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Research Paper

# Nature of Fall Accidents in Construction Industry: An Indian Scenario

Engineering

**KEYWORDS :** construction projects, fall accident, triggering events, India

**C.Vigneshkumar**

M.Engg, Construction Engineering and Management , K.L.N College of Information Technology, Madurai

## ABSTRACT

*Fall accidents in construction projects, particularly building works, are the most frequent accidents. Those accidents may results in death and serious injuries of workers involved and other consequences such as lost of work days and the industry bad image. Robust accident prevention is required through improving continuously health and safety in construction. Therefore, understanding triggering events and their factors leading to fall accidents are of important input. The objective of this paper is to findings of triggering events based past fall accident cases in India. The fall accident cases were retrieved from accident reports provided by ADSI 2012 and Indian statistical report 2012. In this paper, current profile of accident records of India is presented. This paper also presents the nature of fall accidents. The event area and their potential active failures leading to fall of accidents are described. It is expected the knowledge shared in this paper assist all people involved in construction projects to plan an accident prevention strategy properly.*

## INTRODUCTION

Accidents in construction projects in many countries are of important issue to handle. The phenomena makes the construction industry has a bag image of risky place of accidents. The nature of construction project itself has potential hazards of accidents since its uniqueness, open space, exposure to weather, involving many unskilled labors, tight schedule of short targeted project duration, workers turn over and working at height, confined space and psychologically and physically vulnerably working environment.

Fall accidents are the most frequent accident in construction projects. In USA, between 1992 to 2006 fall accidents contribute 32% of fatality and 37% of death in the construction industry. In New Zealand, fall from different height is also the most contributory accident in the industry. The rate of fall accident accounts for 51% of injuries in the China construction industry. In Hong Kong, it is found that fall accidents represent more than 47% of total fatality in 2004 and more than 30% of fatalities in Taiwan are caused by fall accidents. It has been concluded that fall is the most dangerous accident in many countries.

Robust accident prevention is required through improving continuously health and safety in construction. Therefore, understanding triggering events and their factors leading to fall accidents are of important input. The objective of this paper is to findings of triggering events based past fall accident cases in India. The fall accident cases were retrieved from accident reports provided by ADSI 2012 and Indian statistical report 2012. In this paper, current profile of accident records of India is presented. This paper also presents the nature of fall accidents and its preventive measures. The event area and their potential active failures leading to fall of accidents are described. It is expected the knowledge shared in this paper assist all people involved in construction projects to plan an accident prevention strategy properly.

## NATURE OF FALL ACCIDENTS

The term "accident" can be defined as something that is unplanned, uncontrolled, and in some way undesirables; it disrupts the formal functions of a person or persons and causes injury or near miss. During an accident a person's body comes into contact with or is exposed to some object. Other person, or substance, which is injurious; or the movement of a person causes injury or creates the probability of injury. Accident in construction resulting in physical injuries and fatalities can be broadly categorized into the following eight basic groups. They are (i) falling from height, (ii) Structure by falling object/ moving vehicles, (iii) excavation related accidents, (iv) operations of machinery/ tools related accidents, (v) electrocutions, (vi) fire/ explosion, (vii) failure of temporary structure, and (viii) others.

A fall is defined as an event in which a person coming to rest unintentionally on the ground or other lower level, not by the result of a major intrinsic event such as (stroke) or overwhelming hazard. Fall accidents are significant public health risk and a leading cause of nonfatal and fatal injuries among construction workers worldwide. A more comprehensive understanding of causal factors leading to fall incidents is essential to prevent falls in the construction industry. There are many factors to research and variety of proposed methodology as well as locations will improve understanding of the nature of fall accidents including preventive actions to be developed for avoiding, reducing and eliminating potential hazards to fall accidents.

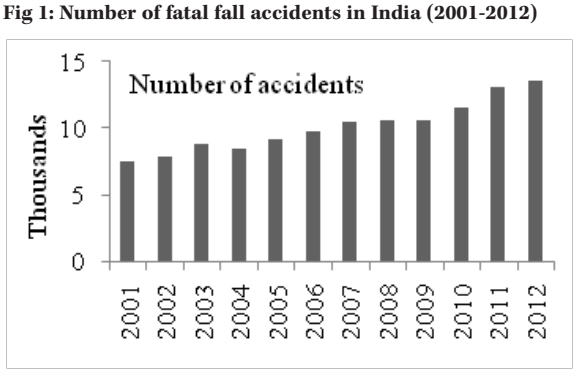
Four factors of accident causation in construction namely, (i) working conditions, (ii) management failure, (iii) unsafe acts of workers and (iv) Non-human related events. Among those factors are operative actions such as improper personal protective equipment, failure to follow instructions and compliance with working standards and careless as well as over confident which account for almost 29.8 % leading directly to accidents.

The objective of this study is to find out factors leading to fall accidents in construction projects using two approaches which are event area breakdown structure and the nature of fall accident analysis. In this paper, current profile of accident records of India is presented. This paper also presents the nature of fall accidents. The event area and their potential active failures leading to fall of accidents are described. It is expected the knowledge shared in this paper assist all people involved in construction projects to plan an accident prevention strategy properly.

## FALL ACCIDENTS IN INDIA

In India, in the last decade, the accident rate is fluctuative from year to year. It shows that this country is still one of countries having higher rate of accidents as shown in Figure 1.

**Fig 1: Number of fatal fall accidents in India (2001-2012)**



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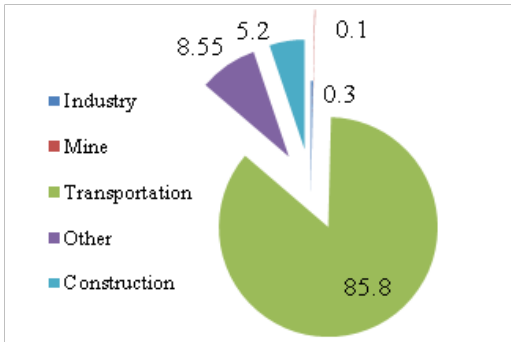
**Source: Indian statistics year book 2001 to 2012**
**Fig 2: Number of fatal accidents based on sector (2012)**




**Source: Accident deaths and suicides in India 2012**

Figure 2 shows that accident in the construction sector accounts for almost 5% of all accidents in all sectors followed by transportation sector.

There are many accidents leading to fatal and serious injuries in construction. Table 1 shows the types and number of accidents in construction Industry. Here, fall accidents are greater than other type of accidents; the fall is perceived as the most dangerous accidents in the field since its consequences to kill workers.

**TABLE-1**
**TYPES OFACCIDENTS IN CONSTRUCTION INDUSTRY (INDIA)**

| Type of construction accidents | Years | |
|---|---|---|
| | 2011 | 2012 |
| Fall from height | 10483 | 11052 |
| Explosion (Boiler, Gas cylinder, etc) | 481 | 555 |
| Fire | 1401 | 1432 |
| Electrocutions | 8987 | 8839 |
| Fall into Pit/Manhole, etc | 2638 | 2480 |
| Suffocations | 3209 | 2063 |
| Collapse | 3284 | 3005 |
| Total | 30324 | 29185 |

**Source: Accident deaths and suicides in India 2012**

Fall accident may occur to any age of workers working in the construction industry. According to 2012 records, Table 2 shows that workers who are 30 – 44 years old are riskier to get accidents both due to their youth behaviors and also their higher proportions who working in the construction projects

**TABLE-2**
**FALL ACCIDENTS AND WORKER'S AGE**

| Age wise | Male | Female |
|---|---|---|
| <14 | 705 | 276 |
| 14-29 | 2628 | 421 |
| 30-44 | 3405 | 481 |
| 45-59 | 2595 | 359 |
| >60 | 1156 | 293 |
| Total | 10489 | 1830 |

**Source: Accident deaths and suicides in India 2012**

Fall accident may occur to any sex of workers working in the construction industry. Table 3 shows that male workers are riskier to get accidents due to their behaviors in the construction projects.

**TABLE-3**
**SEX WISE FATAL ACCIDENTS IN INDIA**

| Sex-age | Injured | Dead |
|---|---|---|
| Male | 590 | 10489 |
| Female | 167 | 1830 |
| Total | 757 | 12319 |

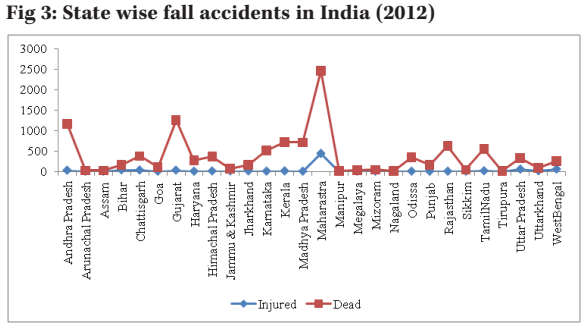
**Source: Accident deaths and suicides in India 2012**

Fall accidents may occur in many different places in high rise building projects. In India, the fall accidents mainly take place in the state of Maharastra, Gujarat, Andhra Pradesh and Rajasthan. Figure 3 shows the evidences of where the fall accidents usually take place and figure 4 show the territory wise fall accidents.

**CONCLUSION**

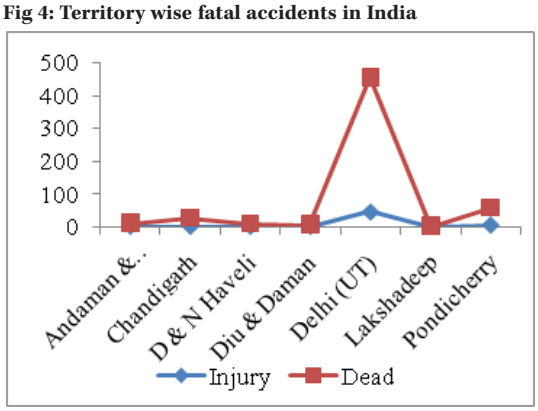
In this paper, the nature of fall accidents in India is presented. The fall accidents involve different event area and factors. India experience shows that personal or human factors particularly worker behavior are main factors leading to fall accident in high rise building projects. The fall accidents mostly occur in Maharastra as well as involving many young workers who are 30 - 44. These findings needs further works on investigating a causal structure of variables under each factor of personal and non-personal factors including assignment of their degree of possibility leading to fall accidents and their non-linearity of causal structure. It will assist in developing proper accident prevention strategy such as mitigating any root potential factors to lead to fall accidents while designating who will be fined if they fail to comply with their responsibility related to the identified variables under each factor proposed above.

**Fig 3: State wise fall accidents in India (2012)**




**Source: Accident deaths and suicides in India 2012**

**Fig 4: Territory wise fatal accidents in India**




**Source: Accident deaths and suicides in India 2012**

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