IDENTIFICATION OF POTENTIAL HAZARDS IN OCCUPATIONAL SAFETY AND HEALTH AMONG RICE MILLING WORKERS AT UD. LESTARI

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ABSTRACT

The rice milling industry plays an important role in various industries, making a significant contribution in Indonesia. However, the risk of danger in rice milling work exposes workers to various occupational hazards, which has an impact on their health and safety. This research was conducted qualitatively with observational and quantitative approaches for dust and noise measurements, conducting interviews, observation, and measurements from April to May 2024. The aim of this study was to identify various OHS hazards present in UD. Lestari's rice milling operations. Purposive sampling was used to select 6 informants who had direct experience and expertise relevant to the identified hazards. Descriptive qualitative analysis was employed to systematically analyze and interpret the data gathered from these informants. This research found that all respondents experienced respiratory problems (100%) and 3 people (50%) experienced hearing problems, attributed to inadequate use of Personal Protective Equipment (PPE) and smoking habits. Dust levels inside the production area exceeded permissible limits (8.04 mg/m^3), posing risks of respiratory diseases. Similarly, noise levels surpassed recommended thresholds (93.26 dB), increasing the likelihood of hearing loss. This study contributes valuable insights into enhancing workplace safety and underscores the importance of ongoing efforts to safeguard worker health in informal sector industries. Future research should explore additional factors influencing OHS outcomes to further enhance workplace safety practices and employee well-being.

Keywords: Potential Hazards, Milling Rice Workers, Dust Level, Noise Level

INTRODUCTION

Occupational health and safety (OHS) encompasses all activities aimed at ensuring and protecting the safety and health of workers through efforts to prevent work accidents and occupational diseases (Asiedu et al., 2023). By implementing good OHS practices at the workplace, it is expected to enhance production processes and reduce the risk of work accidents and occupational diseases (Mayadilanuari, 2020). Work accidents and occupational diseases can occur not only in the formal sector but also in the informal sector (Sukismanto et al., 2023).

The percentage of informal sector workers has increased over the past 2 years during the pandemic, comprising approximately 59.97 percent of the total workforce of 135.61 million as of the end of February 2022 (Rohmah et al., 2024). Informal sector workers are the most vulnerable to exposure to various risks associated with workplace hazards, which can lead to occupational diseases and work accidents, and even fatalities (Sriagustini and Supriyani, 2021).

Rice milling is one of the important informal sector industries that contribute to food security in Indonesia (Connor et al., 2021). Like other industries, rice milling activities present various OHS risks for its workers (Santoso, 2023). These risks include respiratory disorders due to dust, hearing impairments caused by machine noise exceeding 85 dB, musculoskeletal disorders, work fatigue, and others (Widodo, 2020). Previous study found that based on the classification of hazard potential in rice milling using the Hazard and Operability Study (HAZOP) method, the distribution was as follows: high 10%, moderate 70%, and low 20% (Ahmad Sobirin and Zaqi Al Faritsy, 2023).

Given these various OHS risks, efforts are needed to prevent work accidents and occupational diseases. To enhance safe and healthy working conditions for workers in the rice milling industry, identifying potential hazards is essential (Putri et al., 2023). Potential hazards encompass anything that could potentially lead to losses, damages, injuries, illnesses, accidents, or even fatalities related to work processes and systems

(Harnawati, 2024). These hazards can result in damage and losses to: 1) humans directly or indirectly involved in the work, 2) property including work equipment and machinery, 3) the environment both within and outside the company, 4) the quality of goods and services produced, and 5) the company's reputation (Ariyanto, 2021).

According to the Industry Rice Milling Data Collection (PIPA) report in 2020, the number of rice milling industries in Indonesia amounted to 169,789 businesses (BPS, 2020). Meanwhile, the number of rice milling industries in Central Java totaled 23,345 (BPS, 2020). With these activities, the number of informal sector workers involved in the rice milling process is quite significant. Therefore, it is important to have a profound understanding of the potential hazards that workers in rice milling may face.

UD. Lestari is an informal sector business unit engaged in rice milling located in Gunungpati Subdistrict, Semarang City. This business unit employs a total of 16 workers, consisting of 14 male and 2 female workers aged between 25 and 50 years. Meanwhile, the average production capacity at UD Lestari is 5-8 tons per day. The rice milling process there includes sun-drying of wet paddy, the first stage of rice milling which involves husking using a husker machine producing brown rice, and the second stage of rice milling which involves polishing using a polisher machine producing polished or white rice. Finally, the white rice is packaged and marketed. Based on the results of initial observations at UD Lestari, it was found that all workers did not use PPE when working, the work environment was dusty and the sound of the rice milling machine was very loud which could increase the risk of OHS for workers. Based on the above, the aim of this research is to identify various OHS hazards present in UD. Lestari's rice milling operations.

METHODS

This research was conducted qualitatively with observational and quantitative approaches for dust and noise measurements It took place at UD Lestari Rice Milling from April to May 2024. Informants for this study were selected through purposive

sampling, totaling 6 individuals, including: a) the business owner, b) a supervisor, c) 2 rice milling workers, d) a rice weighing worker, and e) a rice sorting worker.

The research instruments used include in-depth interview guidelines, observation sheets, noise measurements, and dust content measurements. In-depth interviews were carried out using a semi-structured interview guide aimed at informants where data collection was carried out continuously until no more information was obtained from the informants or the data was saturated (Rutledge and Hogg, 2020).

In this research, data validity was checked using data source triangulation techniques.

Observations were conducted on the environmental conditions and all work processes at UD. Lestari. Dust measurements were conducted using a high volume sampler (HVS) placed inside and outside the production area for 4 hours then the results were later weighed in the laboratory. Meanwhile, noise measurements were taken using a sound level meter for 10 minutes at each of the 7 different points within the production area.

RESULTS AND DISCUSSION

Table 1. Respondent Characteristics

No	Name	Age	Gender	Job Description	Smoking / Not Smoking	Working Period (Years)
1.	SP	50	Male	Owner	Smoking	18
2.	AM	41	Male	Supervisor	Smoking	15
3.	MY	27	Male	Rice sorting worker	Smoking	4
4.	KI	25	Male	Rice weighing worker	Smoking	6
5.	AS	35	Male	Rice milling worker	Smoking	8
6.	JM	31	Male	Rice milling worker	Smoking	12

The main informants in this study were 5 individuals, consisting of a supervisor, 2 rice milling workers, 1 rice sorting worker, and 1 rice weighing worker. Triangulation informants in this study included the

owner of the rice milling business. The average age of the workers was between 25 and 50 years old with a working period of more than 3 years. All informants interviewed were male and smokers. The study did not include female respondents because female workers in rice milling only performed sun-drying tasks and did not operate machinery.

Through observation and interviews, it was found that the workers did not use Personal Protective Equipment (PPE) such as earplugs, masks, gloves, and goggles during their work. This was due to the discomfort and inadequate supply of the PPE at that workplace. Consistent with previous research, it was found that poor-quality PPE could affect workers' willingness to use them (Tamene et al., 2020). Business owners should also provide sufficient quantities of PPE for all their employees. The use of PPE is expected to reduce the risk of work accidents and occupational diseases in the rice milling industry (Dewi et al., 2023). Therefore, the lack of awareness among workers about the importance of using PPE needs to be addressed promptly.

Table 2. Distribution of Dust Levels

Location	Time (Hours)	Result (mg/m^3)	Threshold Value (mg/m^3)
Inside The Production Area	4	8,04	3
Outside The Production Area	4	5,08	3

Dust levels were measured at two points, indoors and outdoors. Each measurement lasted for 4 hours. Table 2 showed that the dust level measured inside the rice milling area was 8.04 mg/m3, while outside area was 5.08 mg/m3. According to Minister of Manpower and Transmigration Regulation No. 13 of 2011 regarding threshold limit values for chemical and physical factors, the permissible exposure limit for dust in the

environment is 3.0 mg/m3 (Permenaker, 2011). Based on this regulation, it is evident that the dust levels measured at UD. Lestari exceeded the applicable threshold limit value in Indonesia.

In line with previous research at the rice milling facility in Gegeran Village, Sukerejo, it was found that the indoor dust measurement yielded 5,9 mg/m3, which exceeded the permissible dust threshold limit in Indonesia (Permenaker, 2011). Failure to control occupational health and safety measures promptly could lead to occupational diseases such as pneumoconiosis (Sahri et al., 2023).

Pneumoconiosis is a disease caused by the accumulation of dust particles after prolonged exposure in the lungs, which can lead to respiratory disorders (Cherian et al., 2023). The onset of this disease was caused by continuous deposition of dust, resulting in fibrotic changes in lung parenchyma, thereby reducing lung elasticity and decreasing lung vital capacity (Lestari et al., 2023). Additionally, rice dust was organic dust that could release substances such as histamine and allergens, leading to respiratory obstruction (Beigoli et al., 2024).

Therefore, efforts were needed to prevent respiratory disorders in workers by using PPE such as masks. The use of masks could reduce the risk of respiratory disorders among workers and other airborne-transmitted diseases (Ramadan et al., 2023).

Table 3. Results of Noise Measurement

Points	Measurements						Results
	1	2	3	4	5	6	
A	87,4	87,3	87,7	87,3	86,8	87,6	94,15
B	94,3	94,7	94,5	95	95,3	95	93,85
C	96,4	96,3	96,4	96,1	96,5	96,3	95,28
D	90,3	90,8	91,5	91,2	90,8	90,8	89,98
E	90,8	90,3	92	90,5	90,6	90,6	90,23
F	92,5	93	92,7	92,7	92,8	92,8	91,70
G	99,1	98,5	98,6	98,5	98,6	98,5	97,63
Average General Noise Measurements : 93.26							

General noise measurements were conducted at seven (7) points inside the area where the rice milling machine is used. Table 3 showed that the general indoor noise level was 93.2 dB. According to Regulation of the Minister of Manpower and Transmigration No. 13 of 2011 regarding the threshold limit values for chemical and physical factors, it is explained that the threshold limit value for noise during an 8-hour workday is 85 dB (Permenaker, 2011). Based on this regulation, it is known that the noise level at UD. Lestari exceeds the threshold limit value set by the Indonesian government.

Previous research found that age (p-value=0.014), length of service (p-value=0.028), and noise intensity (p-value=0.028) had a significant effect on hearing loss in rice mill workers (Putri et al., 2024). Therefore, efforts were needed to reduce the risk of hearing impairments in workers through the use of PPE (Yeşiltepe and Karadağ, 2023). The use of PPE was chosen because eliminating the noise source from machines was not feasible (Adhifa M, 2023). PPE options for noise reduction included earplugs, earmuffs, or a combination of both (Putro et al., 2024). The use of earplugs could reduce noise by up to 30 dB, while the use of earmuffs

could reduce noise by up to 50 dB
(Endrianto, 2023).

Table 4. Respiratory and Hearing Disorders Among Workers (by interview)

Type of Disease Disorders	Yes	No
Respiratory disorders	6 (100%)	0
Hearing disorders	3 (50%)	3 (50%)

Based on table 4, it was found that all respondents experienced respiratory disorders (100%). Additionally, the number of workers who experienced hearing disorders was 3 people (50%), comprising 2 workers in the rice milling section and 1 worker in the rice sorting section. These three workers operated in areas where production machines generated extremely loud noise. None of these workers used earplug or earmuff. Conversely, the other 3 workers did not experience hearing disorders because they did not work in the production area. This corresponds with previous research findings that workers exposed to machine noise exceeding 85 dB for more than 8 hours are at risk of permanent hearing impairment (Elshaer et al., 2023).

Subsequently, the respiratory disorders experienced by all respondents were due to their lack of use of PPE such as mask and their smoking habits. All respondents had a smoking habit, which could increase the risk of respiratory disorders (Berlian et al., 2023). Pulmonary function disorders in rice milling workers could be prevented by using masks while working and avoiding smoking. This is consistent with the study by (Nurfitria et al., 2020), where rice milling workers who wore masks while working tended to have normal pulmonary function status.

Previous research conducted by (Pando-Sandoval et al., 2022) showed that individuals who had a smoking habit had a greater chance of suffering from lung diseases compared to non-smokers. Another study indicated that

the smoking habit among rice milling workers was associated with impairments in lung function capacity (Hasibuan et al., 2023).

Based on the above research findings, to prevent respiratory and hearing disorders, efforts can be made to conduct socialization sessions emphasizing the importance of PPE among workers at UD Lestari's rice milling. Previous research has indicated that raising awareness about the use of PPE during work can enhance workers' understanding of the importance of workplace safety and reduce the risk of work-related accidents and diseases (Sumardiyono, 2024).

CONCLUSION

In conclusion, this study highlighted various occupational health and safety (OHS) hazards that were prevalent at UD Lestari. The findings revealed significant risks associated with respiratory and hearing disorders among workers, primarily attributed to inadequate use of Personal Protective Equipment (PPE) and smoking habits. The dust levels inside the production area had exceeded permissible limits, posing risks of respiratory diseases. Similarly, noise levels had surpassed recommended

thresholds, increasing the likelihood of hearing impairments among workers. Furthermore, future research could explore additional factors influencing OHS outcomes in informal sector settings, aiming to foster continuous improvement in occupational safety practices and worker well-being.

ACKNOWLEDGEMENTS

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