

Contributing Factors to Non-Compliance of PPE Usage among Construction Workers

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DOI: <https://doi.org/10.30880/peat.2026.07.01.083>

Article Info

Received: 12 January 2026
Accepted: 20 February 2026
Available online: 25 May 2026

Keywords

Non-compliance, Construction workers, PPE, Contributing factors, Construction workers

Abstract

The construction field is among the industries that are most dangerous to work in, and where workers often face risks like falls, being struck by objects and machine related accidents. Construction workers and the use of PPE Despite stipulation in accordance to the Personal Protective Equipment (PPE) for Construction Works Regulation 1993 under Occupational Safety and Health Act (OSHA) 1994, low compliance towards the PPE among construction workers is still sensible issue for safety. The objective of the study is to explore the reasons for not compliance with PPE and its association with workers' demographic factors. A cross sectional study was conducted among 132 construction workers in Kepong, Kuala Lumpur using a structured bilingual questionnaire. Data were collected and analysed by SPSS based on descriptive and inferential statistics. The results show that, although workers have good knowledge of PPE and know the importance of using it, non-compliance is still present due mainly to discomfort, heat exposure, perceived difficulty in accomplishing work tasks and some practices particular to themselves. Availability of PPE and years of work experience were the significant correlates with PPE compliance; demographic factors had no or not significantly relationship. In summary, efforts to improve PPE use not only need to provide PPE itself but also focus on promoting comfort by issuing well-fitted and adjustable PPE, intensifying safety supervision, enhancing worker safety training and a good safety climate at construction sites

1. Introduction

The construction industry contributes substantially to the growth and development of a country, particularly for a developing country like Malaysia (1). From highways to high-rises, this industry transformed how people lived and worked in buildings. But the progress was built on an ugly reality construction was one of deadliest jobs. Those working in this field suffered daily risks, such as falls, being struck by objects, and machinery- or sharp tools-related injuries. In addition to all that, they were more likely to work in loud, transient or dangerous conditions where safety was even more crucial.

In an effort to keep workers safe, Personal Protective Equipment (PPE) became a standard part of construction work. Helmets, gloves, safety shoes, safety vests and glasses were supposed to save the workers from severe

injury. PPE usage was enforced by the law in Malaysia known as Occupational Safety and Health Act (OSHA) 1994. The safety items were intended to be the final line of defense after other controlling protocols failed to remove hazards.

But even with rules and safety talks on site, many workers still didn't wear PPE properly, or sometimes at all. This was concerning, not least as construction consistently had a high rate of workplace injuries and fatalities. The building industry stayed among the highest fatalities that recorded by Department of Occupational Safety and Health (DOSH), Malaysia. In 2023, based on data from the Department of Statistics Malaysia (DOSH), the incidence rate reported 4.19 cases per 1,000 workers emphasizing safety issues that are paramount in this sector.(2)

2. Methodology

2.1 Research Design

This study was conducted among construction workers in Kepong, Kuala Lumpur to explore the reasons for not compliance with PPE and its association with workers' demographic factors. A cross sectional study was conducted among 132 construction workers using a structured bilingual questionnaire. The study used quantitative methods. The study design allowed the identification of contributing factors influencing PPE compliance among construction workers and the association between PPE compliance and workers' demographic factors. A cross sectional study was conducted among 132 construction workers using a structured bilingual questionnaire. The objective of the study is to explore the reasons for not compliance with PPE and its association with workers' demographic factors.

The study used quantitative methods. Data were collected among 132 construction workers using a structured bilingual questionnaire. The research focused on workers' knowledge of PPE, non-compliance due mainly to discomfort, heat exposure, perceived difficulty in accomplishing work tasks and some practices particular to themselves, as well as the association with demographic factors such as years of work experience. The study design allowed the identification of contributing factors influencing PPE compliance among construction workers and the association between PPE compliance and workers' demographic factors.

2.2 Data Collection Method

A structured questionnaire was developed for the present study using Microsoft Word and produced in two languages (English and Bangladeshi) to ensure clear understanding of the questions irrespective of their native language and to minimize language barriers that may have influenced the veracity or candor of responses. The questionnaires were delivered in two different ways; either printed and distributed as paper copies or deployed using Google Forms according to availability and convenience of the participants. The survey used a multiple-choice format with the response categories "Yes," "No," and "Sometimes" to make it easy for participants to provide answers and reduce confusion, and the questions were straightforward, plain and corresponded to the reading and understanding level of construction workers. The questionnaire items were categorized into different sections, with the first part collecting general demographic information including age, gender, job title and number of years of working experience, followed by sections focusing on factors for PPE non-usage such as workers' knowledge on PPE, behavior regarding the use of PPE, comfort level of using PPE and workplace practices incorporating training, supervision and enforcement of safety regulations. The questionnaire was reviewed prior to distribution to guarantee that it was easy to understand, relevant and able to collect the data needed for the research purposes.

3. Result and Discussion

3.1 Behavior factors

Table 1 represented the descriptive analysis of behavioral factors in relation to PPE utilization among the construction workers. The findings suggest that respondents are able to conduct personal protective equipment requirements (mean = 3.51, SD = 0.60), representing a moderate amount of consistent PPE use and some similarity in behavior among the majority of workers. The likelihood of not using PPE reported an average score of 1.74 (SD = 0.80), suggesting that intentionally not wearing PPE is a rare phenomenon among respondents, although individuals tend to differ slightly more in this characteristic. In general, construction workers have to a large extent exhibited good safety behavior through the consistent use of PPE, although some purposeful non-

use exists, indicating that continued supervision and behavioral-based safety programs will help to enhance PPE compliance.

Table 1

Behavioral factor	Factor	Mean	Standard Deviation	Significant
	Frequency of wearing required PPE	3.51	0.60	Moderate
	Frequency of choosing not to wear PPE	1.74	0.80	Low

3.2 Comfort factors

Table 2 presents the descriptive analysis of comfort related factors that impact PPE usage by construction workers. The data indicate that “PPE fit properly” had a mean score of 3.42 (SD = 0.53), showing a moderate level of agreement that the PPE given fit the workers accordingly, although comfort throughout long hours of use remained a problem. “PPE is comfortable to wear for long hours” recorded a mean of 2.65 (SD = 0.71), indicating a low perception of comfort, while “PPE makes the work hard to perform” had a mean of 2.60 (SD = 0.91), suggesting that workers moderately believe PPE impairs task performance. In addition, the item “PPE removed from heat or discomfort” recorded a mean score of 2.51 (SD = 0.96), indicating that PPE is sometimes taken off due to physical discomfort or heat. In general, the results indicate that issues related to PPE fit, comfort, heat and perceived difficulty in performing work tasks moderately affect compliance with PPE among construction workers, and these issues need to be resolved to increase sustained PPE usage at the worksite.

Table 2 : Comfort factors

Factor	Mean	Standard Deviation	Significant
PPE fits properly	3.42	0.53	Moderate
PPE is comfortable for long working hours	2.65	0.71	Moderate
PPE makes work difficult	2.60	0.91	Moderate
PPE removed due to heat or discomfort	2.51	0.96	Moderate

3.3 Workplace practice factors

Table 3 displays the descriptive analysis of workplace practice factors affecting PPE use among construction workers. The results suggest that compliance with PPE regulations or warnings had a mean score of 3.47 (SD = 0.50), indicating a moderate and quite uniform level of compliance to safety regulation in the workplace. The item “damaged PPE is replaced promptly” recorded a mean score of 3.18 (SD = 0.78), indicating that PPE replacement reasonably takes place but fluctuates between workers’ experiences. “Other PPE monitoring” had a mean score of 3.40 (SD = 0.53), showing that supervision and safety practices remain at a moderate level at construction sites, while “PPE is made available by my employer when required” had the highest mean score of 3.64 (SD = 0.49), suggesting a high level of employer control and consistency in PPE provision. In general, the findings indicate that PPE provision, enforcement, supervision and replacement practices are generally positive yet at a moderate level, emphasizing the necessity of enhancing safety management programs to improve PPE compliance behavior among construction personnel.

Table 3 : Workplace practice factors

Factor	Mean	Standard Deviation	Significant
PPE rules or warnings are enforced	3.47	0.50	Moderate
Damaged PPE is replaced promptly	3.18	0.78	Moderate
Supervisor monitoring of PPE usage	3.40	0.53	Moderate
PPE is provided by employer when needed	3.64	0.49	Moderate

3.4 Contributing Factors Influencing PPE Compliance

Spearman's rank correlation was applied to examine the relationship between the different contributing factors affecting PPE compliance among construction workers. The results show that availability of PPE provided by employers was statistically significantly associated with PPE compliance ($r_s = 0.289$, $p = 0.001$), indicating a higher probability that workers will use PPE if the employer provides it, and therefore the null hypothesis that there is no correlation between PPE availability and PPE utilization was rejected. However, none of the other factors were statistically associated with PPE adherence, including PPE makes job difficult ($r_s = -0.010$, $p = 0.913$), comfort of PPE worn for long hours ($r_s = 0.156$, $p = 0.074$), taking off PPE because of heat or discomfort ($r_s = -0.127$, $p = 0.145$), supervisor's monitoring about PPE use ($r_s = 0.060$, $p = 0.494$), and timely replacement of damaged or worn-out PPE ($r_s = -0.019$, $p = 0.825$), and for these reasons the null hypothesis was retained for these variables. Taken together, the results suggest that the provision of PPE by employers is a significant determinant to promote compliance, while comfort-related perceptions and other workplace practices have no direct effects on PPE adherence among construction workers.

Table 4: Contributing factors influencing PPE compliance

Variables	Spearman's rho (r_s)	p-value	Null Hypothesis (rejected/Accepted)
1.Comfort-Related Factors and PPE Compliance			
PPE makes job harder	-0.010	0.913	Accepted
PPE comfort (long hours)	0.156	0.074	Accepted
Heat/discomfort	0.127	0.145	Accepted
2.Workplace Practices and PPE Compliance			
PPE always provided by employer	0.289	0.001	Rejected
Supervisor monitoring	0.060	0.494	Accepted
Damaged PPE replaced quickly	-0.019	0.825	Accepted
Rule/warning for not wearing PPE	0.048	0.584	Accepted

4. Conclusion

The purpose of this study was to determine the reasons leading construction workers not complying with PPE and to have a better understanding on the issues that influence for the inconsistent utilization of PPE. From the results, it was deduced that PPE non-conformity is multi-causal process and not just a one thing. The findings of the study indicated that construction workers are knowledgeable about PPE and understand the necessity of using it for safety, but knowledge is not always enough to gain full compliance. Workers reported using PPE on a regular basis, although some conceded that they did not always follow such equipment policies especially during strenuous activities or when working in difficult conditions. Comfort was one of the most important determinants in PPE compliance, with heat and physical discomfort being the most commonly cited reasons for not using PPE for long times, forcing workers to take off PPE even though they knew it was dangerous. Overall, workplace practices were good, with the majority of workers reporting being provided PPE by their employer and supervision over PPE use, although there were complaints of delays in replaced the damaged PPE, and statistical analysis revealed that PPE availability was statistically associated with PPE compliance. In terms of demographics, gender, age and type of job did not significantly affect PPE compliance, but number of years of work experience was positively associated with compliance. In summary, this study reveals that the factors contributing to PPE non-compliance on a construction site are predominantly practical rather than knowledge based, and these problems need to be handled in order to enhance safety measures and reduce potential accidents at construction sites.

Acknowledgement

I sincerely dedicate this work to the Pagoh Educational Hub's Department of Chemical Engineering Technology, Faculty of Engineering Technology, for their kind provision of facilities during this research process. We greatly appreciate all of the information about the progress of the final year project, as well as the assistance in sharing and discussing the final submission of this document in order to make the deadlines.

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