

Explanation Of Production Room Workers' Complaints Regarding Noise Exposure Below The NAB In Furniture Production Rooms

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Abstract.

The wooden furniture industry is a growing informal sector in Sukarama District, Bandar Lampung City, characterized by a work environment filled with exposure to physical factors such as noise. Although noise levels in some production areas are still below the Threshold Limit Value (TLV) of 85 dBA, workers continue to report health complaints related to this exposure. This study aims to explain complaints of production area workers regarding noise exposure that is still below the TLV. The method used is a qualitative descriptive study of 15 workers from three wooden furniture industries and direct observation of the work environment. The results showed that most workers experienced complaints such as headaches, difficulty concentrating, fatigue, and sleep disorders. These complaints were associated with long working hours, the type of machinery used, and the failure to use personal protective equipment (PPE) such as earplugs. Although noise levels have not exceeded the TLV, continuous exposure for 8 hours or more per day still has a psychophysiological impact on workers. Interventions such as work time management, education on the use of PPE, and machine maintenance are needed to reduce noise intensity. These findings emphasize the importance of evaluating noise risks not only based on threshold values, but also taking into account workers' perceptions and subjective health conditions.

Keywords : Noise; Furniture; Wood; Health and Environment.

I. INTRODUCTION

The wood furniture industry is a rapidly growing industrial sector in Indonesia and employs a large workforce, particularly in urban and suburban areas. The furniture production process, which involves cutting, smoothing, assembling, and finishing wood using various tools and machines, results in significant noise exposure in the workplace (Yanti et al., 2023). Noise is a physical risk factor in the workplace that not only disrupts comfort but also has the potential to cause health problems, both physical and psychological, even though the noise level is still below the threshold limit (TLV) set at 85 dBA for an 8-hour workday (Regulation of the Minister of Health of the Republic of Indonesia No. 70 of 2016). Several studies have shown that long-term noise exposure, even below the TLV, can still cause complaints such as fatigue, impaired concentration, irritability, and sleep disturbances in workers (Setyawati & Saputra, 2021).

These complaints are closely related to monotonous work environments, minimal protection, and the absence of adequate noise control systems. Furthermore, workers in informal sectors such as the furniture industry generally have low knowledge and awareness of the importance of implementing occupational safety and health (OHS), including the use of personal protective equipment such as earplugs (Susanto et al., 2022). Research by Putra et al. (2020) found that workers in production areas exposed to noise below the NAB still reported symptoms of stress, irritability, and difficulty sleeping due to the accumulation of repetitive production machine noise. Noise can also impact the effectiveness of communication between workers, increase the risk of workplace accidents, and reduce productivity (Handayani & Hapsari, 2019).

II. THEORETICAL STUDY

According to the World Health Organization (WHO), exposure to noise in the workplace is one of the leading causes of occupational health problems in developing countries, including in the informal sector,

which lacks strict oversight (WHO, 2021). In the furniture industry, workers typically work not only for long hours but also use high-frequency machinery without soundproofing, resulting in continuous noise exposure and inadequate rest periods (Rahmah et al., 2020). Research by Prasetyo and Mulyadi (2022) also shows that subjective perceptions of noise, such as annoyance or discomfort, contribute to complaints even when objectively the noise level is within safe limits. Furthermore, a study by Harahap (2023) highlighted the importance of considering non-physical variables, such as workers' psychological conditions, which can exacerbate the impact of noise on health.

A noisy work environment tends to trigger disruptions in the body's biological rhythms, such as increased blood pressure, heart rate, and muscle tension (Fitriyani et al., 2021). This is a concern because systemic disruptions can develop into chronic health problems if left untreated. Therefore, research focused on exploring workers' complaints about noise exposure below the TLV is crucial for describing real-world conditions and providing a basis for preventive interventions. Based on the above description, it can be concluded that even though noise exposure is still below the threshold value, there is still the potential for health complaints that should not be ignored. Therefore, this study was conducted to explain complaints from production room workers regarding noise exposure below the NAB in the wood furniture industry, specifically in Sukarama District, Bandar Lampung City. The results of this study are expected to contribute to the development of occupational health protection policies and increase industry players' awareness of the importance of noise management in the workplace.

III. METHODS

This study uses a qualitative descriptive method to comprehensively and in-depth describe the phenomenon of worker complaints regarding noise exposure below the Threshold Limit Value (TLV). This approach was chosen because it can explore workers' perceptions, subjective experiences, and responses to work environment conditions that cannot be measured solely through quantitative data (Gunawan, 2021). Qualitative research is highly effective in examining behavior, thought patterns, and social meanings formed in specific work situations (Nasution, 2020). This research was conducted in three wooden furniture industries in Sukarama District, Bandar Lampung City, from March to April 2025. The research subjects were selected using a purposive sampling technique, with inclusion criteria being workers who were active in the production area, had a minimum of 5 years of work experience, and were willing to be informants. A total of 18 people became informants in this study, consisting of 15 workers and 3 furniture industry managers.

Data collection techniques were carried out through in-depth interviews, direct observation, and visual documentation as supporting data. Interviews were conducted with open-ended questions aimed at exploring workers' experiences regarding noise exposure, the use of personal protective equipment (PPE), and complaints such as dizziness, difficulty concentrating, or excessive fatigue. In addition to subjective data collection, objective noise level measurements were conducted using a pre-calibrated Sound Level Meter (SLM). Measurements were taken during working hours, with the device positioned approximately 1.5 meters above the floor, corresponding to the worker's standing ear level. The noise data were then compared with the provisions of the Indonesian Minister of Health Regulation Number 70 of 2016, which stipulates a NAB of 85 dBA for an 8-hour workday. Although below the threshold, worker complaints were the primary focus of this exploration, given that several studies have shown that long-term exposure to noise, even below the NAB, can still cause psychological fatigue and mild physiological disorders (Handayani & Puspitasari, 2020).

IV. RESULTS AND DISCUSSION

This research was conducted in three wooden furniture industries located in Sukarama District, Bandar Lampung City, namely BDS Furniture, EJM Furniture, and SJ Furniture. Based on the results of noise measurements using a Sound Level Meter (SLM), all production rooms in the three industries showed noise levels below the Threshold Limit Value (NAB) set by the Indonesian Minister of Health Regulation No. 70 of 2016, which is 85 dBA for 8 working hours. The recorded noise levels ranged from 40–50 dBA.

Although still within technically safe limits, workers still felt various health complaints associated with noisy working conditions.

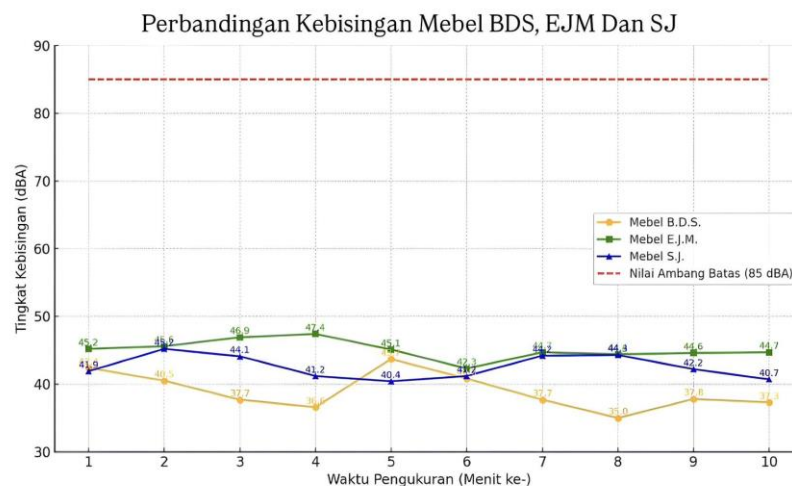


Fig 1. Noise Graph of BDSEJM and SJ Furniture

Based on the graph above, noise levels in BDS furniture were recorded over a 10-minute period, with values recorded per minute. BDS furniture exhibited varying values but were still within safe limits. The results of the study show that the noise levels in three wooden furniture industries in Sukarama District, Bandar Lampung City, namely BDS Furniture, EJM Furniture, and SJ Furniture, are generally still below the Threshold Limit Value (NAB) of 85 dBA for a working duration of 8 hours per day based on the Minister of Health Regulation Number 70 of 2016. This is supported by the measurement results and statements from workers.



Fig 2. BDS Furniture Noise Source From Paint Compressor Machine

"The machines are a bit noisy, but it's still normal. We don't work around them all the time." (BDS Furniture Worker). Workers stated that the noise comes from the cutting and sanding machines, but it's not continuous. The noise is only heard when the machines are operating, and workers are used to it and don't find it significantly disturbing. This indicates a tolerance for intermittent noise that isn't constant throughout the workday.



Fig 3. EJM Furniture Noise Source From Paint Compressor Machine

"Usually, it's only when they're cutting wood that it's noisy. Otherwise, it's not that loud." (EJM Furniture Worker) This statement indicates that noise at EJM occurs only during certain production processes. Outside of these times, the work environment remains conducive and doesn't cause hearing fatigue or communication barriers between employees.



Fig 4. Noise Source of SJ Furniture From Grinding Machine

"The noisiest part is when we're sawing or sanding. But we're used to it, and we can still chat with our colleagues." (SJ Furniture Worker). Workers revealed that while there is noise during certain activities like sawing and sanding, it doesn't interfere with communication or work comfort, indicating adaptation to the existing noise level. Interviews with workers revealed that most workers complained of problems such as headaches, ringing in the ears, fatigue, difficulty concentrating, and discomfort while working. These complaints most often arose as the work day approached midday or in the afternoon, and improved after breaks or after work. Several workers stated that the constant noise of wood cutting and sanding machines caused boredom and mild stress. Furthermore, none of the workers used ear protection. Observations also revealed that the production area is semi-open, and the machines are not equipped with soundproofing. The lack of partitions and the close proximity of machines result in noise being heard directly and spreading throughout the work area. This situation is exacerbated by the long daily work hours, which typically last for eight hours. Three furniture managers stated that they had never previously conducted noise level tests and were unaware of the impacts of noise on health. Of the three industries studied, Mebel SJ had the highest noise levels, followed by Mebel BDS and EJM, although these were still below the NAB. However, the level of subjective complaints was higher among workers at Mebel EJM, possibly due to other factors such as work pressure, aging machinery, and lack of ventilation. Overall, the results of this study indicate that even though noise levels in the furniture industry production area are below the threshold, worker complaints still arise and affect daily work comfort and productivity.

Based on the results of research conducted in three wooden furniture industries in Sukarama District, Bandar Lampung City, it was found that the noise level in the production room was still below the established threshold value (NAB), which is 85 dBA for 8 working hours according to Minister of Health Regulation No. 70 of 2016. Despite this, workers still reported complaints such as dizziness, fatigue, and difficulty concentrating while working. This indicates that noise with an intensity below the NAB can have physiological and psychological impacts on workers, especially if it occurs continuously without adequate mitigation efforts. This phenomenon is in line with the opinion of Lestari & Ekawati (2020), who stated that chronic noise exposure, even if it does not exceed the NAB, still has the potential to cause work fatigue and psychological stress, especially when combined with other factors such as static work postures and uncomfortable room temperatures. From these three worker statements, it can be concluded that noise in the wood furniture industry tends to be temporary and occurs only during certain production processes. The noise levels generated are still below established thresholds, so they do not cause direct physiological disturbances. However, noise from machinery such as saws and drills has the potential to cause psychological stress if it lasts for a long time or occurs repeatedly at high intensity (Ramirez et al., 2020). This aligns with previous research stating that noise exposure below the NAB can still impact workers' psychosocial well-being, especially if it occurs over a long period without adequate hearing protection (Yanti, 2023).

Therefore, even though current noise levels do not exceed the standard, regular monitoring and worker education on the importance of using personal protective equipment (PPE) are still necessary as preventative measures. Work in the furniture industry generally involves the use of heavy equipment such as power saws, wood cutting machines, and drills, which produce high-frequency sounds. According to Suhartono (2022), noise from wood production machinery tends to be continuous and repetitive, which can increase the risk of non-auditory effects such as sleep disturbances, irritability, and even high blood pressure in the long term. Worker complaints in this study indicate that noise exposure not only impacts the auditory system but also disrupts workers' work comfort, productivity, and quality of life. Moreover, in some locations, inadequate ventilation and high room temperatures can exacerbate work stress experienced by workers (Indrawati et al., 2019). It was also found that most workers do not use personal protective equipment (PPE) such as earmuffs or earplugs while working, either due to a lack of knowledge or the lack of facilities. However, a study by Arifin and Mahyudin (2021) stated that the use of hearing PPE can reduce the risk of hearing loss by up to 70% if used consistently. Lack of discipline in the use of PPE is also exacerbated by a work culture that does not optimally integrate occupational safety and health (K3) principles. Workers assume that as long as there are no serious complaints or the machine is not too loud, there is no need to wear protective equipment. Even if the noise level is below the TLV, it does not mean the work environment is completely safe.

According to the World Health Organization (WHO, 2021), the ideal noise level in the workplace to maintain comfort and productivity is between 55–70 dBA. Exceeding this level, even if it does not reach the TLV, can still cause communication disruptions, reduced concentration, and mental fatigue. Several workers in this study also reported difficulty hearing commands from superiors while machines are running. An indicator that the communication function has been disrupted by the continuous sound of the machine (Yuliana, 2020). Physiologically, some workers complain of headaches and ear pain after working for more than five hours, even though they do not experience clinical hearing loss. A study by Lintong (2017) explains that continuous noise exposure can cause a temporary threshold shift (TMS), which, if prolonged and repeated, can develop into a permanent threshold shift (PMS). Therefore, even if the noise level is currently below the TLV, long-term exposure can still cause cumulative hearing damage. This situation indicates that a noise control approach is not sufficient to refer solely to the TLV limit, but needs to consider workers' subjective perceptions and the long-term effects of exposure. As stated by Mahawati (2021), ergonomic workplace design and occupational health education programs can reduce noise-related complaints even when noise levels remain within safe limits. Work environment improvements, such as improving ventilation, training on PPE use, and regular machine maintenance to reduce unnecessary noise, should be part of a noise control strategy. Furthermore, providing adequately quiet restrooms can help workers recover from excessive noise exposure. Strengthening internal regulations at the company level is essential to ensure a healthy and productive work environment for all employees.

V. CONCLUSION AND SUGGESTIONS

Even though noise levels in furniture production areas are below the threshold, workers still experience complaints such as dizziness, difficulty concentrating, and fatigue. This indicates that continuous noise exposure remains a health risk. Lack of PPE and suboptimal working conditions exacerbate the impact. Preventive measures such as implementing occupational health and safety (K3), using PPE, and improving working conditions are needed to protect workers' health.

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