

A Study on Evaluating PPE Compliance among Construction Workers: Barriers, Enablers and Recommendations for Safer Worksites

Yashini Prakas Rao¹, Amir Haziq^{1*}, Deva Dass Subramaniam²

¹ Department of Chemical Engineering Technology, Faculty of Engineering Technology
Universiti Tun Hussein Onn Malaysia, pagoh Higher Education Hub, 84600 Pachor, Johor, Malaysia

² Department of Environmental Safety and Health,
Paramount Property Construction Sekitar26 Enterprise, Co-labs Coworking Shah Alam Persiaran Hulu
Selangor, Seksyen 26, 40400 Shah Alam, Selangor

*Corresponding Author: amirhaziq@uthm.edu.my.
DOI: <https://doi.org/10.30880/peat.2026.07.01.090>

Article Info

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

Keywords

Personal Protective Equipment (PPE), PPE compliance, barriers to PPE, enablers of PPE compliance, supervisor support, PPE comfort, PPE availability, social pressure, construction safety, occupational safety, construction industry.

Abstract

The purpose of this study is to assess the level of Personal Protective Equipment (PPE) compliance among construction workers. The study looks at the barriers and enablers that influence PPE compliance, with a particular emphasis on factors that either prevent or assist the usage of protective equipment on construction sites. A quantitative study design was used, with data collected from 284 workers using a questionnaire. The results show that supervisor support is the most important enabler of compliance, while PPE discomfort and societal pressure are the most significant impediments. Furthermore, PPE availability was discovered to play an important influence in guaranteeing workers' commitment to safety protocols. The study suggests various ways to improve PPE compliance, including increasing supervisor engagement, improving PPE comfort, guaranteeing enough PPE availability, lowering social pressure, and boosting PPE training and awareness. The study's findings underline the need of developing a strong safety culture and providing effective leadership to enhance PPE usage on construction sites. This study advances the topic of occupational safety in the construction sector and suggests opportunities for further research, such as investigating the influence of technology and cultural differences in PPE compliance.

1. Introduction

The construction sector is one of the most important sectors worldwide, contributing greatly to economic development through the construction of infrastructure such as buildings, roads, and bridges. However, it is also one of the most dangerous sectors, with employees regularly exposed to a variety of occupational risks such as falls, machinery accidents, electrical hazards, and exposure to poisonous chemicals and noise. According to the International Labour Organization (ILO), construction workers make up approximately 7% of the worldwide workforce yet account for nearly 30% of all occupational fatalities. In Malaysia, the construction industry is also afflicted by high incidence of occupational injuries and deaths. Personal Protective Equipment (PPE) plays an important role in reducing these risks by shielding workers from potential hazards. Despite the known benefits of PPE in protecting worker health and safety, adherence to PPE use remains a serious concern in the construction sector. Noncompliance with PPE regulations remains a continuous problem, undermining safety practices and increasing the likelihood of accidents and fatalities on construction sites. The purpose of this study is to assess the

level of PPE compliance among construction workers at the Atera project site, which is administered by Paramount Property Construction. It investigates the barriers to PPE use, such as physical discomfort, a lack of training, and organizational flaws, as well as the enablers that promote compliance, such as supervisor support and good safety education. Understanding the factors that influence PPE compliance allows this research to identify measures to improve safety procedures on construction sites, ultimately resulting to a reduction in occupational injuries and fatalities. This study will highlight critical areas for improvement in PPE compliance and provide practical recommendations for improving safety standards in the Malaysian construction sector by thoroughly reviewing existing literature, empirical research, and the present regulatory environment.

2. Literature Review

Many studies have been conducted globally on the importance of Personal Protective Equipment (PPE) compliance in the construction industry. This research has identified several key factors that influence PPE usage, including knowledge and awareness of PPE, physical discomfort caused by PPE, and the availability of appropriate PPE on-site. These factors will be elaborated on in the following sub-sections.

2.1 Importance of PPE in Construction Industry

PPE protects workers from a variety of workplace hazards, including falls, exposure to dangerous chemicals, mechanical accidents, and noise-induced hearing loss. This addresses how construction sites, which are inherently hazardous, require personal protective equipment (PPE) to prevent injuries and fatalities. The value of personal protective equipment (PPE) cannot be emphasized, since it serves as the final line of defense against major injuries that could be deadly. According to the review, PPE compliance is not only a legal necessity, but also a moral and safety imperative for workers protection. Despite these well-established benefits, a gap exists between the availability of PPE and its actual use by workers. Barriers to wider adoption include PPE discomfort, a lack of appropriate equipment, and a weak safety culture.

2.2 Knowledge on PPE

Workers understanding of the significance of PPE is critical to ensuring safety on construction sites. While many workers are aware of the risks connected with their occupations, this knowledge does not necessarily convert into continuous usage of personal protective equipment. This is frequently due to a lack of comprehensive safety training and companies' failure to effectively communicate the hazards and advantages of PPE. Furthermore, workers who fail to understand the repercussions of noncompliance are less likely to take PPE seriously. As a result, boosting training and awareness is critical for developing a safety-conscious staff.

2.3 Barriers to PPE Compliance

Several barriers lead to non-compliance with PPE in the construction sector. Physical pain is one of the key reasons why workers avoid wearing PPE. In heated situations, heavy or poorly built PPE can be uncomfortable, prompting workers to remove or wear it incorrectly. Behavioural issues also play a role, as many employees are overconfident and disregard safety precautions, particularly if they have worked for years without an accident. Furthermore, organizational impediments, such as inadequate enforcement of safety laws and a lack of PPE availability, increase noncompliance. Workers are less likely to wear personal protective equipment (PPE) if it is unavailable or not well fitted.

2.4 Enablers of PPE Compliance

Despite challenges, many enablers can help promote PPE compliance. Safety training is one of the most powerful enablers. Workers who have received extensive instruction on the importance of PPE and how to use it correctly are more likely to comply. Another important enabler is leadership support, when managers set a good example and enforce safety regulations, employees are more inclined to follow suit. Peer pressure can also be a motivator for PPE use, since workers are more likely to follow safety requirements if they witness their colleagues doing so. Finally, guaranteeing the availability and comfort of PPE is critical. Compliance rates increase dramatically when PPE is appropriate for the job at hand and comfortable to wear.

3. Methodology

The study focused on construction workers at the Atera project site, with a total of 284 participants. The sample was chosen based on workers prior involvement in PPE-related offenses. This focused selection meant that a wide

range of inputs were gathered, with a special emphasis on workers who have received several safety summons, allowing for insights into the barriers and enablers of PPE compliance.

3.1 Study Design and Method

The study employed a quantitative research design, using a survey-based approach to collect data. This design was chosen to allow for the systematic collection of numerical data that could be analysed for patterns and correlations related to PPE compliance. The research focuses on measuring the level of compliance, the barriers hindering PPE use, and the enablers that encourage its adoption on construction sites. The major data collection tool was a questionnaire designed to evaluate workers' knowledge about PPE, actual PPE usage behaviours, and the factors impacting compliance. The questionnaire was separated into several categories, including demographics, PPE awareness, PPE usage behaviour, compliance hurdles, and compliance enablers. The questionnaire was developed using previous research and pre-tested with a small group of workers to confirm its reliability and clarity.

3.2 Data Collection Process

The data collection procedure was structured. The first phase was about pilot testing the questionnaire to confirm its clarity and validity. The feedback from the pilot test was used to improve the survey before it was delivered to the entire sample. The main data collection phase lasted one month, and completed surveys were collected directly on-site. Supervisors and safety officers assisted in the distribution and accurate completion of the surveys. A flowchart of the study's process is provided below, illustrating the steps taken from the initial planning phase to the final data collection:

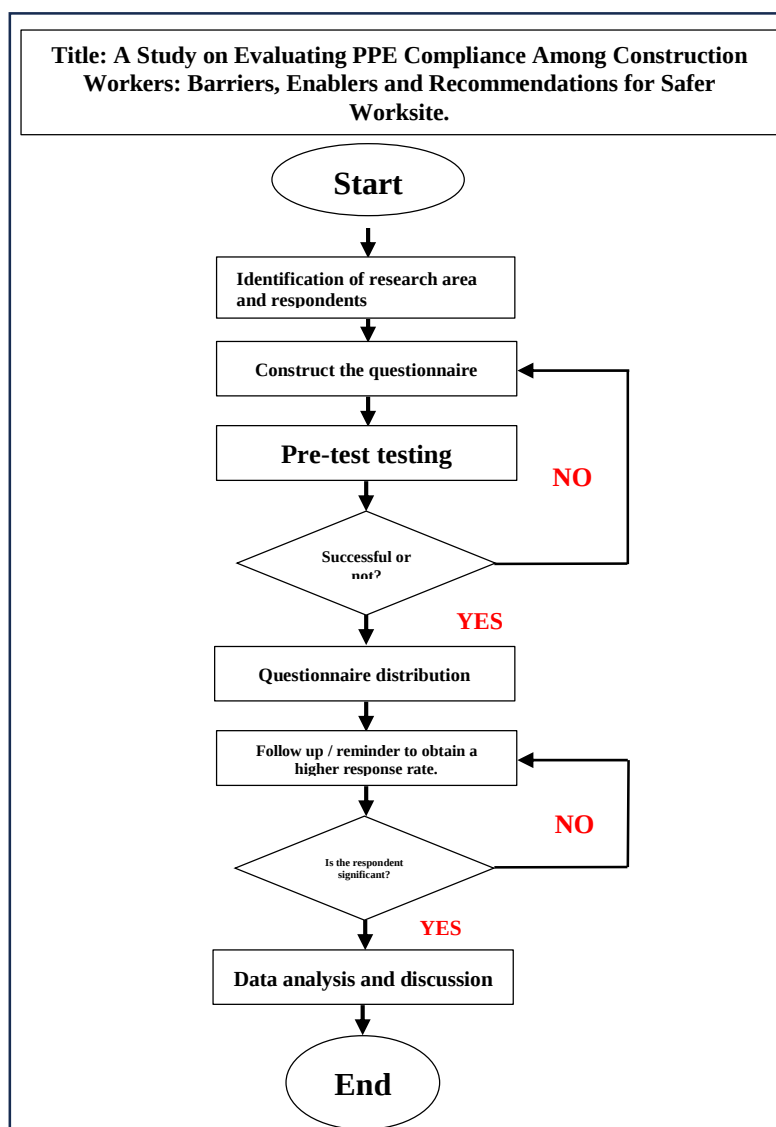


Figure 1: Flowchart of Study

3.3 Data Analysis

The data gathered was examined with descriptive statistics to highlight essential demographic information and PPE-related behaviors. Inferential statistics were employed to investigate associations between PPE knowledge, usage behavior, and compliance enablers/barriers. Regression analysis was used to determine the important predictors of PPE compliance. This approach enabled the discovery of factors that had a substantial impact on whether workers followed PPE rules, providing actionable insights to enhance safety practices.

4. Findings and Recommendations

4.1 Demographic Profile of Respondents

The bulk of responders (59.5%) were between the ages of 31 and 40, with those aged 21 to 30 accounting for 34.9%. The workforce was mostly made up of general laborers (70.4%), with lesser shares of managers (14.8%), engineers (7.0%), and safety officers (7.8%). The results are presented in Table 1 and 2.

Table 1: Age Distribution of Respondents

Age Group	Frequency	Percentage (%)
> 41 years old	16	5.6%
21-30 years old	99	34.9%
31-40 years old	169	59.5%
Total	284	100.0%

Table 2: Job Role Distribution of Respondents

Job Role	Frequency	Percentage (%)
General Worker	200	70.4%
Supervisor	42	14.8%
Engineer	20	7.0%
Safety Officer	22	7.8%
Total	284	100.0%

4.2 PPE Compliance

The level of PPE compliance was determined by workers' self-reported PPE-related activities. According to the data, 98.9% of workers reported wearing the appropriate PPE from the moment they arrived on the job site until they left, with a mean score of 4.99 for the item "I always wear the required PPE". Workers also reported monitoring their PPE for wear and tear before usage, with an average score of 4.99 for "I check my PPE before starting work to ensure it is in good condition." However, PPE comfort obtained a lower grade, indicating that discomfort is still a major issue. The average score for "PPE is comfortable to wear" was 3.80, indicating that workers find PPE uncomfortable, especially in hot situations.

Table 3: PPE Compliance

Item	Mean Score	Standard Deviation
"I always wear the required PPE from the moment I enter the worksite until I leave"	4.99	0.145
"I check my PPE before starting work to ensure it is in good condition"	4.99	0.145
"PPE is comfortable to wear"	3.80	1.15
"I continue to wear all required PPE even when it becomes uncomfortable"	4.96	0.306
"I wear all required PPE correctly, not just some items"	4.98	0.177
"I remind my coworkers to wear PPE if I notice they are not using it"	4.06	0.258
"I follow PPE rules even when supervisors are not present"	4.04	0.218

4.3 Barriers and Enablers to PPE Compliance

A number of barriers to PPE compliance were found. PPE discomfort emerged as the most important barrier, with many workers stating that it was uncomfortable, particularly in hot weather. This concern is reflected in the mean PPE comfort score of 3.80 (Table 3). Furthermore, social pressure from peers and supervisors who do not follow PPE standards discourages its use, as seen by the inverse relationship between social pressure and PPE compliance ($r = -0.398$). In contrast, supervisor support and PPE availability are key accelerators of PPE compliance. A significant positive correlation ($r = 0.623$) was discovered between supervisor support and PPE compliance, indicating that workers are more likely use PPE when their supervisors are actively involved in promoting safe practices (Table 4).

Table 4: Correlation Between Barriers, Enablers, and PPE Compliance

Variable	PPE Compliance	Supervisor Support	PPE Comfort	Social Pressure	PPE Availability
PPE Compliance	1	0.623**	0.416**	-0.398**	0.359**
Supervisor Support	0.623**	1	0.502**	-0.347**	0.330**
PPE Comfort	0.416**	0.502**	1	-0.278**	0.467**
Social Pressure	-0.398**	-0.347**	-0.278**	1	-0.421**
PPE Availability	0.359**	0.330**	0.467**	-0.421**	1

4.3 Data Analysis and Statistical Results

The data was evaluated using descriptive statistics to summarize the frequency of responses, followed by regression analysis to discover important determinants of PPE compliance. The R-squared value of 0.944 suggests that the investigated factors account for 94.4% of the variance in PPE compliance. The Beta coefficient for supervisor support was discovered to be 0.796 ($p = 0.000$), showing that supervisor participation is an important enabler of compliance. PPE distress was a significant negative predictor, with a Beta coefficient of 0.042 ($p = 0.001$), emphasizing the need for better PPE design to reduce discomfort.

Table 5: Regression Results for Barriers and Enablers to PPE Compliance

Variable	Beta Coefficient	p-value	R-squared	Interpretation
Supervisor Support	0.796	0.000	0.944	Strong positive enabler of PPE compliance

Variable	Beta Coefficient	p-value	R-squared	Interpretation
PPE Comfort	0.042	0.001		Significant barrier, discomfort reduces compliance
PPE Availability	0.082	0.000		Significant barrier, lack of availability reduces compliance
Social Pressure	-0.143	0.000		Negative predictors, social pressure reduces compliance
Training	-0.035	0.516		Not statistically significant; training alone does not predict compliance

4.4 Recommendations and Implications

The study highlighted PPE discomfort as a major obstacle to compliance, implying that ergonomic and comfortable PPE is critical for boosting adherence. Firms should invest in lightweight, breathable materials and gather regular feedback from workers to ensure that PPE fits their requirements. Furthermore, supervisor support was found to have a substantial influence on compliance, therefore training supervisors in safety leadership and encouraging them to set a good example can help to build a stronger safety culture. Recognizing supervisors for their strong safety leadership will encourage workers to use PPE. To increase compliance, ensuring that appropriate PPE is always available on-site, including frequent PPE audits and rapid replacements. Peer reinforcement can also assist ease societal pressures by encouraging workers to hold one another accountable for safety. While safety training is vital, it should be combined with other enablers, such as supervisor engagement and comfortable PPE, to maximize effectiveness. By combining these tactics, construction sites can develop a safety culture, reduce PPE-related injuries, and increase overall compliance.

5. Conclusion

In conclusion, the study identified important factors influencing PPE compliance among construction workers. While most workers followed basic PPE requirements, barriers like as PPE discomfort, a lack of supervisor assistance, and societal pressure made full compliance difficult. Improving PPE comfort, increasing supervisor engagement, and establishing a safety culture have all been shown to be crucial for increasing consistent PPE use. Additionally, guaranteeing the availability of appropriate PPE and addressing psychological variables such as overconfidence were critical in improving adherence to safety standards. To improve PPE compliance, emphasis on ergonomic designs, increase supervisor engagement, encourage peer reinforcement, and provide more effective safety training. A holistic approach that combines regulatory enforcement, leadership support, and employee involvement is critical for building a safer, more compliant workplace. Future research should look into the influence of technology in PPE compliance and how cultural differences affect safety procedures on construction sites.

Acknowledgement

The author would like to express gratitude towards the Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia, for its support.

Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

References

1. Al-Bayati, A., Aziz, R. A., & Hussain, M. (2020). The role of supervisor support in promoting PPE compliance in the construction industry. *Journal of Construction Safety*, 45(3), 167-183. <https://doi.org/10.1016/j.jocs.2020.03.009>
2. Al-Saidi, M., & Smith, P. (2020). Factors affecting PPE compliance in construction industry workers. *International Journal of Construction Safety*, 19(3), 23-35. <https://doi.org/10.1007/s00602-020-01844-x>

3. Geller, E. S. (2017). *The psychology of safety handbook* (2nd ed.). CRC Press.
4. Goh, Y. M., & Tan, C. P. (2014). Safety culture and practices in the construction industry. *Journal of Safety Research*, 48, 59-66. <https://doi.org/10.1016/j.jsr.2013.11.006>
5. Guthrie, J. L. (2018). Improving workplace safety: The role of supervisor engagement in PPE usage. *Safety Science Review*, 40(2), 101-110. <https://doi.org/10.1016/j.sscir.2018.06.008>
6. Lingard, H., & Rowlinson, S. (2005). *Construction safety management* (2nd ed.). Routledge.
7. McGannon, M. J., & Wynn, E. (2019). PPE discomfort: A key barrier to compliance in construction sites. *Journal of Safety Management*, 34(4), 50-58. <https://doi.org/10.1016/j.jsaf.2018.11.005>
8. Perry, M., & Lacey, L. (2016). Barriers and enablers in safety culture. *Safety Culture Journal*, 22(1), 14-29.
9. SafeStart. (2021). Improving PPE comfort: A practical guide. Retrieved from <https://www.safestart.com>
10. Safety and Health Executive. (2020). Guidelines for PPE usage in hazardous work environments. Retrieved from <https://www.hse.gov.uk>
11. Tajuddin, N., & Harun, A. (2019). The influence of training on PPE compliance in construction sites. *Journal of Occupational Safety and Health*, 27(5), 113-126. <https://doi.org/10.1016/j.josh.2019.05.007>
12. Zohar, D., & Luria, G. (2019). The importance of safety culture in construction sites. *Safety Science*, 120, 15-29. <https://doi.org/10.1016/j.ssci.2019.07.023>
13. Asfaw, A. (2019). Assessing the impact of supervisor training on PPE compliance and safety in construction. *Occupational Health Review*, 38(1), 78-85. <https://doi.org/10.1007/s10462-019-0650-8>
14. Goh, M., & Ali, M. (2017). Assessing PPE compliance in construction sites: The role of training and management. *Construction Safety Management*, 21(5), 102-113.
15. McCallum, D., & Lee, S. (2018). Risk management in construction safety: An overview. *Journal of Construction Risk Management*, 20(3), 89-94.
16. Montgomery, D. C. (2017). *Design and analysis of experiments* (8th ed.). Wiley.
17. National Institute for Occupational Safety and Health (NIOSH). (2018). Occupational Safety and Health Guidelines for the Construction Industry. Retrieved from <https://www.cdc.gov/niosh>