

UNIVERSITI TEKNOLOGI MARA

**IMPACT OF HEAT STRESS ON HEALTH-
RELATED SYMPTOMS AND PHYSIOLOGICAL
CHANGES AMONG PALM OIL MILL WORKERS
AT MUKAH, SARAWAK**

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ABSTRACT

The palm oil industry is one of the most important sectors in the Malaysian economy. However, workers in palm oil mills (PO) are exposed to various health and safety hazards, including heat stress as PO is one of the main workplaces with high heat exposure. Heat stress occurs when a person's body cannot get rid of excess heat. The next stage is frequently fainting and, in extreme cases, death. Heat stress can cause heat stroke, heat rash, heat exhaustion, and heat cramps. It also leads to physiological and psychological changes, which can affect performance. The objective of this study is to determine the level of heat stress with physiological changes and health-related symptoms among workers in PO at Mukah, Sarawak. A total of 31 workers from four workstations were included in this study. Previous studies found that the highest ambient working temperatures in PO were in sterilization, boiler room, oil room, and engine room. The human resources division provided the names of the employees. Simple random sampling was used to choose the respondents from the list. The level of heat stress was measured using WBGT while the health-related symptoms and physiological changes was identified using a set of questionnaire and personal measurement, respectively. Data were then analyzed using SPSS Ver28. Results showed that boiler, engine and sterilizer workstation had high WBGT_{in}, which caused moderate heat conditions. The maximum temperature was found in the sterilizer (28.6°C) and boiler (28.6°C). There was a significant difference found in BCT of boiler for before and after 8 hours shift ($p < 0.001$). However, statistical analysis using Spearman Rho's test showed that there is no correlation between heat stress level with physiological changes and health-related symptoms among study participants. To conclude, this study showed the heat stress levels in boiler, engine and sterilizer was exceeded the permissible limit of the ACGIH Threshold Limit Value (TLV). Although this study indicates that workers were not exposed to excessive heat, mitigating steps should still be taken to limit future heat exposure.

Keywords: *heat stress, health-related symptoms, palm oil mill, physiological changes.*

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

The palm oil industry is one of the most important sectors in the Malaysian economy (Athirah et al., 2014; Myzabella et al., 2019). However, workers in palm oil mills (PO) are exposed to numerous health and safety hazards, including heat stress as PO is one of the main workplaces with high heat exposure (NurIzzate et al., 2015), often throughout the course of an 8-hour shift.

PO process involves the physical extraction of crude palm oil and palm kernel from fresh fruit bunches (FFB), where almost all the processes involve high temperatures (NurIzzate et al., 2015). There are nine workstations in PO; loading ramp, sterilization, kernel, press, production room, boiler room, oil room, engine room and workshop. Previous studies found that the highest ambient working temperatures in PO were in sterilization, boiler room, oil room, and engine room (NurIzzate et al., 2015). Therefore, this study was focus on heat exposure to the workers in these four stations.

Workers who work in hot environments or are exposed to extreme heat may be at risk of heat stress (Jacklitsch et al., 2016). Heat stress occurs when a person's body cannot get rid of excess heat which will cause the body's core temperature and the heart rate to increase. The person begins to lose attention and has problems focusing on a task while the body continues to retain heat. They may also feel agitated or ill, and they frequently lose the desire to drink. If that person is not cooled down, the next stage is frequently fainting and, in extreme cases, death (Jacklitsch et al., 2020). Heat stress not only causes heat rash, heat exhaustion, heat cramps and heat stroke, but also leads to physiological and psychological changes, which can affect workers' performance (Aliah et al., 2019). Hence, the purpose of this study is to determine the level of heat stress,