

## “A Review on Construction Workers' Safety Issues Related To The Use of Personal Protective Equipments”

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**Abstract:** Personal protective equipments contribute a significant role in ensuring overall safety on construction workers. Various studies show that PPE is commonly not worn by many workers on construction sites, which undermines their overall safety and leads to different kinds of injuries. This study discusses on the factors that determine the use of PPE on construction sites, including availability of PPE, maintenance and training in the use of PPE. About 35 related studies published over the past twenty-five years have been reviewed. The review concluded that the most majority of workers understand the need for PPE and want to be protected against accident, injury and illness.

**Keyword:** Personal Protective Equipment, Construction workers safety, Occupational health and safety, poor safety management.

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### I. Introduction

The use of personal protective equipment (PPE) is required in specific work areas for the protection of workers from various occupational hazards in construction projects. PPE is equipment that will protect the user against health or safety risks at work. The equipment must be used for its intended task at all times on the job site to insure workers' safety. Each construction site should have a construction site manager. This is an occupational health and safety specialist who designs and implements safety regulations to minimize injuries and accidents. Generally the worker is responsible for requiring wear of proper personal protective equipment in construction site includes: To attend all PPE training sessions, to use appropriate PPE on the job is very important, follow all Warnings and Precautions, listen and Follow Directions, support assigned PPE in healthy condition, report any and all unsafe conditions you may find in your work area. The Personal protective equipment is not worn by workers in many construction sites. The personal protective equipment is very importance of each and every construction sites to protect the human life. PPE typically includes: head protection, eye protection, face protection, respiratory protection, hand protection, hand & skin protection, hearing protection, food protection, electrical protection devices, fall protection etc. Generally the most of safety issues in construction are developing on low quality of PPE, shortage of PPE, lack of awareness of PPE etc.

### II. Review Of Literature

Mohd.Aqleem Mir and BibhaMahto, (2015), discussed about Site Safety and Planning of Building Construction. They studied the various site safety measures at building construction sites and compared the site safety measures with relevant safety codes and also mentioned that the Safety climate can be used as an effective measure of assessing and improving site safety for projects under construction.

Emuze et al., (2016) revealed that the inadequate enforcement of regulations, unfounded attitude towards Health & Safety and non-availability of PPE forms the major reasons for their poor usage by workers on project sites.

Bruno Lot Tanko and Natalia Anigbogu, (2012) mentioned that the vast majority of workers understand the need for PPE and want to be protected against accident, injury and illness. However there is a need to address the issues of comfort with respect to PPE to ensure it does not interfere with worker's productivity and takes into account specific work environment. Supervision, checking and properly maintaining and replacement of PPE would also go a long way in improving the practices of PPE use on construction sites in Nigeria. They also mentioned that the Policies and regulations with respect to PPE need to be developed and implemented.

Edward Sargent and Frank Gallo, (2015) stated that Respiratory protection is a critical aspect in the effective control of occupational hazards in laboratories.

Jonathan Izudi and John BoscoAlege, (2017) discussed the use of PPE among building construction workers in Kampala and Uganda. They also studied the low use of PPE among building construction workers.

ChandanMehra, et al., (2016) explained the construction organizations interested in maximizing safety and competitiveness must look to Total Quality Management initiatives for inspiration.

Asanka and Ranasinghe, (2015) established the relationship of accidents with addition project cost, time, scope, company reputation, and their impact on national safety indexes. They stated that the commitment of all humans involved, from the project manager to the labourer towards good practices would enhance the safety performance in construction sites.

Tan chin keng and Nadeeraabdulrazak, (2014) concluded that generally the construction site has good and structured safety practices namely safety policy, education and training, site safety inspection, safety auditing, safety meeting, site safety organization, personal protective equipments, emergency support and safety measuring devices, fall protective systems, and safety promotions.

Karan Singh et al., (2014) Indicated that the need of the professionals to take the responsibility in getting acknowledge the various safety and health rules, regulations, acts and principle at the same time creating the awareness among the each other and train the industry for the betterment of the projects and humanity.

SmitaBhole, (2016) stated that the importance of safety in construction should pay more attention as the injuries loss the human life and also delay in completion of project.

Pratibha Joshi et al., (2012) stated that prevent the health hazards at construction workplace, all possible hazards that may be encountered should be identified in advance. In their study, various types of hazards present in construction areas were identified and appropriate PPE for hazard prevention were suggested.

Muralitharan and Elangovan, (2015), discussed about Safety and analysis in material handling of construction industry. The accident factors may occur due to employees, equipments, materials, techniques and circumstances are underlying causes of poor safety management. They sated that the Unsafe operating procedures, negligence of maintenance, human errors contribute for many accidents while handling the materials.

Joseph Emuron et al., (2017) discussed about the occupational health hazards among construction workers. They concluded that the level of health and safety management in construction sites is relatively good.

ThewodrosBekeleTolera, (2016) studied the extent of occupational injuries among Addis Ababa city housing and construction project workers of project site. They stated that the Implementation of basic occupational health and safety services including the provision of personal protective devices and insuring utilization is highly advisable.

Dongping Fang et al., (2015) studied that the both direct and indirect effects of supervisory behavior and safety climate on worker safety behavior exist, which well supported the initial arguments of their study.

Nikhil Roy and Jeevan Jacob, (2015) identified the construction safety issues and developed the technical solutions for that. For the purpose: extensive literatures survey was conducted to get insight into the problem and questionnaire survey in construction sites was conducted to establish the major safety issues.

Dharani et al., (2015) Studied about the Personal Protective Equipment is used to prevent hazardous effect in all industries. It is useful in preventing the loss of humans.

Shamsuddin et al., (2015) stated that the majority of accidents happen as result of unsafe acts and unsafe condition. Since all hazards in construction are not always possible to be identified and eliminate therefore through effective accident investigation, construction accidents can be prevented just by identifying the main root cause of those accidents. They created the awareness among construction workers about various safety related protections in the construction industry.

DekiPelzomDukpa and PhuntshoDendup, (2017) demonstrated while the use of PPE plays an important and necessary role, education is undoubtedly the key to preventing workplace injuries and death.

Jatin Kumar Patel et al., (2016) conducted a study on construction site through the method of questionnaires survey and Safety performance factor analysis, safety performance category analysis, safety performance index and statistical analysis method. The Survey has been conducted on thirty sites. It was observed that site management seemed not interested in their work. Overall, most of sites lie between unsafe to moderately unsafe range. They showed that the overall safety performance level of site construction needs drastically improvement.

Arunkumar et al., (2016)concluded that the perception of rural construction workers of Tanjore district, the construction firm should not pressurize workers to complete the work beyond their limits.

Man-Woo Park et al., (2015) stated that the Construction is one of the most dangerous job sectors, which annually reports tens of thousands of time-loss injuries and deaths.

Jimmie Hinze et al., (2013) revealed the that the fourteen strategies differentiate safety performance and that twenty-two strategies were implemented by 100 percent of the sample projects. The implications are that the twenty-two practices implemented in all projects cannot be considered a foundation of a safety program and the fourteen differentiators are the keys to improve the safety performance.

Yates, (1994) explained about the competition in construction and the strategies in the construction competition in the detailed manner.

Subashini Suresh et al., (2016) contributed to knowledge in the areas of government policy and decision making in health and safety implementation for the construction industry.

Peter UchennaOkoye,et al (2016)revealed that there was moderate level of health and safety knowledge, and low level of health and safety compliance among building construction workers in the state. It also found that the effect of the health and safety knowledge and compliance on project performance was low. concluded that though there was positive relationship which suggest that health and safety knowledge and compliance to health and safety rules were related, this would not be translated that health and safety knowledge would automatically ensure compliance.

Rubio-Romero et al., (2013) demonstrated that the most significant differences were found in toe boards, accesses, guardrails, and ties. For all the elements, standard scaffolding was found to offer a higher and more satisfactory safety level than nonstandard scaffolding.

Izobo-Martins, (2018) concluded that improvement of safety culture and ergonomics of the physical demands on all workers in the construction industry would bring changes in the workers attitude and improved the site productivity in Nigeria.

Subramani and Lordsonmillar, (2014) studied about the various factors of poor safety management. They provided a set of recommendations and strategies to contractors for improving the safety performance.

Praveenkumar and Vishnuvardhan, (2014) discussed about the major causes for serious accidents occurring in India is very high compared to the foreign countries with strong planning, effective implementation and continual training with focused safety management a good safety record could be achieved comparable to international level.

Gregory Carter and Simon D. Smith, (2006) indicated that hazard identification levels are far from ideal. A discussion on the reasons for low hazard identification levels indicated the key barriers.

Josephine Mutwale-Ziko et al., (2017) denoted that the implementation of health and safety induction practices is inadequate, as indicated by the negligent and non adherent attitude to health and safety induction aspects on the sites by most stakeholders on construction sites.

AmullaWalter, (2017) concluded that utilization of PPE was inadequate thereby endangering the health of the participants. They stated that the Provision of PPE by contracting employers and sensitization would improve access and utilization of PPE among construction painters.

Ali et al., (2010) stated that the accidents are generally causes by unsafe act and unsafe condition besides others sub causes which are indirectly cause to the accidents happen. Accidents can be result from combination of contributing causes one or more than that. The main causes of the construction accidents are the human element, poor site management, failure to use personal protective equipments and unsafe equipment used in construction works.

ThanwadeeChinda, (2016) studied about the factors affecting construction safety equipment selection. They suggested that the suppliers' relationship, the after sale service, the site condition, the workers' attitude, the compatibility function, and the comfortability issues must be considered when making the selection decision.

### III. Methodology

This paper framed through a separate methodology. This work was carried through the literature review from the previous studies based on the workers safety and use of personal protective equipments in the construction industry. The factors have been identified through the literature review. Finally this study concluded about the critical factors affecting the workers safety and use of personal protective equipments in the construction industry.

#### IDENTIFICATION OF CRITICAL FACTORS INFLUENCING CONSTRUCTION WORKERS' SAFETY BASED ON THE USE OF PPE

There are different types of factors influencing construction workers' safety based on the use of PPE. This section used the table for list out the critical factors.

**Table 1:** critical factors influencing construction workers' safety based on the use of PPE

S. No	Author's Name	Year	Factors
1	Mohd. Aqleem Mir and BibhaMahto.	2015	Safety behavior, communication, involvement, attitude, supervisory supportive environment, safety climate.
2	Emuze et al.	2016	Poor use of PPE.
3	Bruno Lot Tanko and Natalia Anigbogu.	2012	Use of PPE, Availability if PPE, Maintenance of PPE.
4	Edward V. Sargent and Frank Gallo.	2015	Safety training, Safety inspection, Maintenance.
5	Jonathan Izudi and John	2017	Low use of PPE, Safety training.

	BoscoAlege.		
6	ChandanMehra et al.	2016	Safety meeting, Safety inspection of tools and equipment, use of PPE.
7	W.A.Asanka and M. Ranasinghe.	2015	Construction accident.
8	Tan chin keng and Nadeeraabdulrazak.	2014	Safety practice, safety training, site safety, inspection, safety meeting, safety auditing, safety organization, emergency support, safety measuring device, use of PPE, fall prevention, safety promotion.
9	Karan Singh et al.	2014	Safety and health rules, falling material and objects, electrical hazards, construction accidents, scaffolding and ladders, structure failure.
10	Miss. Smita .A. Bhole.	2016	Fall from height, preventive measures, scaffolding safety.
11	Pratibha Joshi et al.	2012	Use of PPE, prevent health hazard at work.
12	T. Muralitharan and T. Elangovan.	2015	Safety inspection, investigation of accidents, unsafe operating procedure, safety issues.
13	Joseph Emuron et al.	2017	Availability of first aid material at construction sites, prepare safety training
14	ThewodrosBekeleTolera.	2016	Use of PPE, Health and safety training.
15	Dongping Fang et al.	2015	Safety climate, behaviour based safety, worker safety.
16	Nikhil Roy and Jeevan Jacob.	2015	Lack of safety knowledge, Lack of safety training.
17	Dharani et al.	2015	Use of PPE, prevent hazards.
18	Shamsuddin et al.	2015	Safety practice, lack of training, worker behaviour, accident investigation, lack of innovation technology, maintenance, inspection, Use of PPE, poor safety awareness, lack of organizational commitment, poor technical supervision, shortage of skilled labourers, unsafe equipment, lack of first aid facilities, lack of safety regulations.
19	DekiPelzomDukpa and PhuntshoDendup.	2017	Lack of safety promotion, poor health and safety management system, poor attitude of contractors and labours towards OHS, low priority given to safety, lack of competent manpower to enforce regulations.
20	Jatin Kumar Patel et al.	2016	Non safety performance, safety at site, training program for worker, safety policy, safety training, safety regulation, safety meeting, safety inspection at site, safety plan at site, scaffolding facilities.
21	S. Arunkumar et al.	2016	Lack of first aid training program, safety alarms not provided at site, safety net not provided for scaffolding.
22	Man-Woo Park et al	2015	Hardhat detection, safety alert, not wearing hardhat.
23	Jimmie Hinze	2013	Management commitment, safety education, worker involvement, PPE inspection and policy, first aid.
24	Janet K. Yates,	1994	Lack of welfare facilities, lack of safety guideline, safety climate, housekeeping, health and safety practice.
25	Subashini Suresh et al.	2016	Use of PPE, proper training, maintenance of PPE.
26	Peter UchennaOkoyeet al.	2016	Lack of PPE, lack of training, maintenance of PPE.
27	J. C. Rubio-Romero et al.	2013	Safety policy, scaffolding accidents, fall from ladders, equipment accident, safety training, safety education, poor management commitment to safety.
28	O.O. Izobo-Martins.	2018	Provide safety booklets in various language, management commitment, effective safety training.
29	T. Subramani and R. Lordsonmillar.	2014	Safety policy, safety training, safety meeting, safety equipment, safety inspection, workers attitude towards safety, poor safety management, improvement of safety performance.
30	AV. Praveenkumar and CK. Vishnuvardhan.	2014	Labour safety condition, communication, training, PPE, record keeping, housekeeping, health and safety regulation.
31	Gregory Carter and Simon D. Smith.	2006	Hazards identification.
32	Josephine Mutwale-Ziko et al.	2017	Employee responsibility, occurrence of accident, health and safety meeting.
33	Amulla O. Walter.	2010	Utilization of PPE, protective work practice measures.
34	A.S. Ali et al.	2010	Site safety officer, poor site management, failure to use of PPE, unsafe equipment used in construction workers.
35	ThanwadeeChinda.	2016	Safety policy, equipment design, use of PPE, site condition.

The details from the table.1 show that the identification of factors through the review of literature. The majority of PPE factors affecting the construction workers and construction sites are including: use of PPE, availability of PPE, maintenance of PPE, safety training, safety meeting, safety inspection, safety policy, working at ladder, poor site management and scaffolding accident. These are the critical factors identified in the above table.1 and also these factors are frequently mentioned by many researchers in the previous studies in the area of personal protective equipment in the construction projects. The use of PPE is the frequently mentioned factor influencing the construction workers' safety. The availability of PPE and maintenance of PPE are the fundamental factors influencing the safety issues. These factors directly affect the construction workers' safety. Each and every Construction Company must train their construction workers to avoid unnecessary safety issues. It is necessary for construction industry. Lack of safety inspection in the construction project gives the way to the construction site accidents. Lack of safety meetings is another important factor influencing the workers' safety due to the unawareness of the impact of safety problems. These types of factors highly affect the construction workers.

#### **IV. Conclusion**

This study was conducted to identify the factors influencing construction workers' safety issues related to the use of PPE. There are thirty-five number of previous studies from the past twenty-five years have been reviewed in this paper. Through this study, the critical factors such as the use of PPE, worker not wearing PPE, first aid facilities, site accident, incident investigation, safety promotion, safety management training, lack of education of workers, poor safety management, housekeeping are the highly contributed factors. These are the critical factor affecting the workers in building construction project. This paper recommends that the above mentioned factors should be reduced for the safe working environment of the construction workers.

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