



An Investigation to Evaluate Construction Workers' Knowledge of Workplace Hazards and their Use of Safety Precautions at Pmch, Patna

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ABSTRACT:

This study examines the different safety and control measures (SCM) used in construction projects to lower the risk of mishaps and the waste that follows. A field investigation and a review of the literature are part of the research technique. Safety management during public building construction is critical for ensuring the well-being of workers, the public, and the integrity of the project itself. This abstract explores the essential strategies and practices for effective safety management in such high-profile projects. It examines key components including risk assessment, safety planning, regulatory compliance, and training. The role of safety management systems (SMS) in identifying hazards, implementing preventative measures, and fostering a culture of safety is highlighted. The abstract also addresses the importance of continuous monitoring and adaptive safety protocols to respond to evolving risks and ensure compliance with local and international safety standards. By integrating these elements, public building construction projects can achieve safer work environments, reduce accidents and delays, and enhance overall project success.

1. Introduction

Accidents, defined as unplanned and unexpected events that disrupt a planned work sequence, can lead to production loss, personnel injuries, equipment damage, and interruptions in production flow. Control measures involve actions that limit or influence an outcome in a specific way, preventing situations from worsening or spreading. In construction, safety is about protecting the health and lives of individuals involved in building, operating, maintaining, and demolishing engineering works, as well as those affected by these activities. The construction industry is characterized by its complex and often dangerous work environments. Workers are routinely exposed to a wide range of hazards, from physical dangers like falling objects and heavy machinery to chemical exposures and noise pollution. Despite the implementation of stringent safety regulations and the provision of protective equipment, incidents of accidents and injuries remain a significant concern. Therefore, it is crucial to assess how well construction workers understand these hazards and

adhere to safety precautions. This investigation aims to evaluate workers' knowledge and practices related to workplace safety. This investigation will provide crucial information for improving safety measures in the construction industry. By identifying gaps in knowledge and practice, the study will help stakeholders, including employers, safety officers, and regulatory bodies, to develop targeted interventions. Enhanced safety practices not only protect workers but also contribute to a more efficient and effective construction industry overall.

In summary, evaluating construction workers' knowledge and use of safety precautions is essential for creating safer work environments. This investigation aims to bridge gaps between theoretical safety knowledge and practical application, ultimately contributing to reduced accident rates and improved worker protection in the construction industry.

2. Objectives

The study aims to create a safer working environment for construction workers, reduce the incidence of accidents,



and minimize the associated costs and disruptions. This comprehensive approach not only enhances safety but also contributes to the overall efficiency and productivity of construction projects.

1. The study's primary goal is to examine the state of safety management in projects involving the construction of public buildings and offer suggestions for improvement.
2. To examine the frequency of usage of control measures on construction sites.

3. Significance of the study:

Throughout the construction process, building safety is vital. Without workers, construction cannot be completed. As such, the construction sector necessitates risk-taking and working in dangerous situations. Everyone engaged in construction activities has to understand the importance of taking the required safety precautions, such as wearing personal protective equipment (PPE).

An unanticipated and unexpected incident that throws off the intended course of events and activities and causes production loss, personal harm, and damage to plants and equipment is referred to as an accident. It is an unforeseen, undesirable incident that cannot be foreseen [1]. Any incident that occurs during or as a result of work that causes a fatal or non-fatal harm is considered an occupational accident [2].

Because they are the most visible and frequently directly involved in or present during an accident, risky conduct and unsafe situations are sometimes referred to as the principal causes of accidents. Operating without authority, failing to secure equipment, failing to warn other employees of potential danger, failing to use personal protective equipment (PPE), carelessly tossing materials, operating, or working at unsafe speeds—either too fast or too slow—using unsafe equipment or using equipment unsafely, using unsafe procedures when loading, placing, mixing, taking unsafe positions, lifting improperly, cleaning, adjusting, oiling, repairing, etc. are examples of unsafe acts [3-4].

A workplace injury's true costs come out higher than its initial cost. A workplace accident might result in indirect costs that are hard to quantify as well as morale issues and other expenditures in addition to financial ones. According to previous studies [5], indirect expenditures

might include things like harm to the company's reputation, broken equipment, low morale, inefficiency, and missed production time. One of the difficulties facing the construction sector is preserving the health and safety of the personnel [6].

The field of occupational safety and health (OSH) in India is poorly researched, particularly in smaller cities. As a result, the researchers set out to investigate safety on a public building project at the PMCH Patna construction site. Figure 1 below illustrates the conceptual framework of the research.

Equipment for Personal Protection

Examples of personal protective equipment (PPE) include helmets, goggles, protective clothes, and other clothing and equipment meant to prevent harm to the wearer's body. One of the key factors influencing accidents on construction sites is thought to be personal protective equipment (PPE). Construction site safety is impacted by a number of variables, including worker resistance to wearing personal protective equipment (PPE), ignorance, and poor PPE maintenance [7-8].

Safety Training

Safety training is necessary to acquaint employees with their safety, the nature of their jobs, and how to use personal protective equipment (PPE) to improve safety performance [9].

Safety policy

The firm's goals and objectives are incorporated into the safety policy guideline. A safety policy outlines rules and procedures to protect the health and safety of employees and the general public [10].

4. Methods

A cross-sectional study was conducted in PMCH reconstruction sites in Patna district, Patna-04 from September 2022 to October 2023 among construction workers, contractors, site supervisor and semiskilled workers. Employees who were ready to give consent and participate in the research study, workers present at the chosen construction sites at the time of the study, and workers performing unskilled and semi-skilled work were included in the study.

Data collection technique and tool: - The workers were interviewed by researcher on the same days the workers



and others (instead of being asked to complete a questionnaire as their reading skills were not known) as well as helped to complete a questionnaires format prepared by researcher that included questions on anthropometric measurements, period of livelihood at work-place and in that area, health impact by cement dust, usage of PPEs. Study consisted of various questions evaluating knowledge about health hazards and diseases caused by cement dust, types of PPE and its benefits, taken appropriate actions. The questionnaire was filled under close supervision to avoid conflicts by the selected subjects. In each section sampling was performed in accordance with the order of names in the alphabetical list from the factory. The health questionnaire was prepared in local language Bhojpuri. Prior to the field work, the questionnaire was translated

from local language to English and then compared according to standard procedures.

5. Result and Discussion

The demographic profile of the respondent is given in Table 1 below. Out of 54 respondents, 50% of the respondents were construction workers, 16.6% were consultant supervisors, and 33.4% were contractors. Majority of respondents 90.3% were male and 9.7% were female. Regarding the age of respondents, the majority, and 66.7% were 18 to 30 years old, 27.8% were 31 to 43 years old and 5.5% were 44 to 55 years old. Similarly, 3.7% of respondents have less than one year of experience, 42.6% have 1 to 3 years of experience, 33.3% have 4 to 6 years of experience and 20.4% have more than 6 years of experience in public building construction projects.

Table-1: Demographic Profile of the Respondents

Variable	Category	Percent
Type of respondents	Contraction workers	50%
	Consultant supervisor	16.6%
	Contractor	33.40%
Sex	Male	90.30%
	Female	9.70%
Age	18 to 30	66.70%
	31 to 43	27.80%
	43 to 55	5.50%
Year of working experience	< 1 year	3.70%
	1 to 3 years	42.60%
	4 to 6 years	33.30%
	> 6 years	20.40%

The number of minor injuries at construction sites may be higher than those reported in the research since the sites are not used to tracking incidents. The availability of safety gloves is a major source of happiness for the workers, contractors and engineers working on the

building site; their contentment with boots, helmets, and other items progressively declines. In the PMCH construction site, personal protective equipment is primarily non-existent. Accidents occur when the workers are forced to complete the task without the usage



of PPE. Figure 1 illustrates how a lack of safety awareness, a lack of laws, negligent contractors, and

negligent personnel are the main causes of accidents. The primary cause is a lack of understanding about safety.

Figure-1: Reasons behind causes of accident

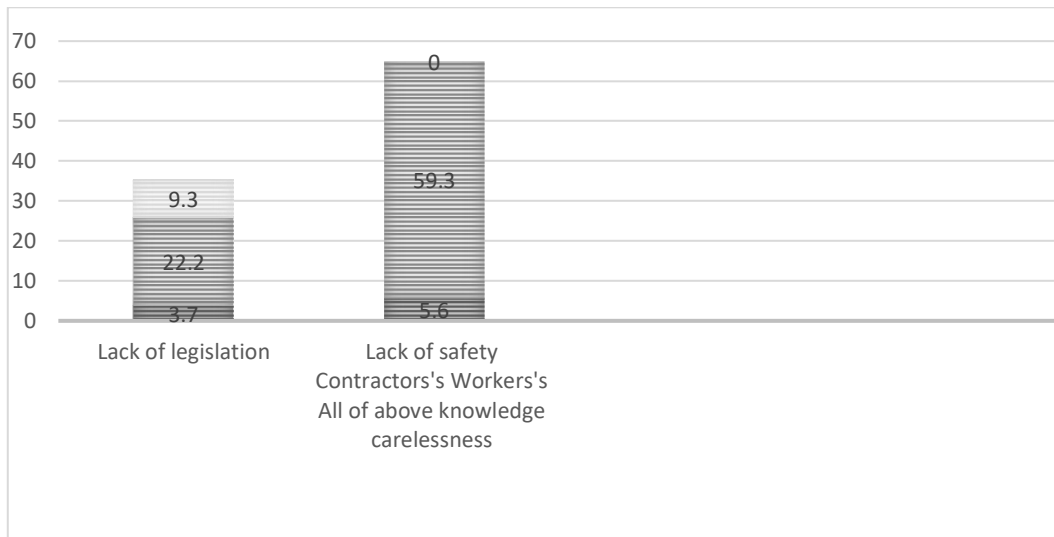
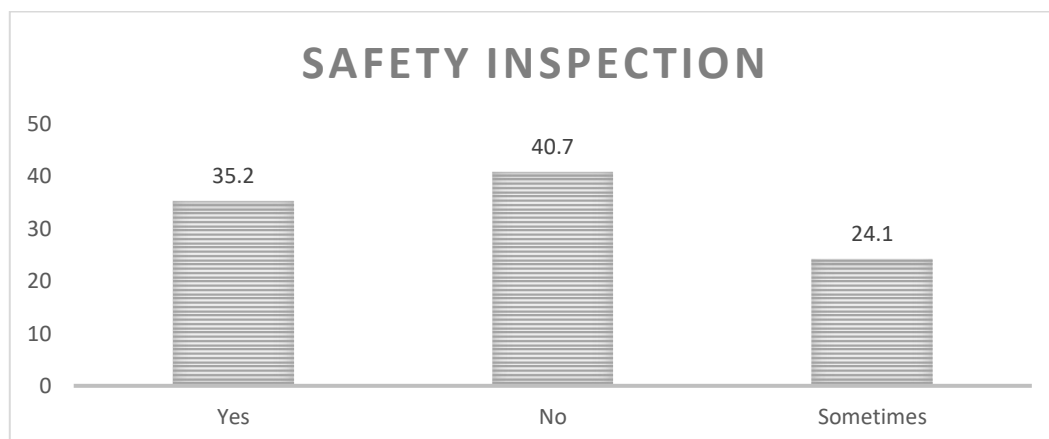


Figure-2: Safety Inspection

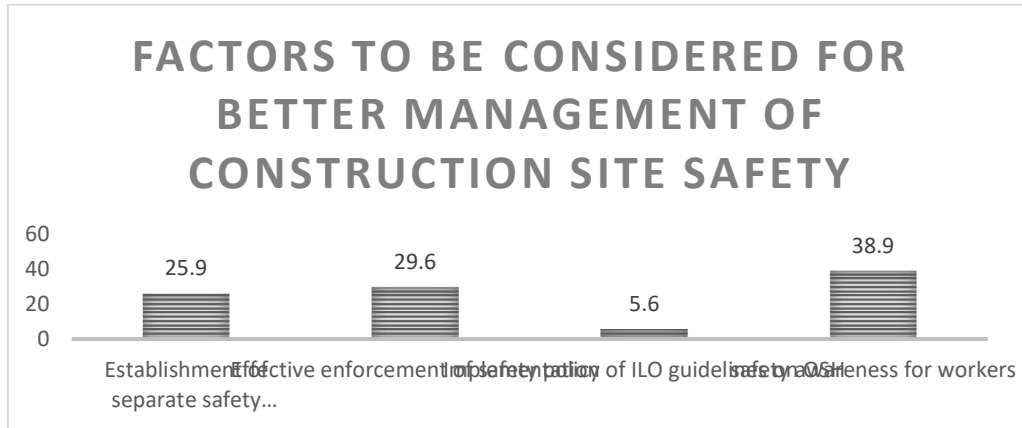


As per Figure 2, 40.7% of respondents said that there is no routine site inspection to find health and safety problems, whereas 35.2% said that Safety authorities do examine sites, and 24.1% said that government agencies occasionally visit the site.

The standard procedure for enforcing safety at the workplace is a safety inspection. The investigation revealed that building sites are not routinely inspected by government organizations and Construction Company which leads to safety breaches.



Figure-3: Factors to be considered for Better Management of Construction Site Safety



As shown in Figure 3, In response, 38.9% of respondents stated that they believed the current provision was insufficient and that the best method to reduce accidents on construction sites was for workers to be informed of safety precautions. A separate safety department should be formed, according to 25.9% of respondents, to handle construction site safety properly. On the other hand,

29.6% of respondents believe that current safety policies should be actively implemented. The outcome illustrates how some safety hazards unique to the construction sector are not addressed by the rules and regulations currently in place. By adding more safety clauses, safety rules might be strengthened and made more enforceable.

Figure-4:

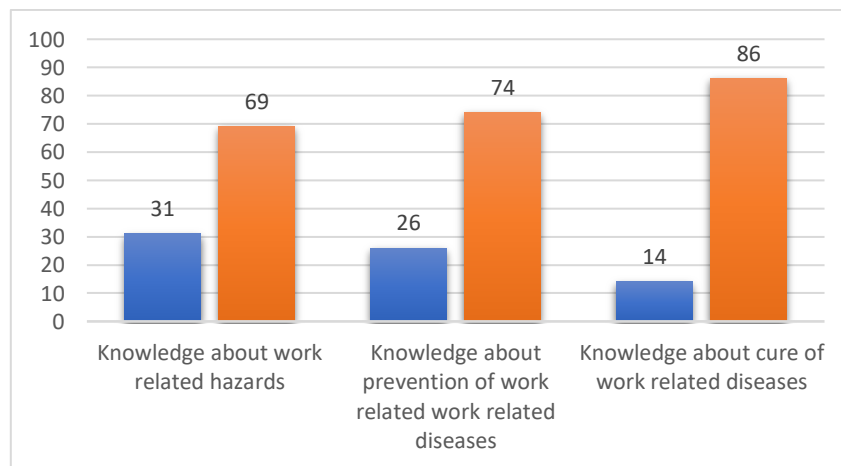


Figure-4, shows that only 31% of the workers had knowledge about work related hazards. 26% of the workers responded positively regarding knowledge of prevention of work related hazards. Only 14% workers knew about cure of work-related disease.

Despite being one of the most important aspects of managing construction projects, safety management is not well executed. Although the project specification mentions and includes the practice, the majority of the issue is restricted to policy and is not put into effect on construction sites. Although both the consultant and the contractor bear responsibility for it, safety management



is largely disregarded as a result of inadequate oversight on both sides. When creating policy, legislators must include provisions for improved safety during the construction of public buildings. Furthermore, an appropriate executive level examination must be conducted. Proper equipment, including toolbox talks, induction training, and instructions on how to use it, should be the contractor's primary focus.

6. Conclusion and Recommendation

The study depicted that accidents, injuries, and illnesses are serious problems during construction activities. The authorities such as the government, clients, and consultants, are all responsible for the inadequate safety performance of the building construction project by choosing a system of competitive bidding without include health and safety considerations in the tender papers. This research set out to determine the current state of safety management and offer recommendations for improving site safety for public building construction. One of the main factors linked to construction site accidents is being struck by an object or falling from a height. There isn't any other suitable or sufficient PPE accessible on building sites, except from basic items like boots and gloves. According to the survey, diseases, accidents, and injuries are major issues at construction sites for buildings. The main factors that made the situation worse were the government's lack of strong commitment to safety and health concerns, the lack of a safety culture among employees, and the poor incentive of contractors to practice safety and health. A site-specific safety strategy and more safety terms in the contract document were suggested by the majority of responders. A distinct safety department with a safety manager, a sufficient safety strategy and plan, and an adequate budget were all lacking at the site, which resulted in inadequate execution of the safety standards and regulations guaranteed by state laws and acts. The absence of routine safety inspections by government agencies also had a role in the poor implementation.

Before work begins, a safety manager ought to be assigned to assess the site's safety standards and advise employees of any potential risks. Workers' knowledge of and proficiency with safety should be improved through safety training and induction programs. PPE that is appropriate for the job should be utilized. Strict enforcement of current safety laws and regulations is

necessary. Additional research might be conducted taking into account different infrastructure projects as well as project-specific safety precautions on construction sites.

Conflicts of Interest: *The author declares no conflict of interest.*

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