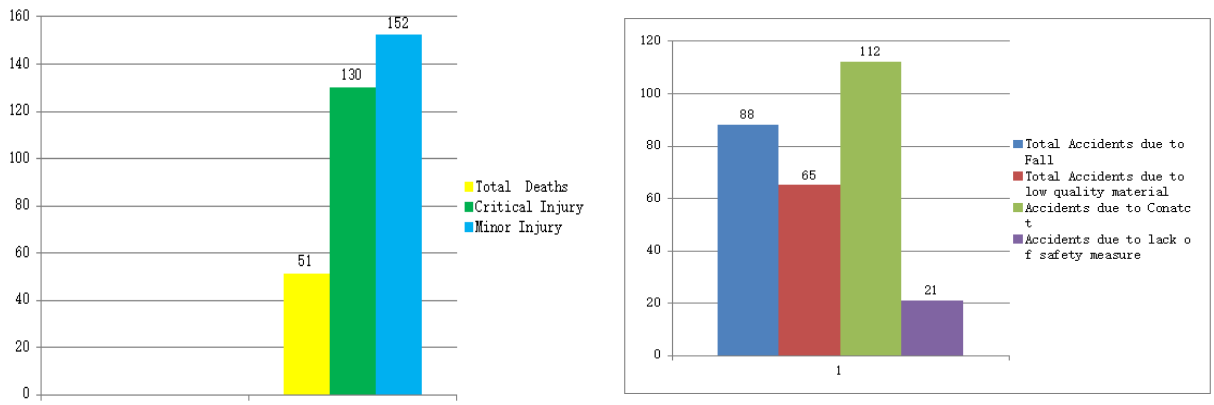


Figure: Accident Summarized Chart

IV. CONCLUSIONS

Falls are the prime cause of accidents in the implementation of the Building projects in Peshawar Khyber Pakhtunkhwa construction industry and they have the highest accidents/incidence rate. The purpose of this study was to investigate the main causes and influential factors leading to fall accidents in Peshawar Khyber Pakhtunkhwa construction industry. The main contribution of this study was that it has specifically analyzed the fall heights and the current situation of usage of fall protection by using actual accident database. Since there has been hardly any research done in the last decade to analyze fall accidents by examining the study presents updated trends, causal factors and dimensions about fall accidents.It has been noted that falls are the foremost accidents in the construction projects of Peshawar Khyber Pakhtunkhwa that leads to serious injuries or fatalities. The severity of the problem of "falls" in the Peshawar Khyber Pakhtunkhwa construction industry can be ascertained from the fact that it is fatal four followed by electrocution, struck by, caught in/ between especially trades contractors were found to be more vulnerable to falls as they are involved in 73% of the fall accidents in the past two decades. Specialty trade contractors tend to be small companies with limited annual revenues and they generally have poor safety record. These might be the contributing factors leading to greater number of fall accidents in case of specialty trade contractors. The findings of this study showed that falls from the roofs is the leading cause of fall accidents followed by falls from the ladders and scaffolds. These three fall types contributed to almost 55% of the falls in the Peshawar Khyber Pakhtunkhwa construction industry. 'Roofing, siding and sheet metal works', 'carpentry works', 'structural steel erection works' and 'single family housing construction' trades are responsible for half of the falls in the construction industry.

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