

## **Hazards at Construction Site and Influential Factors of Construction Accidents in Bangladesh**

**M. R. Chowdhury<sup>1,\*</sup>, R. Hasan<sup>2</sup>, D. Mondal<sup>3</sup>, F. Nadim<sup>4</sup>**

<sup>1</sup>*Undergraduate Student, Department of Building Engineering & Construction Management, RUET, Bangladesh  
(1612007@student.ruet.ac.bd)*

<sup>2</sup>*Lecturer, Department of Building Engineering & Construction Management, RUET, Bangladesh  
(rakibulkuet14@becm.ruet.ac.bd)*

<sup>3</sup>*Undergraduate Student, Department of Building Engineering & Construction Management, RUET, Bangladesh  
(diptoruetcem@gmail.com)*

<sup>4</sup>*Undergraduate Student, Department of Building Engineering & Construction Management, RUET, Bangladesh  
(farhansabbir1621@gmail.com)*

### **Abstract**

Construction projects in Bangladesh are facing hazards, ambiguities, and complications, which result in accidents. Human death, injury, project delay, excessive cost result from construction accident. This affects the financial and infrastructure growth of the country, which need to be taken care of. The aim of this research is to recognize and explore the most common hazards at construction site and the crucial factors behind the accidents. An extensive literature review was done to design the considerable factors. A survey was performed to rank the severity of the hazards and the responsible factors of accidents in terms of relative importance index (RII). It is traced from the analysis that fall of brick particles, working at height, deficiency of railing on wall and stair, electrocution, and collapses are the main hazards at construction site. Also, this research found twenty authentic factors, among them unawareness of construction safety, inadequate use of personal protective equipment, deficiency of worker's skill on instruments, owner and contractor's apathy for safety and not following safety codes are the vital reasons responsible for the accidents. This work tends to set effective suggestions to minimize hazards and accidents at construction site.

**Keywords:** *Hazards; Construction site; Severity rate; Construction accident; Bangladesh.*

### **1. Introduction**

Construction sector is one of the most risky sectors in Bangladesh. The construction market expands day by day for the increasing demand of infrastructure facilities, dwellings, office and commercial spaces (Benny and Jaishree, 2017). This industry has earned about 10% of gross domestic product (GDP) of Bangladesh, which indicates the great contribution to our economy. Construction sector of Bangladesh deals with more safety puzzles than other thriving countries in the world (Ahmed, 2019). For this reason, probable hazards and accidents in this industry is a major concern as hazards and accidents are inter-connected. In general, hazard is a situation which generates threat to human lives, property, resources, and environment and so on. Most

of the hazards are potential that may cause accidents and sometimes even disaster, according to experts. Construction projects are facing so many hazards, uncertainties and complexities that take part in regularly occurring incidents (Sousa et al., 2014). Specialists mentioned that in Bangladesh, about 80% of construction projects face damages and deaths from hazards that ultimately results in accidents. Also, construction workers face three times further chances to die and two times of getting wounded than any worker of several financial movement (Sousa and Teixeira, 2004).

Each year, at about 150 persons, workers are expired and thousands of folks get wounded for the accidents at construction sites in Bangladesh (Ahmed et al., 2018). Specifically in 2018, almost 163 workers were passed away in the construction sector, which is the second highest number after transportation sector. These statistics certainly explains the poor status of construction sector against probable hazards and tragic accidents. Officers from Bangladesh Occupational Safety, Health and Environment Foundation (OSHE) stated “Accidents in construction program is an intense issue for construction of Bangladesh. This is counted as one of the key barriers of originality and advancement of construction industry in Bangladesh and also fetches enormous complications in numerous paths. It is evil, it is really evil for construction industry of Bangladesh” (Ahmed and Hoque, 2018). That’s why lack and implementation of construction safety at site are becoming major concerns. On the other hand, above a thousand of companies are present in Bangladesh that are engaged in the practice of construction (Roy and Islam, 2019). But a good number of them are unconcerned and careless in case of maintaining and providing safety. As a result, the management of safety issues in this sector is very miserable in Bangladesh. Improper project schedule, managements’ low expertise, improper planning, deficient skilled workers, variations and insufficient collaboration of worker’s are the key threats to ensure safety of an ongoing construction project (Husin et al., 2008). In fact, if proper and higher authority doesn’t look upon in this matter, hazards and construction accidents at site will be uncontrollable. As a consequence, the damages of property, resources and life of people will occur so frequently. Moreover, the contribution in GDP will fall quickly and the financial sustainability of Bangladesh will be hampered. For such cases, Bangladesh needs to act thoroughly to lessen the accidents and enhance the construction sector with neoteric techniques and tricks. In fact, proper management of safety and regular inspection may facilitate both the project’s fruitful completion and sustainability of organization. In order to minimize accidents, we should know the reasons of accident, in particularly the deep factor of accidents and the ways to control the hazards (Rahim et al., 2008). In addition, a widespread safety plan and safety management system needs to be structured to impede and control hazards and accidents at construction projects. To support the higher authorities and enhance the culture of safety, the prime aim of this study is to recognize and explore the hazards and responsible factors of accidents. Hopefully, the work will help higher personnel, project stakeholders, and sponsors to realize the lacks of current safety systems at construction site. To conclude, this work will provide effective suggestions which may help in eliminating hazards and minimizing accidents at construction projects.

## 2. Methodology

The necessary data was assembled from research papers and practical inspections. The data was observed to identify the possible hazards and responsible factors of construction accidents. A good portion of significant data and information was accumulated particularly from a decent inquiry and the rest were narrated exerting available sources of news.

**2.1. Data Collection**

The type and conduct of this review can be termed as quantitative course of data collection. In this approach, observation via journals and conference papers, contents seemed to be effective for the questionnaire design. From the literature scan, twelve possible hazards and twenty crucial factors were considered that are responsible for the accidents at construction site. During the pandemic, it was quite difficult to perform on field survey. That’s why questionnaire was distributed through google form to 140 respondents for the completion of survey. In this process, the active respondents were owners, contractors, site engineers, workers and students from the relevant field. Following tables represent the short sample of response collection, where level of each factor was judged based on relative value (1-Negligible, 2-less, 3-medium, 4-high, 5-very high):

Table 1. Hazards at site

Hazards	Relative Value				
	1	2	3	4	5
Working at height				*	
Manual handling of materials			*		
Electrocution				*	
Contact with harmful chemicals					*
Deficiency of railing on wall and stair			*		
Falls, trips and slips		*			
To be continued					

Table 2. Factors of construction accidents

Factors of Accidents	Relative Value				
	1	2	3	4	5
Unawareness of construction safety					*
Improper design			*		
Not following BNBC safety codes				*	
Inadequate supervision				*	
Lack of technical guide			*		
Reckless actions of personnel			*		
Type and nature of project		*			
To be continued					

**2.2. Data Analysis**

Relative Importance Index (RII) was used to visualize the rank of hazards and responsible factors of accidents. Equation (1) represents the mathematical formula for the calculation of Relative Importance Index:

$$\text{Relative Importance Index} = (\sum W)/(AN) \tag{1}$$

Here, W = Weight given to each factor (Relative value 1 to 5, where 1 means least and 5 means intense).

A = Highest value of range (In this study, A = 5) and,

N = Number of total respondents.

### 3. Results and Discussions

In this study, twelve most common and major hazards at construction site were found. With the help of Relative Importance Index (RII), the severities of these hazards are sorted below in figure 1.

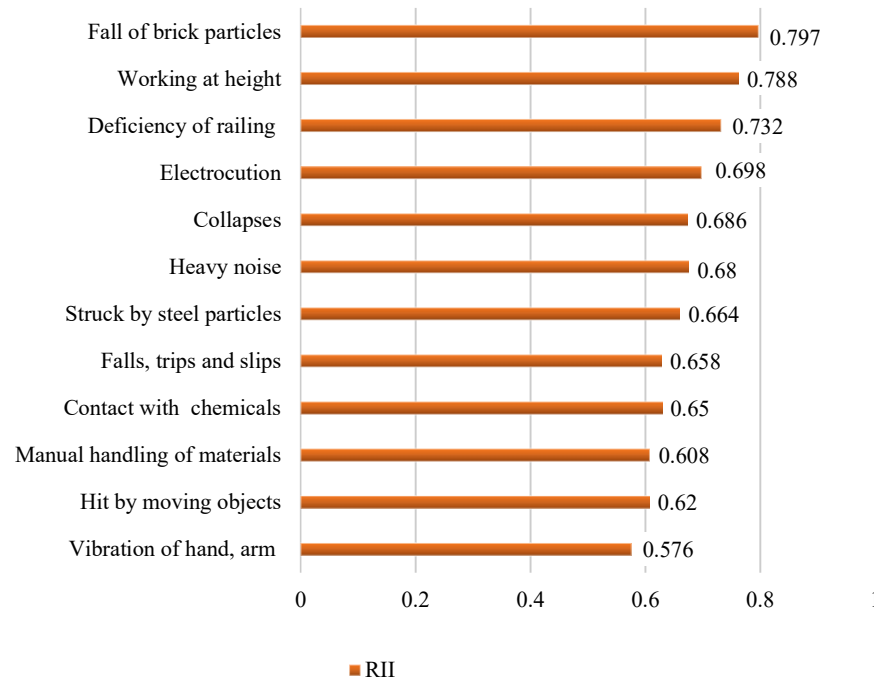


Figure 1. Hazards at construction site

Figure 1 pointed out fall of brick particles from height, working at height, deficiency of railing, electrocution and collapses are the top five critical hazards both for passer-by and workers. But, fall from height (for working at height), electrocution, suffocation, collapse of wall and roof are the top five hazards that are responsible for fatalities (Roy and Islam, 2019). The current result differed because of the latest on site investigation and also for the respondent’s opinion that they had experienced recently.

Furthermore, the study sorted twenty major threats and responsible factors of accidents based on RII. Figure 2 expresses the ranking of those factors according to the RII value.

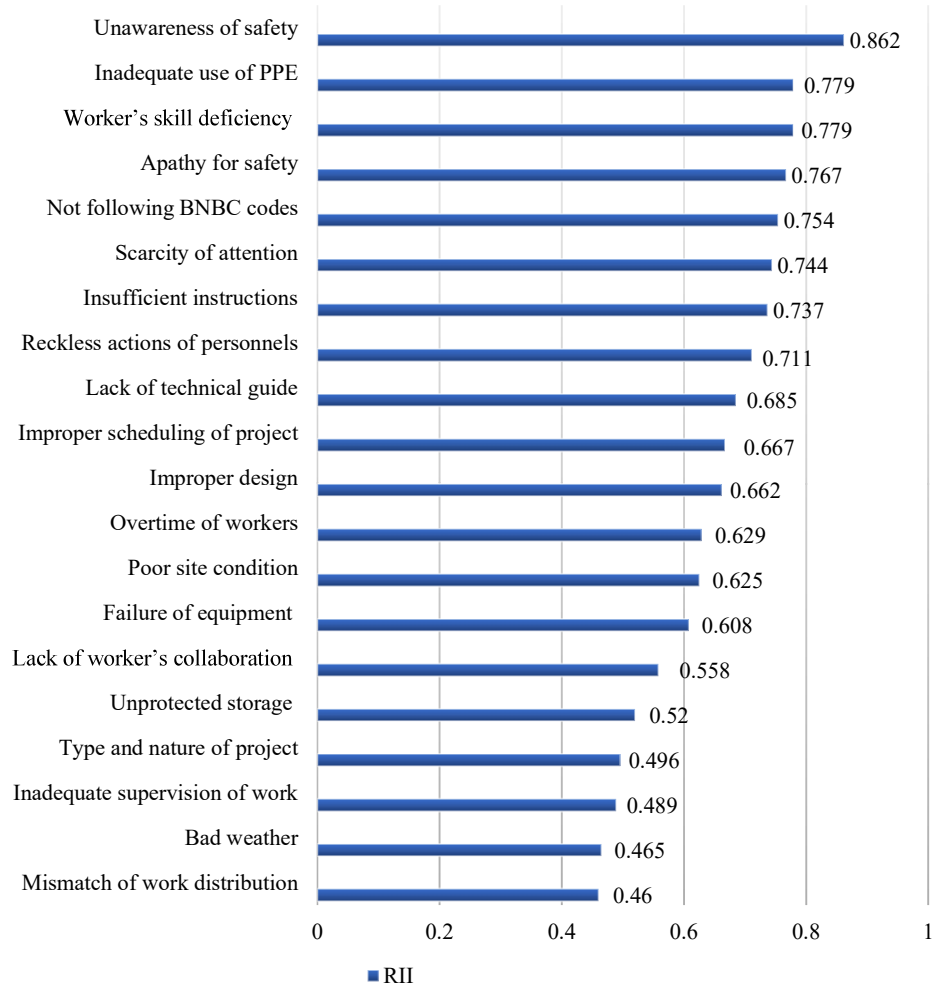


Figure 2. Responsible factors of construction accidents

In Bangladesh, the construction sector has filed above forty percent of the vocational and severe wounds and mortalities ([Safety and Rights Society report, 2015](#)). The top five bases of accident are unawareness of safety related matter, lack of PPE, inadequate safety eliminating design, vulnerable equipment and inadequate knowledge and instruction ([Ahmed, 2019](#)). But above figure confesses that unawareness of safety, inadequate use of PPE, worker's skill deficiency, owner and contractor's apathy to pay for safety and unfollowing of BNBC codes are the top five responsible factors of accidents. From the comparison, it can be stated that the first two factors of accident stood in the same position for every consideration, but the other factors varied for level of judgment and for recent inquiry. To conclude, all of these factors are the major influencers of construction accidents that are liable for both loss of human lives and permanent injuries.

#### 4. Conclusions

Construction hazards and accidents are the most critical issues and have negative impacts on both the project and human lives. For this reason, the study was structured to analyze the most probable hazards and the causes of accidents that are interconnected and takes part in harmful actions. Based on the RII, fall of brick particles, working at height, deficiency of railing, electrocution and collapses were found as the main hazards. In addition, unawareness of safety, inadequate use of PPE, worker's skill deficiency, owner and contractor's apathy to pay for safety and unfollowing of BNBC codes were the prime responsible factors of accidents. This findings can assist the stakeholders, sponsors, higher personnel and researchers to feel the current situations of hazards at construction site and the possible reasons behind the tragic accidents. Also, this can help in conducting further broad and informative study by considering the stated factors in this work. To control the current situation, higher authorities should take necessary steps to ensure safe environment and safety in construction works. Skilled workers, training on equipment, regular inspection at site, following authorized safety policy, proper management and most importantly awareness of safety should be taken care of for the implementation of safety programs. Thus, the probable hazards and deadly construction accidents can be minimized significantly.

#### References

- Ahmed, S. (2019). Causes of Accident at Construction Sites in Bangladesh. *Organization, Technology and Management in Construction: an International Journal*, 11, 1933-1951. Doi: 10.2478/otmcj-2019-0003.
- Ahmed, S., Sobuj, M.H.R. and Hoque, M.I. (2018). Accidents on construction sites in Bangladesh: A Review. *Paper presented at the 4th International Conference on Civil Engineering for Sustainable Development (ICCESD 2018), KUET, Khulna, Bangladesh.*
- Ahmed, S., and Hoque, M.I. (2018). Investigation of the Causes of Accident in Construction Projects. *Journal of System and Management Sciences*, 8(3), pp. 67-89.
- Benny, D. and Jaishree, D. (2017). Construction Safety Management and Accident Control Measures. *International Journal of Civil Engineering and Technology (IJCIET)*, 8(4), pp. 611-617.
- Husin, H.N., Hamimah, A. and Jusoff, k. (2009). Management of Safety for Quality Construction. *Journal of Sustainable Development*, 1(3), pp. 41-47. Doi: 10.5539/jsd.v1n3p41.
- Islam, M.S. and Roy, C. (2019). Hazards and safety issues at construction sites in Bangladesh. *MOJ Civil Engineering*, 5(2), pp. 52-56. Doi: 10.15406/mojce.2019.05.00149.
- Rahim, A., Hamid, A., Majid, M.Z.A., Singh, B. (2008). Causes of accidents at construction sites. *Malaysian Journal of Civil Engineering*, 20(2), pp. 242-259.
- Sousa, V., Almeida, N.M. and Dias, L.A. (2014). Risk-based management of occupational safety and health in the construction industry – Part 1: Background knowledge. *Safety Science*, 66, pp.75-86. Doi: 10.1016/j.ssci.2014.02.008.
- Sousa, S. and Teixeira, J. (2004). Prevention measures to reduce risk of falling from heights. *Paper presented at the IX National Symposium of ISMAI, Porto, Portugal.*
- SRS. (2015). Safety and Rights Society Annual report: Workplace deaths in Bangladesh in 2015. Dhaka, Bangladesh: Safety and Rights Society.