

A Prevalance Study on Injuries in Manufacturing Industries

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Abstract: Physical injuries are injuries that often happen to individuals, although not necessarily at work, accidents can happen anywhere. This study was conducted because most workplace accidents involve physical injuries to employees. Risk control methods are implemented to reduce physical injuries to ensure workers are always safe. The researcher's methodology would collect primary data by using data sources obtained through accident reports, sick leave letter records, and first aid records. Data analysis for this study would use bar graphing through Microsoft Excel to infer primary data sources, namely accident reports, employee medical letter reports, and first aid records. Statistics from the data obtained for 5 years starting from 2018 to 2022 show that the highly significant increase is from the steel billet main product manufacturing section and the lowest is from the steel pole. Therefore, risk control will be carried out using Job Hazard Analysis (JHA) to ensure a reduction and no accidents from happening again.

Keywords: Steel Billet Manufactures, Accidents Report, Medical Records, First-Aid-Records, Physical Injuries

1. Introduction

An accident is defined as an incident arising out of or in connection with work that resulted in a fatal injury or a non-fatal injury. For sectors that involve industry regardless of construction, manufacturing, oil and gas and power plants they need extensive observation in terms of safety and health of workers.

High number of physical injuries reported even though personal protective equipment (PPE) was provided, seem not enough to prevent accidents. Most accidents involve minor physical injuries as a result of several factors such as not using gloves or eye protection. Risk control such as JSA, HIRARC and others is one of the ways to reduce accidents.

1.1 Research questions

Questions that used as a guide in this study were:

- 1) What factors that cause physical injury to employees while working?
- 2) Is the use of (PPE) among workers able to protect workers from physical injury?
- 3) Are safety checklists and weekly observations aware of safety and health while at work?
- 4) Can risk control prevent employees from increasing the percentage of physical injuries continuing to occur?

1.2 Objectives

The key goal of this research was to manage physical injuries among manufacturing workers:

- 1) To determine prevalence of physical injuries in manufacturing industry
- 2) To investigate the statistical cause of the increasing or decreasing percentage of physical injuries among manufacturing workers.
- 3) To prepare risk control to reduce the physical injuries

1.3 Significance of the Study

Study findings able to identify the causes of physical injuries and reduce the number of cases of physical injuries among manufacturing workers.

1.4 Limitation

This study only focused on metals manufacturing plants.

1.5 Scope of the Study

The scope of this study were as follows:

- 1) To focus on accidents involving physical injuries depends on the situation involved.
- 2) The study location is in the metal manufacturing processes such as billet production,
- 3) Data gathered from 2018 to 2022

1.6 Study Methodology

Data findings were obtained through primary data research such as accident reports, medical certificates reports, and first aid records. For primary data, a written report was recorded by the supervisor for each available work activity. Secondary data can be found in newspapers, articles, reference books, newspapers, and the internet.

2. Materials and Methods

2.1 Materials

The instruments used in document analysis were accident reports, medical reports and first aid records. In terms of safety, the accident report is divided into several parts, among which are 11 elements that emphasize the details related to the accident that occurred:

A. Data Accident report

According to Turner (2019), mention data accident reports are raw data recorded by individuals responsible for handling accident cases. This report is recorded in the existing form either in writing or typed. The accident data were classified as personal injury or property damage only and also according to the type and movement of the vehicles involved.

B. Data Medical Certificate Report

According to Lai Chong's prior research (Medical Certificate Verification System Using Qr Code (Graphics & Multimedia Technology), n.d.), A medical certificate is a statement issued by a doctor or other healthcare professional that verifies the results of a patient's medical examination. It can be used as a "sick note" (proof that an employee is unable to work) or as proof of a medical condition.

C. Data First aided record

In his previous study, Muhammad Hakimi (2013) defined first aid is a subject that instructs the user on how to relieve pain, preserve life, encourage healing, and keep the patient's condition from worsening. It is extremely useful in the event of a human-injury emergency. Researchers were able to determine the proportion of industrial plants that got first aid treatment.

3. Results and Discussion

The study was conducted by HIRARC, 4M, JSA, and others to assess the risk of injury in the metals manufacturing industry. The aim of the study was to find out if there is a way to reduce the number of injuries in the industry.

3.1 Results

Part A: Accident Report

a) Summary of accident report and root cause the highest

For the highest injuries is melting process There are eight different types of furnaces in this industrial area. The furnace fire will be heated with fire before the procedure begins. Workers will be readily exposed to sparks as a result of this condition. Employees may fall from the platform while attending to the furnace during the smelting process. Plus, Scrap Processing Plant (SPP) refer to Chapter 3 in Table 3.1, the employee will suffer physical injuries such as the left foot's first three fingers being sore and swollen, the second finger bleeding and the nail being slightly broken and a small hemorrhage under his left eye. This is caused by scraps from the iron thrown during the work process. The root cause of the incident occurred due to workers not using PPE equipment correctly.

Part B: First Aided Records

b) Summary of first aided and root cause the highest

The most medication was consumed, with 275 people using Panadol. Medicated oil had the lowest consumption of 7. During the 5-year period beginning in 2018, the highest was panadol and the lowest was burn aid cream. In 2019, the largest consumption came from Panadols 94, while the lowest came from burn aid creams.

Part C: Medical Certificate

c) Summary of first aided and root cause the highest

A worker was rested for 9 days due to physical injury to a part of the body that suffered an infection in the resulting wound. The root cause of this incident is a high-risk workplace environment. Infrequent inspections and controls, as well as the usage of personal protective equipment (PPE) in the workplace, are not tightened.

3.2 Tables

The table below displays the risk control measures used to limit the likelihood of harm or an accident occurring. Each recommended risk control must be environmentally acceptable and must assist work affairs and employee welfare in terms of safety and health.

Step No.	Description of Step/ Task	Potential Hazards	Effect	Initial Risk Rating	Control and/or Recovery Measures	Final risk rating	Action/ Responsible Person (s)		
1	Metal smelting in the work furnace (Melting)	1.1	Exposed to fire sparks	Wounds or burns parts of body	H	1.1.1	Ensure every employee using PPE especially (face shield, or face mask, safety jacket or heat resistant clothing and safety shoes when operating near the furnace.	M	Safety and Health / Supervisor Section
						1.1.2	Hold a toolbox meeting or briefing about safety before production activities		
		1.2	Exposed to splashing of chemical liquid	Eye injury	H	1.2.1	Make sure employees always practice SOP when handling chemicals, especially the use of appropriate PPE such as goggles or face shields	M	Supervisor section
						1.2.1	Use any machine or tool such as a handle that is suitable for use when pouring chemicals		
		1.3	Bad posture when doing hacker at furnace	Muscle sprain	H	1.3.1	Rotate workers among different tasks to rest the muscle, reduce repetition and ease mental demand.	M	Supervisor Section/ Work Leader
						1.3.2	Prepare a schedule for each worker when operating machines that involve repetitive motion		
						1.3.3	Ensure the worker who operates the machine is a competent person		
		1.4	Working at height	Broken leg	H	1.4.1	Erector must wear full body harness with double lanyard and ensure its secure properly	L	Supervisor Section/ Work Leader
1.4.2	The area must be barricade and allocated the warning signage								
2	Maintenance work in all workplace area	2.1	Sharp edges	Injured finger	M	2.1.1	Wear proper hand gloves	L	Supervisor Section/ Work Leader
		2.2	Use of improper tools			2.2.1	Ensure workers follow the SOP on handling tools when maintenance work is done		
		2.3	Exposed to dust	Eye irritation	M	2.3.1	Worker wears certified dust mask when work.	L	Work Leader / Employee
2.3.2	Seek immediate treatment if any foreign object enters the eye								
3	Scrap Processing Plant	3.1	Exposed to dust	Lung tissue swelling, asthma and throat infections	H	3.1.1	Worker wears certified dust mask when work such as respirator	H	Supervisor Section/ Work Leader
						3.1.2	Installing exhaust extraction systems to reduce dust, particles or fumes		
		3.2	Exposed to fire and explosive	Lives lost, injuries, damage to property and the environment, and to business continuity.	H	3.2.1	Always perform machine maintenance	H	Supervisor Section/ Work Leader
						3.2.2	Wear personal protective equipment (face shield, face mask, safety jacket and safety shoes)		
						3.2.3	Make sure during the work process that no worker approaches the machine that is turned on		
		3.3	Trip and Falls	Head injuries , broken bones and back injuries	H	3.3.1	Provide safe working procedure, barrier and signage in the area	M	Safety and Health /Supervisor
3.3.2	Workers work at designated safe place to carry out job								
4	Continuous casting	4.1	Exposed to heat temperature	Dermatitis and other skin problems.	H	4.1.1	Wear eye protection, gloves, spats (covering top of feet), and thick clothing protecting all exposed skin on arms and legs. NO polyester or synthetic clothing.	H	Safety and Health /Supervisor
						4.1.2	Provide adequate ventilation for workers		
		4.2	Slip and Fall	Burns Crush injuries	H	4.2.1	Keep the footpath area or standing platform for workers in a clean condition	H	Supervisor/ Work Leader
						4.2.2	Provide warning signage when the process of pouring metals liquid is underway		

Table 3.1 Job Hazard Analysis

Work activity	2022	2021	2020	2019	2018
Melting	6	11	9	27	19
Quality Control	1				
Maintenance	1	4	2		3
Scrap Processing Plant	1	1	4	3	2
Logistics		1			
Continuous casting	1		1	2	1

Loading / Unloading	1			1	
Steel pole				1	
Platform				1	
Tower Production				1	
Oxygen Plant					1
Grand Total	11	17	16	36	26

Table 3.2 Accidents Report by year

The findings of the analysis performed to determine the prevalence of physical injuries that occur to employees are shown in Table 3.2 above. Supervisors produce accident reports to aid in the management of employees who have been involved in accidents or sustained significant injuries. Work activities involving smelting had the largest number of accidents, as illustrated in Table 3.2. Following that, the oxygen plant's work activities had the fewest accidents throughout five years. From 2018 to 2022, the highest record for smelting activities was in 2019, while the lowest record for work activities was in quality control. During the five-year period, the most mishaps occurred during smelting industrial operations, resulting in the deaths of 72 persons. While the oxygen plant has had the lowest yearly accident record over the last five years, with only one person injured. This study focuses on four essential work areas: smelting, maintenance, scrap processing plant, and continuous casting. The metals production business has the highest number of accidents due to four job activities.

Work activity	2022	2021	2020	2019	2018
Melting	54	64	56	75	73
Quality Control	9				
Maintenance	9	23	12		11
Scrap Processing Plant	9	6	25	8	7
Logistics		6			
Continuous casting	9		6	5	3
Loading / Unloading	9			2	
Steel pole				2	
Platform				2	
Tower Production				2	
Oxygen Plant					3

Table 3.3 Percentage of accidents

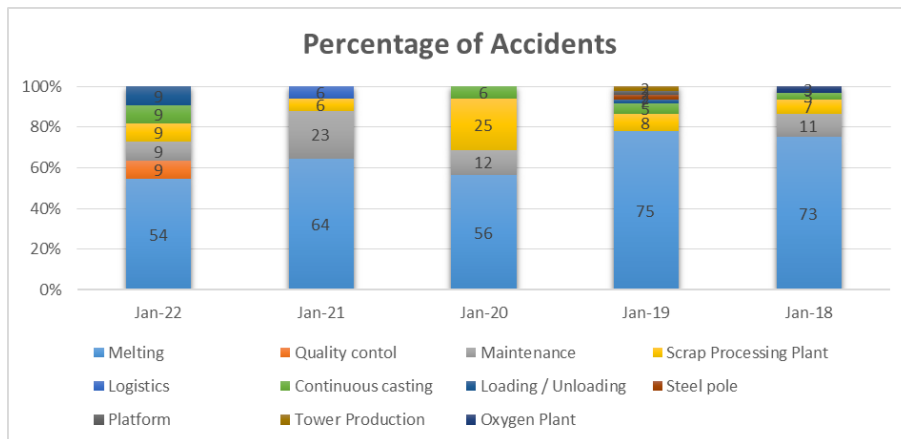


Figure 3.1 Percentage of Accidents

The figure 3.1 above shows the decrease and increase in each part involved in the workplace. The graph also shows the overall data for 5 years of change in 2019 followed by 2018, moving in 2021 to 2020, and finally in 2022. Overall, the graph above shows the highest prevalence of the percentage of work activities in accident reports carried out from metals smelting, Scrap Processing Plant (SPP), maintenance and continuous casting.

Values	Antiseptic Cream	Burn Aid cream	Eyemo / Eyewash	Minyak angin	Panadol	Phil Chi Teck	Plaster	Yellow Lotion	Grand Total
2022	4	8	1	0	45	5	10	10	83
2021	6	2	3	3	41	8	9	5	77
2020	5	4	3	0	42	22	19	1	96
2019	4	3	5	0	94	5	26	6	143
2018	3	1	4	4	53	2	2	3	72

Table 3.4 First Aided Record recruitment

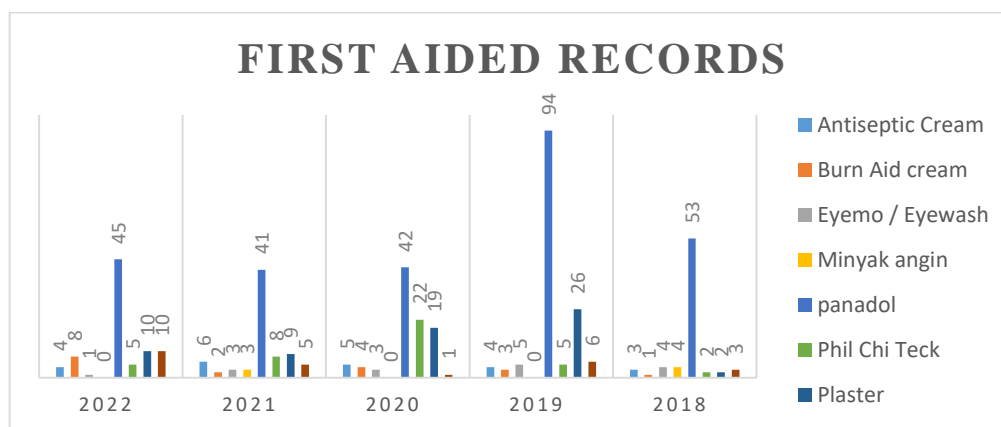


Figure 3.2 First Aided Record recruitment

The record of the usage or receipt of first aid treatment is used to guarantee that the use of medications does not decrease. This is done to ensure that in the event of an emergency, the situation can be controlled using the equipment and treatment requirements contained in the first aid kit. This method prevents supply from running out, and if there is a minor accident or bodily harm, the employee can receive treatment from the Safety and Health department. This is one of the treatments used to keep injuries from worsening and to keep workers safe from bacterial infections that could endanger their lives. The table below is the total amount of medication for injuries that can be treated using the available first aid equipment. The total amount depends on the frequency used by the employee. The data collected in Table 3.4 is collected and described in figure 3.2.

The table 3.5 below shows the number of saved medical records for employees who are saved. it is divided into two categories such as accidents in factories and common illness experienced when sick at work.

Year	Accident in Factories	Common Illness
2018	0	0
2019	8	11
2020	33	6
2021	14	11
2022	7	4

Table 3.5 Medical Certificate Records

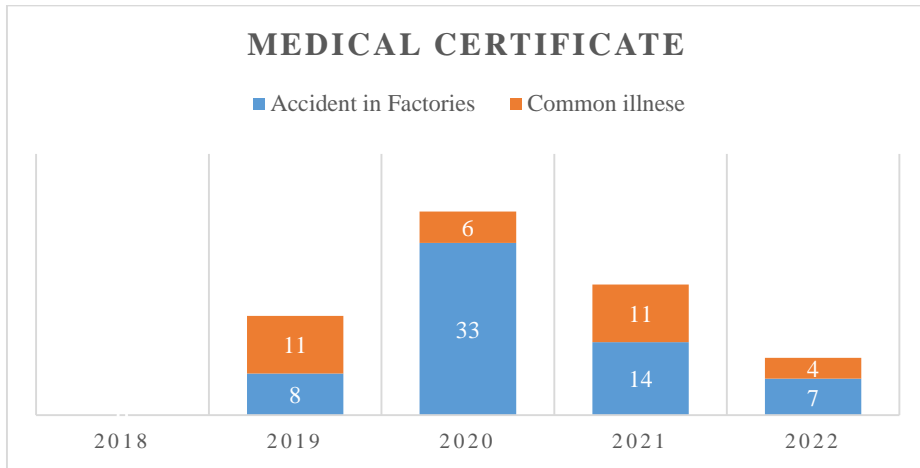


Figure 3.3 Medical Certificate Records

The figure 3.3 above shows the medical certificate granted by the clinic or hospital referred by the employee. The medical certificate issued by the health officer is determined by the individual's disease. The graph data below illustrates the percentage of workers who received medical certifications from the health department, regardless of whether they were injured in an industrial accident or became ill due to a common illness

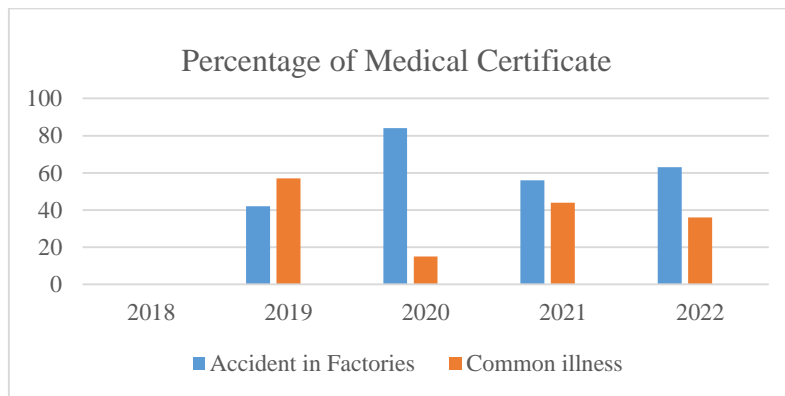


Figure 3.4 Percentage of Medical Certificate

From figure 3.4 the highest prevalence percentage of factory accidents in the mc record given to workers when receiving treatment was in 2020 as much as 84%, and the lowest record as much as 42% in 2019. While the highest record was recorded in 2019 as much as 57% while the lowest for common illness in 2020 by 15%. Starting from the year 2018 until 2022, the highest MC for accident in factories recipient is from the metal smelting work activity that is rested for a period of 9 days while for the lowest record the number of days given as many as 2 days is from the continuous casting work activity.

While, MC for the highest common illness period given 2 days from smelting work activities and for the lowest record from scrap processing plant for 1 day only.

4. Conclusion

Finally, the purpose of this study was to minimize physical injuries among industrial workers. This research strives to guarantee that every employee feels comfortable and is knowledgeable of workplace safety. Not only at work, but wherever they are. Every individual, whether adult or child, prioritizes safety and health. As a result, as people, we must always be alert to our surroundings and utilize personal protection equipment (PPE). This is critical since PPE is the final component in Hazard Identification, Risk Assessment, and Risk Control, which is one of the primary functions of employees when doing jobs. It also can ensure that employees do not risk any serious bodily harm. Furthermore, through this study, it gives some exposure to both employers and employees about the importance of employee safety and health in themselves. This is also one of the ways, to open the eyes of employers to always focus on safety for employees, especially in dangerous work areas.

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