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ANALYSIS OF NOISE INTENSITYON WORK COMFORT AT PUBLIC FUEL FILLING STATION (SPBU) ZAMHUR BATOH BANDA ACEH IN 2025

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ABSTRACT

Noise is one of the physical environmental factors that can have negative impacts on comfort and occupational health. The Zamhur Batoh Gas Station (SPBU Zamhur Batoh) in Banda Aceh, located on the city's main traffic route, has a high potential for noise exposure due to vehicle traffic and fuel dispensing operations. This study aims to analyze the effects of noise intensity, types of noise, and duration of noise exposure on work comfort among employees at SPBU Zamhur Batoh Banda Aceh in 2025 Methods: This study employed a descriptive analytic method with a cross-sectional approach. The population consisted of all 20 employees of SPBU Zamhur Batoh Banda Aceh, who were also taken as the study sample. Noise intensity data were collected through measurements using a Sound Level Meter (SLM) at five measurement points during five different time sessions on both workdays and holidays. Data on types of noise, duration of exposure, and work comfort were obtained through questionnaires. Results: The results showed that 45% of respondents worked under noise intensity levels exceeding the Threshold Limit Value (TLV) of >85 dBA, and all respondents in this category reported experiencing discomfort at work. The dominant types of noise were intermittent noise (45%), impulsive noise (20%), repetitive impulsive noise (10%), and continuous noise (25%). A total of 80% of respondents were exposed to noise for more than 40 hours per week, and 87.5% of them reported discomfort during work. Conclusion: Statistical analysis indicated a significant relationship between noise intensity (p=0.038) and duration of exposure (p=0.032) with work comfort, while no significant relationship was found between types of noise and work comfort (p=0.551).

INTRODUCTION

A Public Fuel Filling Station (Stasiun Pengisian Bahan Bakar Umum/SPBU) is a public facility that provides fuel for motor vehicles, including two-wheeled, four-wheeled, and other types of vehicles. SPBUs operate by selling fuel on a per-liter basis and supply various types of fuel, such as premium, pertalite, pertamax, and diesel, in accordance with applicable operational standards. SPBUs play an essential role in

supporting transportation activities and community mobility (PT Pertamina Persero, 2020).

The development and operation of SPBUs must comply with technical, safety, and spatial planning regulations established by the government. One of the mandatory requirements is a minimum distance of at least 31 meters between an SPBU and residential areas to reduce safety risks and environmental impacts. In addition, the land area required for an SPBU depends on its classification and service capacity, with land requirements generally ranging from approximately 700 m^2 to 2,500 m^2, depending on the type of SPBU and the facilities provided (Ministry of Energy and Mineral Resources of the Republic of Indonesia, 2018).

The existence of motor vehicles is closely related to road activities such as transportation. Traffic density on roads indicates that the number of private and public vehicle owners is increasing every day. Rather than using buses, most people prefer to drive private cars. This can lead to traffic congestion, which is closely associated with noise. Motor vehicle sounds, especially those originating from engines, exhaust systems, and wheel-to-road contact, can be sources of traffic noise. Vehicles with large exhaust systems, such as trucks, buses, and motorcycles, can be significant contributors to traffic noise (Anwar, 2020).

Transportation is defined as the movement of people or goods from one location to another. To facilitate this movement, vehicles are required, which produce sounds such as engine noise from exhausts and horns while in motion. The word “noise” itself comes from the term “noisy,” which describes any sound that disrupts daily activities, distracts attention, or disturbs people. Unwanted sound is the general definition, and it can also pollute the environment (Vedagama, 2020).

In large cities, noise is a serious environmental health problem. Various vehicle activities on roads, especially around SPBUs, are sources of noise. Because they are located on major roads, SPBUs are places with a high risk of noise exposure. Occupational Safety and Health (K3) is regulated under the Regulation of the Minister of Manpower Number 5 of 2018. The maximum Threshold Limit Value (TLV) for noise intensity is 85 dBA, based on assessments of physical and chemical variable thresholds in the workplace. This value is considered suitable for workers who do not have hearing impairments or diseases, with a working duration of less than eight hours per day or 40 hours per week (Sembiring, 2022).

Noise is defined as unwanted sound generated by an activity or operation at a certain time that can disturb environmental comfort and human health, according to Ministerial Regulation Number 40 of 2017 on Noise Quality Standards. This regulation states that the permissible noise level for residential areas and other environments used for functions such as factories, schools, hospitals, and places of worship is 55 dB. The permissible noise level for government and public facilities such as SPBUs is 60 dB.

Long-term exposure to noise can damage workers' hearing and cause noise-induced hearing loss, which may result in deafness. As long as employees are directly exposed to noise, this condition will continue to worsen. According to estimates by the World Health Organization (WHO), 446 million people worldwide, or one in ten people, will experience deafness by the year 2050 (Sembiring, 2022).

Noise stimulation of the nervous system, balance organs, endocrine glands, blood pressure, digestive system, and electrolyte balance can cause dizziness or vertigo, nausea, insomnia, and shortness of breath. Other disorders caused by high-frequency noise include increased blood pressure (±10 mmHg), increased heart rate, constriction of peripheral blood vessels—especially in the hands and feet—paleness, and sensory disturbances (Nur, 2024).

Low-intensity noise below the threshold limit value, or biologically, noise intensity below the Threshold Limit Value (TLV), poses health risks but does not damage hearing. Instead, it can cause stress and other health problems. Stress resulting from noise exposure can lead to various symptoms, including headaches, nausea, insomnia, shortness of breath, sleep disturbances, impaired psychomotor reactions, loss of concentration, disruption of conversational focus, and decreased work performance, all of which can reduce productivity and efficiency (Nur et al, 2024).

SPBUs are among the locations most vulnerable to the negative impacts of noise because passing vehicles generate noise that can cause mental stress for SPBU attendants.

This study aims to examine and analyze the intensity of noise and its impact on work comfort at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh in 2025. Specifically, the research seeks to measure the levels of noise experienced in the workplace, assess employees' perceptions of comfort, and determine the relationship between noise intensity and overall work comfort, providing insights that could support improvements in the working environment.

RESEARCH METHODS

This study is a descriptive analytic study using a cross-sectional approach, aimed at analyzing the relationship between noise intensity and employee work comfort at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh. The research was conducted at the Pertamina Zamhur Batoh SPBU, Lueng Bata District, Banda Aceh City, from 29 April to 12 May 2025, and was carried out in two stages:

a. Stage 1 (29 April – 3 May 2025): Field surveys and interviews with SPBU employees were conducted to collect primary data, along with the distribution and completion of questionnaires.
b. Stage 2 (11–12 May 2025): Noise intensity measurements were performed at five locations within the SPBU area.

The study population consisted of all 20 employees of the Zamhur Batoh SPBU in Banda Aceh. The sample was selected using a total sampling technique, in which the entire population was included as the sample. Noise intensity measurements were carried out at five locations within the SPBU area.

Noise data were measured using a calibrated Sound Level Meter (SLM). Measurements were conducted with the instrument positioned approximately one meter from the noise source, with the microphone placed at the height of the workers' ears and oriented perpendicular to the sound source. Maximum, minimum, and equivalent continuous noise levels (Leq) were recorded. Measurements were conducted in five time sessions: 08:00–10:00 WIB, 11:00–13:00 WIB, 14:00–16:00 WIB, 16:00–18:00 WIB, and 20:00–22:00 WIB. The data were analyzed using descriptive and analytical methods.

RESULTS AND DISCUSSION

Results

1. General Data

Table 1. Distribution of Age, Gender, and Education Level of Employees at SPBU Zamhur Batoh Banda Aceh

Sample Characteristics	Quantity	Percentage (%)
Age group		
21-25 Years	10	50,0
26-30 Years	9	45,0
31-36 Years	1	5,0
Gender		
Male	10	50,0
Women	10	50,0
Educati on Level		
Basics	0	0

Sample Characteristics	Quantity	Percentage (%)
Intermediate	11	55,0
Height	9	45,0
Quantity	20	100

Based on Table 1, it is known that most respondents were in the 21–25 year age group, totaling 10 people (50.0%). Male and female respondents were equal in number, with 10 males (50.0%) and 10 females (50.0%). In terms of education level, most respondents had a secondary education, totaling 11 people (55.0%).

2. Specific Data

a. Noise Intensity

Table 2. Total Laeq Noise Levels at SPBU Zamhur Batoh Banda Aceh

Day	Number of Sessions	Session Point	Total Data (n)	Laeq Total (dB)
Sunday	5	5	25	86,00
Monday	5	5	25	86,00
Quantity			50	86,03

Based on Table 2, the results of noise measurements conducted on Sunday and Monday at SPBU Zamhur Batoh Banda Aceh showed total noise levels (Total Laeq) of 86.00 dB and 86.06 dB, respectively. The total number of data points obtained from both days was 50, with an average total noise level of 86.03 dB.

b. Type of Noise

Table 3. istribution of Types of Noise Experienced by Employees at SPBU Zamhur Batoh Banda Aceh

Noise Type	Quantity	Percentage (%)
Intermittent	9	45,0
Continuous	5	25,0
Impulsive Noise	4	20,0
Repetitive Impulsive Noise	2	10,0
Quantity	20	100

Based on Table 3, out of 20 respondents who experienced discomfort due to noise, 9 people (45.0%) were disturbed by intermittent noise, 5 people (25.0%) by continuous noise, 4 people (20.0%) by impulsive noise, and 2 people (10.0%) by repetitive impulsive noise.

c. Duration of Noise Exposure

Table 4. Distribution of Duration of Noise Exposure among Employees at SPBU Batoh Banda Aceh

Display Length	Quantity	Percentage (%)
≤ 40 hours/week	4	20,0
> 40 hours/week	16	80,0
Quantity	20	100

Based on Table 4, of the 20 respondents, 16 people (80.0%) reported noise exposure durations of more than 40 hours per week, while 4 people (20.0%) reported exposure durations of 40 hours per week or less.

d. Work Comfort

Table 5. Distribution of Work Comfort among Employees at SPBU Zamhur Batoh Banda Aceh

Work Comfort	Quantity	Percentage (%)
Interfering with Comfort	15	75,0
Doesn't Interfere with Comfort	5	25,0
Quantity	20	100

Based on Table 5, out of 20 respondents, 15 people (75.0%) stated that noise disturbed their work comfort, while 5 people (25.0%) stated that noise did not disturb their work comfort.

3. Bivariate Analysis

a. Noise Intensity and Work Comfort

Table 6. Questionnaire Results on Noise Intensity and Work Comfort of Employees at SPBU Zamhur Batoh Banda Aceh

Noise Intensity	Work Comfort				Total	%	P value
	Interfering with Comfort		Doesn't Interfere with Comfort				
	f	%	F	%			
Not Matching the Threshold Value	9	100,0	0	0	9	100	0,038
According to the threshold value	6	54,5	5	45,5	11	100	
Total	15	75,0	5	25,0	20	100	

Based on Table 6, the questionnaire results show that respondents assigned to locations with high noise intensity, especially at Point 2 and Point 5, reported disturbances in work comfort. These disturbances included difficulty concentrating, rapid fatigue, difficulty communicating with coworkers or customers, as well as feelings of boredom and stress while working. In contrast, employees assigned to areas with lower noise levels (below 75 dB), such as during the morning sessions at Points 3 and 4, tended not to experience significant disturbances in work comfort.

Of the 9 respondents who reported noise intensity that did not meet the threshold limit value, all 9 people (100.0%) experienced disturbed work comfort. Meanwhile, of the 11 respondents who reported noise intensity that met the threshold limit value, 5 people (45.5%) stated that their work comfort was not disturbed.

Statistical test results using the Chi-square test obtained a p-value of 0.038 < 0.05, indicating that there is an effect of noise intensity on the work comfort of employees at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh in 2025.

b. Type of Noise and Work Comfort

Table 7. Relationship between Type of Noise and Work Comfort of Employees at SPBU Zamhur Batoh Banda Aceh

Noise Type	Work Comfort				Total	%	P value
	Interfering with Comfort		Doesn't Interfere with Comfort				
	f	%	F	%			
Intermittent	7	77,8	2	22,2	9	100	0,551
Continuous	4	80,0	1	20,0	5	100	
Impulsive Noise	2	50,0	2	50,0	4	100	
Repetitive Impulsive Noise	2	100	0	0	2	100	
Total	15	75,0	5	25,0	20	100	

Based on Table 7, it is known that of the 9 respondents who reported intermittent noise, 7 people (77.8%) experienced disturbed work comfort. Of the 5 respondents who reported continuous noise, 4 people (80.0%) experienced disturbed work comfort. Of the 4 respondents who reported impulsive noise, 2 people (50.0%) experienced disturbed work comfort. All 2 respondents (100%) who reported repetitive impulsive noise experienced disturbed work comfort.

The results of the Chi-square statistical test showed a p-value of 0.551 > 0.05, indicating that there is no effect of the type of noise on the work comfort of employees at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh in 2025.

c. Duration of Noise Exposure and Work Comfort

Table 8. Relationship between Duration of Noise Exposure and Work Comfort of Employees at SPBU Zamhur Batoh Banda Aceh

Noise Exposure Length	Work Comfort				Total	%	P value
	Interfering with Comfort		Doesn't Interfere with Comfort				
	F	%	F	%			
> 40 hours/week	14	87,5	2	12,5	16	100	0,032
≤ 40 hours/week	1	25,0	3	75,0	4	100	
Total	15	75,0	5	25,0	20	100	

Based on Table 8, of the 16 respondents who reported noise exposure durations of more than 40 hours per week, 14 people (87.5%) experienced disturbed work comfort. Meanwhile, of the 4 respondents who reported noise

exposure durations of 40 hours per week or less, 3 people (75.0%) stated that their work comfort was not disturbed.

The results of the Chi-square statistical test showed a p-value of 0.032 < 0.05, indicating that there is an effect of the duration of noise exposure on the work comfort of employees at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh in 2025.

Discussion

Noise Intensity and Work Comfort

The first specific objective of this study was to determine how noise intensity in the work environment of SPBU Zamhur Batoh Banda Aceh is related to the work comfort of employees. Work comfort in this context includes workers' perceptions of calm and comfortable working conditions, the absence of disturbances to concentration, and an environment that supports communication and optimal work activities.

Noise intensity measurements were conducted on two days, Sunday and Monday, representing weekend and weekday conditions. Measurements were carried out at five strategic points within the SPBU area across five working time sessions: 08:00–10:00 WIB, 11:00–13:00 WIB, 14:00–16:00 WIB, 16:00–18:00 WIB, and 20:00–22:00 WIB. Based on the measurement results, almost all points showed high noise levels. Point 2 and Point 5 were locations with the highest noise intensity, both on Sunday and Monday. The total noise level on Sunday was 86.00 dB, while on Monday it was 86.06 dB. The average total noise level from both days was 86.03 dB. These values exceed the noise threshold limit set in the Regulation of the Minister of Manpower No. 5 of 2018, which is 85 dB for an 8-hour workday.

These conditions are associated with the results of the work comfort questionnaire distributed to 20 respondents. Most respondents assigned to points with high noise intensity reported experiencing work discomfort. The forms of discomfort included impaired concentration, rapid fatigue, mild stress, and difficulty communicating with coworkers or customers. Respondents working at points with moderate to low noise levels, such as Points 3 and 4 during the morning session, tended to feel more comfortable and did not experience significant disturbances while performing their duties.

The results of bivariate analysis using the Chi-Square test showed a p-value of 0.038 ($p < 0.05$), indicating a significant relationship between noise intensity and work comfort.

This suggests that high noise exposure is correlated with an increased risk of work comfort disturbance.

This difference indicates that vehicle activity on weekdays (Monday) is denser than on holidays (Sunday), resulting in higher noise exposure. This finding is consistent with the theory proposed by Aini and Mahyuddin (2021), which states that work environments located along major traffic routes experience significantly higher noise levels on weekdays compared to weekends. Consequently, employee work comfort is more disturbed on working days due to greater noise duration and intensity (Aini, 2021).

These results are in line with the study by Puan Salsabila Abrar (2023) at WTP PERUMDA Tirta Daroy, which concluded that noise intensity affects employee comfort and performance. Employees reported difficulty concentrating, irritability, and excessive fatigue, which impacted productivity.

According to the World Health Organization (WHO, 2020), occupational noise is one of the most significant environmental pollutants affecting work comfort and occupational health. When noise reaches or exceeds 85 dBA continuously, it can cause physiological disturbances such as increased blood pressure and heart rate, as well as psychological disturbances including anxiety, irritability, and chronic fatigue.

The author considers that work comfort is strongly influenced by environmental conditions, especially noise levels. At SPBU Zamhur Batoh, vehicle noise, fuel pump machinery, and heavy traffic cause work stress and reduce efficiency. Therefore, hearing protection is necessary to reduce noise exposure.

In the context of SPBU Zamhur Batoh, noise exposure is exacerbated by the absence of soundproofing or acoustic barriers around the work area, as well as the lack of use of personal protective equipment (PPE) such as earplugs or earmuffs by employees. SPBU operators work very close to noise sources without any protection, so the exposure they experience not only poses a risk of long-term hearing impairment but also reduces overall work comfort.

To prevent disturbances caused by noise intensity, several measures can be implemented, such as the use of PPE. SPBU management must provide and require the use of earplugs or earmuffs for employees, especially during peak hours. Acoustic barriers can be installed by adding noise-reducing fences or barriers, such as vegetative plants or sound-insulating materials like water features, particularly on the sides and front of the SPBU.

The author concludes that noise intensity is a dominant factor affecting work comfort at SPBU Zamhur Batoh Banda Aceh. With average noise intensity at or above the threshold limit on working days, comprehensive preventive interventions are necessary to maintain employee comfort and occupational health.

Types of Noise and Work Comfort

Based on Table 7, of the 9 respondents exposed to intermittent noise, 7 people (77.8%) stated that it disturbed their comfort. Of the 5 respondents exposed to continuous noise, 1 person (20.0%) stated that it did not disturb comfort. Of the 4 respondents exposed to impulsive noise, 2 people (50.0%) stated that it disturbed comfort. All 2 respondents (100%) exposed to repetitive impulsive noise stated that it disturbed comfort. The Chi-Square statistical test showed a p-value of 0.551 ($p > 0.05$), indicating that there is no significant relationship between the type of noise and work comfort.

These results differ from previous research by Dewi Yunita Sembiring (2022) at SPBU Medan Area, which showed that various types of noise, especially impulsive noise, affected work stress. This difference may be due to variations in work environments and employees' subjective perceptions of the sounds they experience (Sembiring & Utami, 2022).

According to Susanti and Hermawan (2020), impulsive or intermittent noise such as sudden horn sounds, engines starting abruptly, and mechanical bursts are more psychologically disturbing than continuous noise. These types of noise are startling and unpredictable, triggering acute stress responses. This condition leads to increased heart rate, blood pressure, and adrenaline release, resulting in psychological fatigue.

Differences in noise intensity across points indicate that noise type is not only determined by the sound source but also by SPBU operational dynamics and physical layout. For example, at Point 1, sound intensity increases sharply during peak hours due to vehicles entering alternately, often accompanied by loud engine or horn sounds. At Point 4 (the right side of the SPBU), noise tends to be repetitive impulsive due to the influence of heavy vehicles or public transport that park and frequently turn engines on and off.

The dominant noise sources at the location include vehicles entering and exiting the SPBU area, fuel dispensing machinery, vehicle exhaust sounds—especially from motorcycles and trucks—and horn sounds. These sources generate sounds with high fluctuations in both intensity and frequency.

WHO (2020) states that noise with sudden or alternating fluctuating characteristics is more difficult for the nervous system to tolerate than constant noise. This is because the human body cannot adapt to irregular sounds, leading to faster psychological fatigue. This explains the complaints of some workers stationed at points with impulsive noise types who experience difficulty concentrating and feel fatigued more quickly.

According to the author, although not statistically significant, certain types of noise such as repetitive impulsive noise can still cause discomfort, especially when they occur repeatedly and unexpectedly, but individual tolerance to noise varies widely.

The effect of noise type on work comfort is also strongly influenced by individual factors such as hearing sensitivity, physical and psychological condition, and work experience. Workers accustomed to continuous noise may have higher tolerance than those newly exposed to impulsive noise. However, without protective systems or control measures, the impact remains cumulative and has the potential to cause work stress.

Duration of Noise Exposure and Work Comfort

Based on Table 8, 80% of respondents were exposed to noise for more than 40 hours per week, and among this group, 87.5% reported disturbed comfort. Meanwhile, of the 4 respondents exposed to noise for 40 hours per week or less, 75% stated that they were not disturbed. The Chi-Square statistical test showed a p-value of 0.032 ($p < 0.05$), indicating a significant relationship between the duration of noise exposure and work comfort.

According to the Regulation of the Minister of Manpower of the Republic of Indonesia No. 5 of 2018, the safe exposure limit for noise is 85 dBA for 8 working hours per day or 40 hours per week. If noise intensity exceeds 85 dBA, the safe exposure duration must be reduced proportionally. For example, at an intensity of 88 dBA, the safe exposure limit is 4 hours per day, while at 91 dBA it is only 2 hours per day. These limits are established to prevent hearing damage and disturbances to work comfort caused by acoustic stress.

WHO (2021) states that continuous workplace noise exposure without adequate rest periods can cause long-term physiological and psychological disturbances. In terms of work comfort, these effects manifest as subjective complaints such as rapid fatigue, difficulty focusing, communication problems, and decreased work motivation. This is consistent with the findings of Iskandar and Wahyuni (2020) in the processing industry, where 75% of respondents working in noisy environments for more than 40 hours per

week experienced symptoms such as dizziness, insomnia, emotional disturbances, and work fatigue.

Research by Iskandar and Wahyuni (2020) in industrial settings also showed that workers exposed to noise for more than 40 hours per week more frequently experienced complaints such as dizziness, fatigue, and mood disturbances. Similarly, Alamsyah (2023), in his study in port areas, stated that exposure duration is a dominant factor in determining worker comfort and health conditions.

Prolonged exposure to noise also increases the risk of gradual hearing loss. High-intensity sound damages hair cells in the cochlea, the inner ear structure responsible for converting sound waves into electrical signals. This damage is irreversible, meaning it cannot be cured and can only be prevented. Therefore, controlling exposure duration is a key strategy in maintaining work comfort and occupational health.

In Alamsyah's (2023) study in port areas, it was reported that 68% of workers exposed to noise for more than 45 hours per week complained of work comfort disturbances such as sleep difficulties and irritability. The study emphasized that these disturbances not only occur during working hours but also extend into personal life, reducing overall quality of life.

According to the author, at SPBU Zamhur Batoh, the two-shift work system operating from 06:45 WIB to 22:00 WIB without days off means employees may be exposed to noise for up to 50–60 hours per week. This exposure exceeds safe limits. Moreover, the average noise intensity at this SPBU ranges from 85–94 dBA, depending on time session and measurement location, as discussed previously. These conditions lead to accumulated stress and physical fatigue, ultimately reducing employee work comfort.

To prevent the adverse effects of prolonged noise exposure, several measures can be implemented, including job rotation and regular rest periods. Workers exposed to noise should be given adequate rest time in quiet environments. Shift schedules must consider safe exposure limits. Special rest areas with sound insulation should be provided to allow workers to recover sensory comfort during breaks. Each worker's working hours in noisy environments should be recorded and controlled to ensure they do not exceed weekly exposure limits. Audiometric examinations should be conducted every six months to detect early hearing impairment and evaluate work comfort conditions. Increasing awareness and education through training on noise hazards and self-protection is also essential so that employees do not neglect the use of PPE or normalize noisy working conditions.

CONCLUSION AND RECOMMENDATIONS

Conclusion

Based on the results of the study conducted to examine the effect of noise intensity on work comfort at the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh in 2025, it can be concluded that the overall noise level was high, with a total of 86.00 dB recorded on Sunday and 86.06 dB on Monday, resulting in an average of 86.03 dB. This elevated noise level adversely affected employees' work comfort, as evidenced by questionnaire responses reporting difficulties in concentration, fatigue, and hindered communication during work, with a statistically significant effect ($p = 0.038$). The most dominant type of noise observed was intermittent, primarily originating from motor vehicle sounds and fuel dispensing activities; however, the type of noise was not significantly related to work comfort ($p = 0.551$). In contrast, the duration of noise exposure played a significant role, with employees exposed to noise for more than 40 hours per week experiencing greater disturbances in work comfort, as confirmed by statistical analysis ($p = 0.032$). Overall, these findings indicate that both the intensity and duration of noise exposure are important factors affecting work comfort at the SPBU.

Recommendations

It is expected that the management of the Zamhur Batoh Public Fuel Filling Station (SPBU) in Banda Aceh will implement effective noise control measures, such as installing soundproofing in pump areas or rest rooms, and providing personal protective equipment (PPE), including earplugs or earmuffs, to all employees, particularly those working during peak hours and in close proximity to noise sources. Furthermore, this study is expected to serve as a reference for educational institutions and other researchers interested in exploring the effects of noise intensity on worker comfort. In addition, the findings of this research can provide a foundation for future studies, helping researchers gain a deeper understanding of the relationship between noise exposure and work comfort, and supporting the development of strategies to improve occupational environments.

REFERENCES

Aini, N., & Mahyuddin, A. (2021). The effect of noise intensity on work comfort. *Journal of Environmental Health, 13*(1), 23–30.

Alamsyah, T. (2023). The impact of noise on workers' health in the port area. *Journal of Environmental Health*.

Anwar, A. (2020). Traffic noise characteristics and their impact on urban environments. *Journal of Environmental Engineering and Sustainable Technology, 7*(2), 85–92.

Damayanti, R., Lutfiya, I., & Refi Mirza, E. (2022). Correlation between workplace noise and subjective hearing disorders in textile industry. *The Indonesian Journal of Occupational Safety and Health, 11* SI, 19–30.

Dewanty, R. A., & Sudarmaji, S. (2016). Impact analysis of noise intensity with hearing loss on laundry worker. *Jurnal Kesehatan Lingkungan*.

Firmansyah, M. R., Harahap, N. I., Dewi, D. C., & Delina, S. (2025). The impact of industrial noise exposure on work stress and mental health of workers: A study in the manufacturing industry. *Sustainable Applied Modification Evidence Community (SAMEC)*. https://doi.org/10.69855/samec.v2i2.284

Gedik Toker, Ö., Tas Elibol, N., & Kuru, E. (2025). Industrial noise: Impacts on workers' health and performance below permissible limits. *BMC Public Health, 25*, 1615. https://doi.org/10.1186/s12889-025-22732-1

Hassani, H., & Allami, N. (2024). The impact of noise-induced hearing loss on individual job performance: Exploring aggression and work-related quality of life. *BMC Psychology, 12*, 624. https://doi.org/10.1186/s40359-024-02113-w

Iskandar, R., & Wahyuni, S. (2020). Duration of noise exposure and its effect on industrial workers' health. *Journal of Public Health Science, 8*(3), 145–152.

Jo, H. (2024). Impacts of noise-induced hearing loss on sleep, health, and workplace health problems. *ScienceDirect*.

Kanu, L. K. (2025). *Impacts of workplace noise exposure and mitigation strategies: A scoping review*. *Discover Public Health, 22*, 214.

Maimunah Salsabila, M., Murti, B., & Sumardiyono. (2022). Workplace noise pollution and its correlation with hypertension: A meta-analysis. *Journal of Epidemiology and Public Health*. https://doi.org/10.26911/jepublichealth.2022.07.03.07

Münzel, T., et al. (2025). Effects of air pollution and noise exposure on occupational hearing loss in oil workers. *BMC Public Health, 25*, 2527. https://doi.org/10.1186/s12889-025-23677-1

Nur, B., Nova, P., & Darmawan, M. I., et al. (2024). Analysis of traffic noise levels on Jenggik–Terara Highway. *2*(2), 22–33.

PT Pertamina (Persero). (2020). *Technical and operational standards for public fuel filling stations (SPBU)*. Jakarta: PT Pertamina (Persero).

Rahimimoghadam, S., Javan, S., Yari, S., Kheyrkhah, A., & Nourmohamadi, M. (2023). Evaluation of exposure to noise and vibration and its effect on work-related fatigue. *APJEC, 6*(1), 163–168.

Sembiring, D. Y., & Utami, T. N. (2022). Noise and work stress among employees at SPBU Medan Area District. *Journal of Public Health*.

Song, J., et al. (2025). Association between real-time noise exposure in broader activity contexts and job satisfaction: Evidence from Guangzhou, China. *Cities, 161*, 105912. https://doi.org/10.1016/j.cities.2025.105912

Söylemez, E., Karakaya, C., & Yılmaz, N. (2024). Quality of life and self-reported symptoms in workers exposed to excessive noise. *Akdeniz Tıp Dergisi, 10*(3), 535–541. https://doi.org/10.53394/akd.1351642

Sunarto, D., & Yudhastuti, R. (2022). Relationship of work environment noise intensity with tinnitus complaints. *The Indonesian Journal of Public Health, 17*(3), 429–438.

Vedagama, M. G. V. (2020). Analysis of traffic noise levels in the area of Public Elementary School 1 Ubung, Denpasar, Bali. *Nat Microbiol, 3*(1), 641. https://doi.org/10.33846/sf13217

Widjanarti, M. P., Sumardiyono, & Wardani, A. F. K. (2025). Effect of noise exposure on occupational stress and hypertension among workers: A meta-analysis. *Journal of*

Epidemiology and Public Health, 10(3), 384–398. https://doi.org/10.26911/jepublichealth.2025.10.03.09

World Health Organization. (2020). *Occupational noise: Assessing the burden of disease*. World Health Organization.