

Analysis Factors Associated with Work Accidents Among House Construction Workers in Karang Ayu

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Abstract: Globally, work-related injuries are a significant public health and economic issue, with approximately 5-7% of all deaths in industrialized countries caused by work-related injuries. Each year, work accidents cause 350,000 deaths and 270 million non-fatal serious injuries. Due to its high burden of occupational hazards, the construction industry is more at risk than other industries. Compared with workers in different occupations, building construction workers are three to four times more likely to die and twice as likely to be injured than workers in other occupations. This study aims to analyze the factors associated with the incidence of work accidents among house construction workers in Karangayu, Semarang Barat. This study used descriptive qualitative methods, including observation, interviews, and questionnaires. The result of this study is that factors can cause work accidents, such as age, unsafe actions such as not using PPE properly, and worker knowledge, which leads to unsafe actions. Still, in this observation, there are driving factors behind workers' unsafe actions, one of which is the non-compliance of house construction workers in Karangayu, Semarang.

Keywords: work accident, construction

INTRODUCTION

The most common causes of illness or injuries sustained at work are those that result in retirement, mutilation, and even death (Lette et al., 2018). Globally, work-related injuries are a public health and economic problem, with approximately 5-7% of all deaths in industrialized countries caused by work-related injuries. In low-income countries, non-occupational health problems are a more significant problem than work-related injuries. Work accidents not only cause 350,000 deaths each year but also cause 270 million non-fatal serious injuries (Kiconco et al., 2019). Due to its high burden of occupational hazards, the construction industry is more at risk than other industries. Compared with workers in different occupations, building construction workers are three to four times more likely to die and two times more likely to be injured. Construction workers in developed countries face a 1-4 times higher risk of a fatal accident and a doubled risk of injury when compared to workers in other sectors, according to the International Labour Organization (ILO), one of the United Nations organizations that deals with labour issues.

Furthermore, this factor rises to six in underdeveloped nations for fatal accidents (Baradan et al., 2019). In line with ILO estimates, more issues are associated with labour than in the past (Lette et al., 2018; Tadesse & Israel, 2016). As a result, it is spreading like wildfire around the globe in public health, particularly in developing countries. Construction workers in poor nations suffer 10–20 times more occupational safety and health hazards than those in industrialized nations (Tadesse & Israel, 2016).

The government's focus on infrastructure development has driven the growth of Indonesia's construction industry in recent years. It is a significant construction sector, the second-largest construction market in Asia in 2018, contributing approximately 10.3% to the country's GDP in 2018 (Lestari et al., 2020). However, the sector's occupational safety and health (OSH) performance is poor. Although statistics on the number and intensity of accidents in the construction industry are unreliable, it is estimated that the industry is responsible for 30% of work accidents in Indonesia. This indicates that the construction industry needs to be improved to prevent work accidents. The occupational safety and health (OSH) track record in the Indonesian construction industry is still

poor. Many companies consider health and safety unnecessary costs (Loosemore et al., 2019). Long-term research on occupational safety and health (OSH) shows that OSH failures negatively impact project costs, time and quality of performance, morale, and worker performance. This represents a significant economic and human resource cost to the Indonesian economy and society due to the poor safety performance of the company and its reputation (Loosemore et al., 2019).

There are five main causes of work accidents, according to the Ministry of Public Works and Public Housing (PUPR): (1) Human error; in 2017, only around 150 thousand experts were certified at all levels, including planners, supervisors, and project implementers. Ideally, the number of experts is around 500 thousand-750 thousand people, (2) The quality of construction materials does not meet standards, (3) Many construction equipment is not certified, (4) Construction implementation methods in the field, especially those related to occupational safety and health (OSH) programs, and (5) Budget efficiency (Huda et al., 2021). The close relationship between construction workers and work accidents places this work at high risk, especially in occupational safety and health programs. Workers need to understand occupational safety and health programs to avoid work accidents (Chellappa et al., 2021). Occupational safety and health programs include the use of personal protective equipment when working. The use of personal protective equipment is crucial in construction work because of its role. In general, the construction industry has established regulations regarding the use of personal protective equipment, which must be adhered to in construction work in the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia Number Per.08/MEN/VII/2010 concerning personal protective equipment Article 1 (1) Personal protective equipment is a tool that can protect a person whose function is to isolate part or all of the body from potential dangers in the workplace. However, in practice, the function of personal protective equipment is considered trivial, especially for non-formal sector construction workers such as those in house construction. However, construction work in house buildings also carries the same risks as construction work in the formal sector.

Among other construction jobs, construction workers in private homes are more likely to have less attention than other construction jobs because of their small scale. In Indonesia, construction workers in private homes are common, unlike in different countries like Hong Kong or China, where construction workers mainly work on a larger scale, like apartments. Many studies have focused on examining the causes of accidents, risk management, and the level of employee awareness of safety issues in countries with large-scale construction sectors. Construction managers have become increasingly aware of the dangers associated with their profession in recent years. As a result, there have been notable advancements in safety protocols for building projects. However, in a smaller sector of construction work, the advancements in safety protocols are not noticeable and tend to be ignored, which likely increases the probability of work accidents. There are limited studies that specifically analyze the factors associated with work accidents among house construction workers, especially in Indonesia. This study examines the factors that can cause work accidents, specifically in Karang Ayu, Semarang. In more detail, this study aims to collect data and information from the home construction workers in Karang Ayu to understand better the factors influencing work accidents, their experience working in the construction industry, their experience related to work accidents, and their knowledge. However, this study provided only limited information on the respondents due to inconsistencies in the number of workers who work on construction sites.

METHODS

This research used descriptive qualitative methods, including observation, interviews, and questionnaires. This observation was carried out based on a review of available literature and existing problems. It was identified through interview methods and distributing questionnaires to collect perceptions and suitability from respondents regarding the possible risk of accidents in house construction projects. The research location used in sampling was the house construction project in the Karangayu area of Semarang. The respondents to this research were craftsmen, laborers, and foremen.

RESULT AND DISCUSSION

1. Experiencing Accident

Table 1. Distribution of respondents' frequency according to experiencing accidents in workers House Construction Projects

No.	Experiencing accidents	Frequency	Percentage
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1	Had an Accident	5	100%
2	Not Having an Accident	0	0
Total		5	100

From the results above in Table 1, it can be seen that all workers experienced work accidents (100%).

2. Causes of Accident

Table 2. Frequency distribution of respondents according to the causes of work accidents on House Construction Project Workers

No.	Causes of Accident	Frequency	Percentage
1	Material : bricks, iron pieces, etc	5	100
2	Work tools hammer, saw, grinding machine, cutter iron, ceramic cutter, etc	2	40
3	Other causes	1	20
4	No accident	0	0

Based on Table 2, it is known that the causes of work accidents experienced by workers were caused by materials: bricks, pieces of iron, etc., experienced by all workers (100%), caused by hammers, saws, grinding machines, iron cutters, etc. experienced by two workers (20%), and those caused by other causes were experienced by one worker (20%).

3. The Nature of Accident Injuries

Table 3. Frequency Distribution of Respondents According to the Nature of Work Accident Injuries in House Construction Project Workers

No.	The nature of accident injuries	Frequency	Presentase
1	Serious injuries (broken leg/arm, disability, etc.)	0	0
2	Minor injuries (scratches, punctures, bruises, sprains, etc.)	5	100
3	No accident	0	0
Total		5	100

From the results of Table 8 above, it can be seen that the nature of injuries resulting from work accidents experienced by workers are minor injuries such as scratches, bruises, sprains, etc., experienced by all workers (100%). Being cut or scratched is a form of work accident that workers most often experience. Work accidents do not lead to fatal events because the type of work accident that occurs is

still in the minor category. Although work accidents are still minor, companies should not be negligent. They should remain the main focus for always trying to maintain the safety of workers because, if ignored, this accident case might be much more severe.

Based on the three tables, it is known that all five workers experienced work accidents while working on the house-building project. Based on the questionnaire data, the workers admitted that their injuries were mostly minor injuries in the form of scratches, punctures, bruises, sprains, etc. In addition, the questionnaire results proved that the work accidents experienced by the workers were caused by several factors, namely work accidents caused by materials, such as bricks, iron pieces, etc., work accidents caused by work tools, such as hammers, saws, grinding machines, iron cutters, ceramic cutters, etc., and other causes of work accidents, such as work environment, hoes, zinc, plywood, etc. Most of the five workers have experienced work accidents caused by materials. In comparison, two workers have experienced work accidents caused by materials and tools, and one worker has experienced a work accident caused by other causes. This proves that most of the work accidents experienced by workers are minor injuries caused by various factors. However, the causes of work accidents in house construction workers are not only caused by materials, tools, and other factors. Still, they can also be caused by the workers' characteristics, such as their age and work experience.

Table 4. Frequency distribution of respondents according to labour sex on Project Worker House construction

No.	Sex	Frequency	Percentage
1	Male	5	100
2	Female	-	-
Total		5	100

The results from Table 4 can be seen that the sex of labour is dominated by men, with as many as 5 people (100%) and no female workers.

Table 5. Descriptive distribution of respondents according to labour age in workers House Construction Project

Variable	n	Minimum	Maximum	Mean
Age	5	23	45	33,2

Based on the table above, it is known that five respondents have an age range of 23 to 45 years, with an average (mean) of 33.

Table 6. Descriptive distribution of respondents according to labour age in workers House Construction Project

Variable	n	Minimum	Maximum	Mean
Work Experience	5	5	15	10,8

Based on the table above, it is known that five workers have a range of work experience from 5 years to 15 years, with an average (mean) of 10.8.

Table 5 shows that five respondents have an age range of 23 to 45 years, with an average (mean) of 33. According to Lingard et al. (2019), international research shows that young workers (frequently defined as workers under 25) are more prone to workplace safety incidents and injuries than older workers. In the same article, in a sample of Canadian workers, Breslin and Smith (2005) reported that the rate of injuries requiring medical attention among young workers (aged between 20 and 24 years) was 1.4 times higher than the injury rate among older workers (> 35 years old) (Zhang & Lingard, 2019). It means that age can be a factor in workplace accidents.

However, a recent study conducted by Nikhmatul Huda (2020) showed no relationship between age and the incidence of work accidents (Huda et al., 2021).

Young workers still have high enthusiasm and ambition to show good work results. Therefore, young workers try to avoid minor accidents by maintaining productivity and performance at work (Pitri, 2020). However, carelessness and haste are also present in young workers, and these attitudes often lead to work accidents. In contrast, older workers are prone to work accidents due to a decrease in physical condition and a decrease in the level of vigilance against accidents in the workplace because they feel used to and underestimate the dangers that arise. According to Table 1, most workers have experienced work accidents since beginning their careers in the house-building construction industry. Then it can be concluded that work accidents can occur among young and old workers.

Table 6 shows that five workers have a range of work experience from 5 years to 15 years, with an average (mean) of 10.8. According to Lengkong (2019), work experience is learning and developing the potential for good behavior (Ratnawati et al., 2020). Meanwhile, according to Foster in Tedi (2020: 09), work experience measures the length of time or tenure that a person has taken to understand the duties of a job and has performed well (Taroreh, 2020). Studies in America say a relationship exists between work experience and work accidents. However, this is not in line with the research of Biabani (2020), which shows no relationship between work experience and work accidents (Biabani et al., 2020; Dumrak et al., 2018).

The longer a person works, the more their experience increases; the length of work is synonymous with experience, and young workers tend to have less work experience than older workers. However, based on the data in Table 6, the age factor does not affect work accidents, and it is in line with the level of experience of the workers. Based on this, the researcher assumes that long work experience does not determine the absence of work accidents but can reduce the risk of work accidents. In conclusion, workers' age and length of work experience are related to the occurrence of work accidents in construction workers but do not affect the absence of work accidents.

Table 7. Frequency distribution of respondents according to labour force education on Project Worker House construction

No.	Education	Frequency	Percentage
1	SD	2	4.0
2	SMP	2	4.0
3	SMA	1	2.0
Total		5	10.0

Table 8. Frequency Distribution of Respondents According to Knowledge of House Construction Project Workers

No.	Knowledge	Yes	No
1	Know the risks of the job	5	0
2	Know the importance of using personal protective equipment	5	0
3	Know how to control potential work-related hazards	5	0
4	Know how to improve	5	0

	personal safety at work		
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Table 9. Distribution of respondents' frequency according to actions in workers House Construction Project

No.	Actions	Yes	No
1	Wearing a construction helmet	0	5
2	Wearing a mask	0	5
3	Wearing work gloves	4	1
4	Wearing ear protectors	0	5
5	Wear foot protection equipment	1	4
6	Wear protective clothing	0	5
	Percentage	16,7	83,3

From Table 7, it can be seen that the last education of workers in elementary school, with as many as two workers (4.0); junior high school or primary education, with as many as two workers (4.0); and high school or secondary education, with as many as one worker (2.0). According to Rahmawati, Damayanti et al. (2023), a person's level of education can determine the extent of their knowledge and how they behave (Damayanti & Wahyuningsih, 2023; Nabila & Widowati, 2023). With increasing levels of education, unsafe actions are reduced. Unsafe acts are referred to as not using PPE properly. The level of education and individual knowledge usually have a straight relationship in the sense that the higher the education, the more comprehensive the individual's knowledge, but in some cases, these two aspects are difficult to analyze separately because many other factors influence unsafe acts (Irhandy & Erwandi, 2022; Morita et al., 2022). Based on Dita (2019), there is a relationship between knowledge and safe working attitudes, where safe working attitudes can reduce the risk of accidents (Dita et al., 2019).

Meanwhile, according to the Regulation of the Minister of Manpower and Transmigration of the Republic of Indonesia Number Per.08/MEN/VII/2010 concerning personal protective equipment, article 1 (1), personal protective equipment is a device that can protect a person whose function is to isolate part or all of the body from potential hazards in the workplace. The use of personal protective equipment should be mandatory for workers; this is also stated in the same ministerial regulation in article 6(1), which states that workers/laborers and other people entering the workplace are required to wear or use PPE for potential hazards and risks. According to Irfan (2018), using personal protective equipment that is correct and by the type of work in construction will maximize the function of the personal protective equipment itself, and compliance from the workforce in using personal protective equipment is needed to prevent work accidents (Arpian, 2018). If we look at Table 9, it is known that workers do not use personal protective equipment properly and completely, only using gloves.

It can be seen that the average worker has low education, which is related to the previous opinion that high education will influence workers' safe actions. From the observation results, the workers already know about OSH, but in the PPE use table, it is known that the percentage of workers using PPE is only a few. So, the researcher assumes that workers understand the risks and importance of using PPE but do not comply with its use while working. According to Aisyah (2016) in Nabila (2022), compliance with work procedures could be described as carefully doing the work, wearing personal protective equipment (PPE), obeying the rules, being responsible and not playing as well as being lazy during the work, doing the jobs according to the procedures, the presence of OSH inspection by the safety personnel, using working tools in appropriate manners, forwarding reports to the supervisor in the presence of problems/errors, et cetera (Nabila & Widowati, 2023). Workers are less compliant and

consider it trivial because there is no supervision or binding for them to use personal protective equipment (PPE). This opinion is in line with the observation where one of the workers said:

“Because this is just building a normal house, you must use it if you usually work for the company. Because if we don't use it, we can't enter.”

This statement is based on the results of research by Damayanti (2023), where the lack of supervision is related to the unsafe actions of workers.

The entire table above shows that there are several trend variables from various aspects, and after being compared with previous research, the results obtained are related to each other. There is a correlation between worker accidents, the nature of accident injuries, and the cause of work accidents. As stated in Table 1, all workers experienced work accidents in this house construction project and most experienced minor injuries. The work accidents experienced by the workers were caused by some factors related to the material, work tools, and other causes. The distribution of worker's sex, age, and working experience influences each other but is indirectly associated with work accidents in the house construction industry. However, many workers still behave unsafely, such as by not wearing personal protective equipment (PPE) when working. Many of them feel that all of this is just normal or absolute when working in construction. Workers showing non-compliance in using personal protective equipment can be related to these things. During observations, it was also discovered that non-compliance with personal protective equipment was due to workers feeling free and no one supervising them regarding OSH.

CONCLUSION

In this research, there are still deficiencies in collecting questionnaire data. After comparing previous research, the researcher concluded that five workers (100%) had experienced work accidents. By comparing with previous research, some factors can cause work accidents, such as age, unsafe actions such as not using PPE properly, and worker knowledge, which leads to dangerous actions. Still, in this observation, there are driving factors behind workers' unsafe actions, one of which is the non-compliance of house construction workers in Karangayu, Semarang. The age factor is unrelated to work accidents; whether young or old, workers can still experience work accidents. Work experience also influences the risk of work accidents; although longer work experience does not guarantee the avoidance of work accidents, it only reduces the risk. Apart from the workers' experience, they must also know how to use PPE. The correct use of PPE can reduce work accidents if worn correctly. Still, most workers do not take it seriously, even though using PPE is an obligation for construction workers. There is no relationship between the level of education and work accidents because workers know the risks but do not comply because their work is not supervised.

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