

Occupational Hazards in Building Construction

Sunil Shrestha

Department of Civil and Rural Engineering
Nepal Engineering College, Changunarayan, Bhaktapur, Nepal.
sunils@nec.edu.np



Sunil Shrestha is a professional Civil Engineer. He has received his B.E. in Civil Engineering and M.Sc. in Construction Management from Pokhara University. He has done a research on construction safety management practices in Nepal. He is working as an Assistant Professor at Nepal Engineering College since 2016.

Abstract

Minor injury to fatality and permanent disablement cases due to accident at the construction sites are one of the highest as compared to the other sector. Hence, there is an urgent need to mitigate this problem. The first step that should be taken is identifying the hazard to ensure a safe and conducive working condition. Therefore, this paper is intended to identify and highlight the hazards that are most commonly found at our construction sites today. The data collection was carried out through a questionnaire forms and checklist survey regarding hazards in construction. The sites include high rise commercial building projects. The study determines six major groups of hazards in relation to works at construction sites such as physical, chemical, mechanical, biological, psychological and physiological hazards. The study was conducted on 50 contractors and 5 building construction sites. The results showed that the most common hazards for the project around the study area are noise, electric shock and vibrations as the major physical hazards; cement dust and sand dust as major chemical hazard; hit by equipment as major mechanical hazard and job dissatisfaction as major psychosocial hazard in building construction projects. Thus, contractors should be responsible and accountable for documenting different types of hazards as they are implementing agent of safety during the construction and development of any project. For this, awareness level should be increased by conducting regular awareness program, along with engineering and enforcement activities.

I. INTRODUCTION

A. Background

Formal identification of hazards in the workplace is an essential basis on which successful safety management is founded. The ability of contractors to carry out this process in a formal way and document an appropriate safe work procedure is still problematic. Equally the requirement for those who control a workplace to review the content

of such procedures is also problematic in construction projects [2].

About 90% of the occupational hazards which occurs at construction sites are predictable and by giving adequate attention in planning, implementation, monitoring and control accidents could be prevented [1].

Unsafe act and unsafe condition at construction work leads to the loss of life and property. Thus, hazard identification in construction site plays a vital role to minimize the accidents and hence economic and social losses.

B. Research objectives

The overall objective of the study is to identify the occupational hazards in building construction projects in Nepal.

C. Significance of study

This study identified the occupational hazards in construction projects. This study helps to guide contractors, consultants and workers to maintain standard safety while working in construction projects. Therefore, proper hazards identification in construction projects can be significant to minimize the financial, human and social losses.

D. Scope and limitation of study

The scope of this research covers safety management in building construction projects.

II. LITERATURE REVIEW

E. Occupational hazards in building construction

Hazard can be defined as a potential situation that may cause harm, unintentional injuries, life loss damage, or loss of an item or belongings arising from occupational works. It is also known as the counterpart of safety [3].

As per International Labour Organization (ILO), there are number of hazards that can be found in construction workplace. They are:

- Physical hazards such as noise, vibration, unsatisfactory lighting, radiation and extreme temperatures;

- Chemical hazards arising from dusts, fumes, vapours and gases;
- Biological hazards such as bacteria, viruses, infectious waste and infestations;
- Psychological hazards resulting from stress and strain;
- Mechanical hazards like badly designed machinery, mechanical devices and tool [5].

Thus, formal identification of hazards in the workplace is an essential for safety management at building construction sites [2].



Figure 1 Hazards at Building Construction

B. Hazard identification in building construction

The ability of contractors to carry out the hazard identification process in a formal way and document an appropriate safe work procedure is still problematic. Equally the requirement for those who control a workplace to review the content of such procedures is also problematic in construction projects [2].

Job Safety Analysis (JSA), which is also known as job hazard analysis, is an efficient proactive measure for safety to identify hazards in construction projects. At construction sites the physical environment is constantly changing, workers move through the site in the course of their work, and they are often endangered by activities performed by other teams [4]. To address this difficulty, a structured method for hazard analysis and assessment for construction activities, called “Construction Job Safety Analysis” (CJSAs), was developed. The method involves identification of potential loss-of-control events for detailed stages of the activities commonly performed in construction, and assessment of the probability of occurrence for each event identified [9].

Similarly, observation at site, hazard survey, group discussion and record analysis are also the methods of hazard identification used in construction projects [10].

C. Occupational hazards prevention and control measures

The most influential safety factor was personal awareness followed by communication [6]. The behaviours of contractors play significant role on safety management, including the provision of personal protective equipment, regular safety meetings, and safety training [8]. Similarly, the government should play a more critical role in legal enforcement and organizing safety training programs as well.

Heinrich's hierarchy of hazards prevention and control measure postulates that the effectiveness of prevention and control measures decreases from top to bottom in pyramid [7].

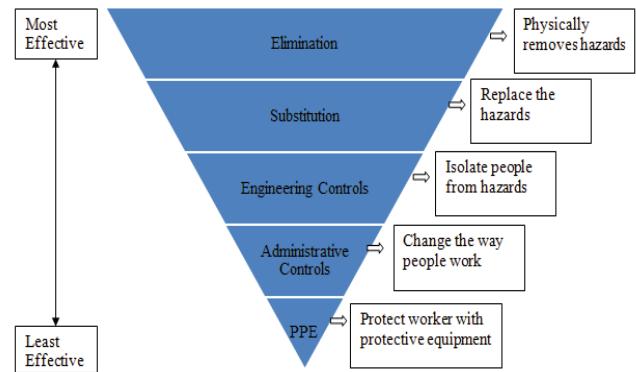


Figure 2 Heinrich's Hazard Control Pyramid

The way to control hazard at construction is elimination which means removing hazard physically. If elimination is not possible then replace the hazards by means of alternative technique of construction like engineering controls. To make effective control of hazard, the worker working in site must be trained with proper personal protective equipment.

The personal protective equipment like hard hat, gloves, feet ware are last line of defence and least effective while elimination is most effective control method.

III. METHODOLOGY

A. Research Design

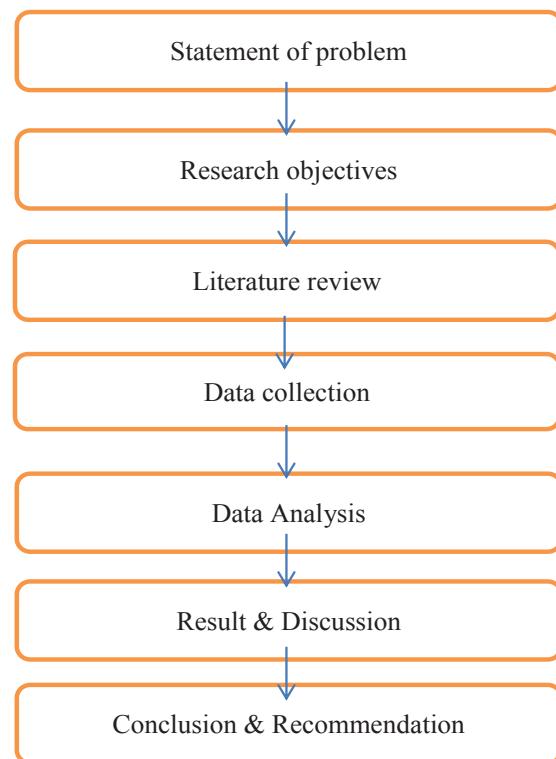


Figure 3. Research Design Flow Chart

Pre-field Work Phase

Design of questionnaire for respondents were developed in pre-field work phase.

Field Work Phase

Conduction of questionnaire survey and collection of primary data related to the hazard issues were done in the field. During questionnaire survey multiple responses from respondents are allowed.

Post Field Work Phase

Processing and analysis of data, illustrating the result, drawing conclusion and making necessary recommendation was done.

H. Study Area

The study area of this research focused on Kathmandu valley.

IV. RESULTS AND DISCUSSION

A. Physical hazards in construction project

The figure 4 shows the overall result of total respondents regarding physical hazards in construction projects. It reveals that 74% of respondents agreed noise as major physical hazard followed by 70% respondents with electric shock and vibration, 56% with lights, 52% with heat and humidity and 14% with radiation.

During case study of construction projects, it was found that noise; electric shock and vibration were main physical hazards. Actually the reason behind this was due to lack in proper care and precaution like no sound insulation, no wiring check while working in construction projects.

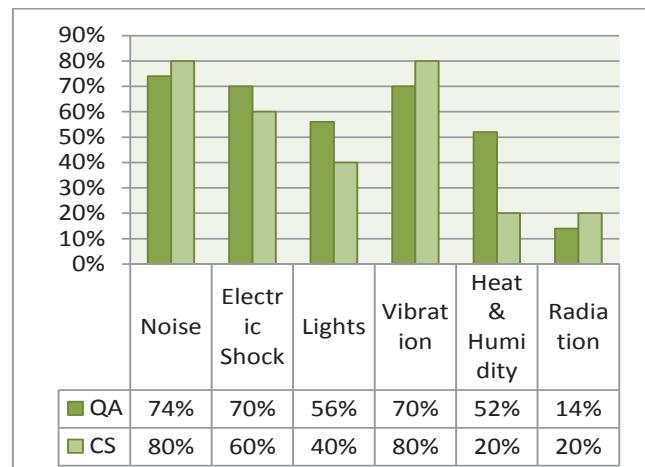


Figure 4 Physical Hazards

B. Chemical Hazards in Construction Projects

Figure 5 shows that among the respondents, 96% agreed that cement dust as major chemical hazard in the construction work. Similarly 92% agreed that sand dust as other chemical hazard and 12% agreed that toxic gases as chemical hazard that takes place in the construction work.

The result of this study also resembles with questionnaire result. Thus, prevention and control of dust at working area is essential. Sufficient amount of dust control measures like mask should be available in construction site. Similarly, water pouring system should be managed at dry working places to minimize dust.

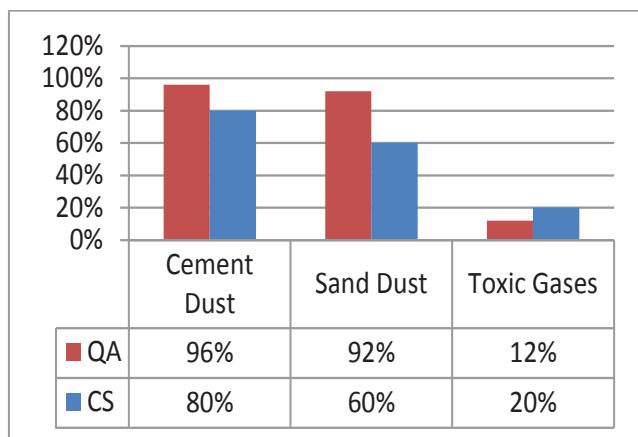


Figure 5 Chemical Hazards

C. Mechanical Hazards in Construction Projects

The figure 6 shows that among the respondents, 82% agreed that hit by equipment as major mechanical hazard in the construction works. Similarly, 60% agreed that defective equipment as other mechanical hazard and 44% agreed that untrained operator as another factor for mechanical hazard that hazards take place in the construction works.

Hit by equipment is the major mechanical hazard in building construction, so proper equipment handling with trained operator is essential to reduce mechanical hazards.

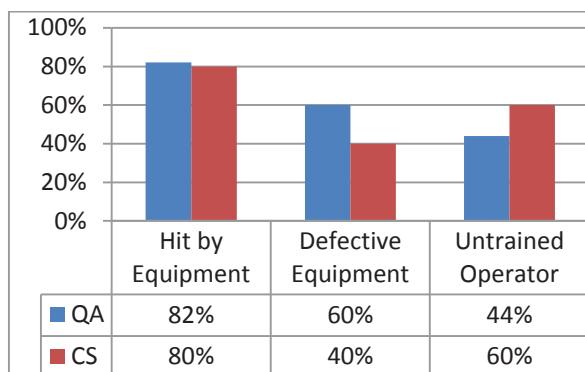


Figure 6 Mechanical Hazards

D. Psychological Hazards in Construction Projects

The figure 7 shows that among the respondents, 66% agreed that job dissatisfaction as major psychological hazard in the construction work. Similarly, 44% agreed that alcoholism and job insecurity as psychological hazard take place in their construction work.

Psychology of worker differs from each other. Every worker wants job security. High rate of worker turnover is a challenge in construction sector. So, job dissatisfaction and job insecurity are the common psychological hazards. But, according to this research, job dissatisfaction in construction projects is relatively high.

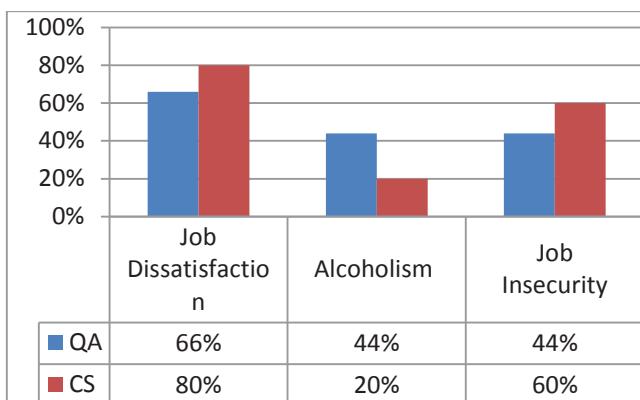


Figure 7 Psychological Hazards

E. Biological Hazards in Construction Projects

Figure 8 shows that among the respondents, 58% agreed that mosquito bite as major biological hazard and 20 % found that animal attack as another biological hazard and 16 % of respondents believed that poisonous

plant as least biological hazard in the construction projects.

The result reveals that mosquito bite was the main biological hazard at construction site, so that prevention of mosquito by means of preventive and control measures like using pesticides, filling swampy areas are essential at construction sites.

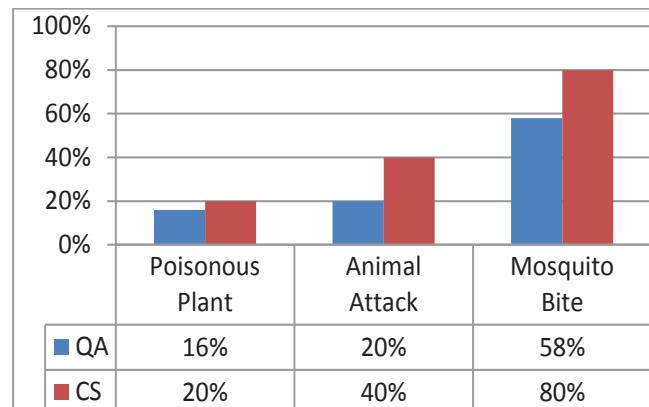


Figure 8 Biological Hazards

F. Physiological Hazards in Construction Projects

The figure 9 shows that among the respondents, 30% agreed that poor hearing as major physiological hazard, followed by 26 % agreed poor eye sight and 18% agreed old age and diseases as physiological hazards. These hazards take place in construction projects.

The manpower working in construction sites should be physically and mentally well. If workers are not fit for the work, this might lead to accident. Due to lack of monitoring, contractors' companies often hire old age person in work. But study results show the percentage is relatively low.

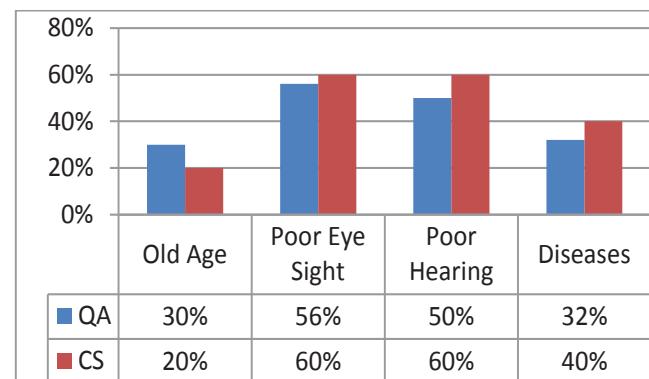


Figure 9 Physiological Hazards

V. CONCLUSION AND RECOMMENDATION

5.1 Conclusions

Based on result and discussion, it is concluded that noise (74%), both electric shock and vibrations (70%) are the major physical hazards. Cement (96%) and sand dust (92%) are major chemical hazards. Hit by equipment (82%) is major mechanical hazard and job dissatisfaction (66%) as major psychosocial hazard in construction projects.

From the result, it is concluded that construction industry is hazardous. Thus, documented and well systematic hazard identification system at every construction project is essential for the safe working environment at construction sites.

5.2 Recommendations

To maintain a safe work environment at site, commitment of a sincere and coordinated effort among all the parties involved in construction sector is needed. Contractors can contribute for the safety in workplace by adopting the following recommendations.

- Contractors should establish documented hazards identification methods for different construction activities, tools and equipment.
- Contractors should prioritize hazards elimination and substitution plan and procedures as first preventive and control measures.

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