Original Article

# Understanding Knowledge and Health Behaviors Regarding Noise Prevention Practices Among Workers in a Small Automotive Parts Manufacturer in Chonburi Province

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## Abstract

**OBJECTIVES:** This study aimed to investigate the interplay between workplace knowledge, health belief factors, and noise prevention practices among workers in a small automotive parts manufacturer located in Chonburi province.

**MATERIALS AND METHODS:** The study targeted employees of the aluminum melting department within the manufacturer, totaling 52 participants. Data collection utilized an online questionnaire.

**RESULTS:** The result showed that the majority of this sample group was male (78.85%), with an age range of 20–39 years (84.62%), predominantly single (59.62%), and held educational qualifications ranging from junior high school to vocational certificates (67.31%). A significant portion reported exposure to noise during work for 6–10 hours per day (48.08%), with experience in the aluminum melting department spanning between 1 and 5 years (80.77%). Overall, a high level of knowledge regarding workplace noise prevention (78.85%), positive health beliefs (76.92%), and adherence to noise prevention practices (90.38%) was observed. Overall health belief with the correlation with noise prevention practice was statistically significant at 0.01 ($p < 0.001$, $r = 0.550$).

**CONCLUSION:** Based on these results, it was suggested that employees must be educated on noise prevention and the correct use of proper noise prevention methods on the job, such as noise protection devices. In addition, promoting awareness and practices for mitigating noise-related hazards is essential for addressing this pertinent issue in the future.

**Keywords:** noise from work, knowledge, health belief, prevention practice

The automotive manufacturing sector is considered one of Thailand's largest industries generating a significant income for the country. It was found that automobile production is ranks first in ASEAN, and is one of the 10 main countries in the world that produce more than 2 million cars per year,[1-2] from forecasting trends in the Thai automobile industry between 2022 and 2031, it was discovered that Thailand is the largest automobile producer in Southeast Asia, known as the Detroit of Asia.[3] As a result of the burgeoning automotive industry, the automotive parts manufacturing sector is also expected to expand. Currently, Thailand hosts numerous large and small automotive parts manufacturers.[4] Automotive parts production is a vital component of the automotive industry, encompassing research and development, product design and manufacturing, as well as basic parts production. One crucial aspect is aluminum melting,[5] which involves several steps that can generate noise. Research[6] studies have shown that the aluminum melting process can reach a maximum noise level of 110 decibels(A), exceeding standard levels.[7] Prolonged exposures to such noisy working environments may pose health risks to workers, potentially leading to hearing loss.[8]

From reports of work-related occupational related disease in Thailand from 2012 to 2021, there were 176 employees who suffered from noise-induced hearing loss and 68 employees lost part of their organs.[9] Hearing

loss is an important occupational health problem that causes personal effects, such as decreased listening ability, leading to communication problems with co-workers, and psychological problems. Impacts on business establishments such as the risk of accidents at work increases. If accidents at work increase, the cost of medical treatment will also increase, thereby impacting the country. For example, there could be economic losses due to compensation for employees who suffer from work-related hearing loss.[10]

After collecting information about the aluminum melting process of workers in a small automotive parts factory in Chonburi Province. In January 2023, it was found that the work process of workers in the aluminum melting department involves feeding aluminum ingots into the melting machine. While the melting machine is operational, it generates noise. And results from measuring the working environment in 2022 showed that the average noise level over an 8-hour working period in the aluminum melting department was 88.7 decibels (A), exceeding the standard set by the Department of Labor Protection and Welfare. According to the department's announcement, the allowed average noise level for an 8-hour working period is 85 decibels (A). And from Preliminary inquiries revealed that most employees in the aluminum melting department occasionally wear hearing protection equipment. Furthermore, the factory only conducts refresher training for employees once a year, which might be insufficient, leading to decreased awareness among employees regarding the importance of noise hazard prevention.

Results from a literature review on noise prevention practices found that knowledge about workplace noise and prevention methods as well as health beliefs, are factors related to behavior in preventing noise-related dangers.[11-13] Given these reasons, the researcher is interested in studying this topic to utilize the research findings for providing knowledge, support, and awareness raising. This aims to induce behavioral changes to prevent noise-related hazards in the aluminum melting department of this small automotive parts company and mitigate the risk of work-related illnesses or injuries due to noise exposure.

To study the comprehension and behavioral responses towards workplace noise, as well as the health beliefs of workers in a small automotive parts factory located in Chonburi Province. This study aims to explore the correlation between workers' knowledge regarding workplace noise and their beliefs and practices concerning occupational noise prevention, within the aforementioned factory setting.

## Materials and Methods

The design of this study was a cross-sectional descriptive study to study the knowledge and health beliefs that are related with practices to prevent danger of noise from work among workers in a small automotive parts factory in Chonburi Province.

The study population was 60 workers in the aluminum melting department of a small automotive parts factory in Chonburi Province. The sample size was calculated using Krejci and Morgan's known population formula at a confidence level of 95%, the sample size calculated was 52 people by using simple random sampling with sampling without replacement method and is a person who meets the conditions of being a worker that working in the aluminum melting department and have worked in the aluminum melting department for 6 months or more. The exclusion criteria were those who did not consent to participate in the research or those who answered the questionnaire incompletely.

### *Research tools*

The tool used to collect data was a questionnaire that had been examined by three experts, it was found that the content validity and the Item objective congruence's index (IOC) between the questions and all variables were greater than 0.50 and internal consistency passed the criteria for all questions. Which will consist of 4 parts, namely:

1. Personal information, there were a total of 7 questions, closed-ended and open-ended, including gender, age, marriage status, educational level duration of exposure to noise per day, years of work, and history of accidents affecting the ears.
2. Knowledge about noise from work, there were a total of 15 questions together with knowledge about the dangers of exposure to noise has 5 questions, knowledge about preventing danger from noise has 3 questions, and knowledge about the use of hearing protection equipment has 3 questions. Which is divided into 2 levels: True and False. In this section there will be a total of 15 points. If they answer incorrectly, they will receive 0 points and if they answer correctly, they will receive 1 point. And there is a level of knowledge about noise from work and how to prevent it, divided into 3 levels using the grouping criteria based on full scores, namely poor level (0-5 points), moderate level (6-10 points) and good level (11-15 points)
3. Health beliefs, there were a total of 16 questions, closed-ended questions, consisting of perceptions of the risk of danger from noise, perception of the severity of danger from noise, perceived benefits of protection against harm and perception of difficult to harm prevention. This section has a total score of 80 points, which is divided into 5 levels: strongly agree (5 points), agree (4 points), not sure (3 points), disagree (2 points), and strongly disagree (1 point). And there are 3 levels of health beliefs using the grouping criteria based on full scores: poor level (16-37 points), moderate level (38-59 points), and good level (60-80 points).
4. Practices to prevent danger from occupational noise, there were a total of 16 questions, closed-ended questions, consisting of following the procedures of work, using hearing protection equipment. and compliance with regulations. This section has a total score of 80 points, which is divided into 5 levels: regularly (5 points), often (4 points), rarely (3 points), sometimes (2 points), and


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never (1 point). And there is a level of practice in preventing dangers from occupational noise, divided into 3 levels using the grouping criteria based on full scores, namely poor level (16-37 points), moderate level (38-59 points) and good level (60-80 points)

*Data collection*

The researcher studied preliminary data by asking for information from the factory, then contacted and introduced himself to the coordinator to clarify the title of the research, the objectives, methods of data collection, and expected benefits, and send the questionnaire to the coordinator, then the coordinator sends the questionnaire to the sample group who agrees to participate in the research via the Line application (Line application), which is an online questionnaire in the form of Google form. After that, the data obtained from the questionnaires were collected, summarized, and analyzed according to statistical methods.

*Data analysis*

Describing the characteristics of personal information, knowledge about occupational noise, health beliefs, and practices to prevent danger from occupational noise using descriptive statistics such as number, percentage, average, minimum value, maximum value, and standard deviation. and finding relationships between knowledge about noise from work, health beliefs and practices to prevent danger from occupational noise Using inferential statistics, including the Chi-square test for qualitative data and the Pearson correlation coefficient for quantitative data.

## Results

The Personal information of the sample population found that the majority, 78.85% were male. Average age 30.62 ± 7.24 years. 59.62% have single status, 67.31% had an education level of lower secondary school/higher secondary school/ vocational certificate level. 48.08% had noise exposure time of 6-10 hours per day. 80.77% had a working period of 1-5 years in the department, and 80.77% never had an accident that affected their ears, as shown in Table 1.

*Knowledge about noise from work*

The results of the study found that more than 90.00% of the population sample answered correctly in the following matters; knowledge about the dangers of exposure to noise, including hearing loss can increase the risk of accidents (96.15%); prolonged and frequent exposure to sound can cause damage to the eardrum (94.23%); and Exposure to sound levels of 85 decibels(A) and above, classified as hazardous sound levels in industrial plants (94.23%). Knowledge about preventing danger from noise, such as: In cases where danger from noise cannot be prevented at the source and through the passage, hearing protection devices such as earmuffs and earplugs should be used (96.15%). The method of preventing and controlling noise at the source of the sound is the most effective method (94.23%), And hearing performance examination according to hearing conservation measures should be checked at least once a year or checked according to risk factors (90.38%). Knowledge about the use of equipment to protect against noise, such as: wearing hearing protection equipment, is the most relevant form of protection for workers at 96.18%. Foam earplugs can reduce the noise level by approximately 15-25 decibels (A) 92.31%. The results of the study found that the majority of the sample population had an overall level of knowledge about noise from work at a good level (78.85%), followed by a moderate level (21.15%), and a poor level (0.00%), as shown in the table 2.

**Table 1:** Number and percentage of the sample classified by personal information (n = 52).

| Personal information (n = 52) | n (%) |
|---|---|
| Gender | |
| Male | 41 (78.85) |
| Female | 11 (21.15) |
| Age (years), | |
| 20 - 39 | 44 (84.62) |
| 40 - 59 | 8 (15.38) |
| Min-Max | 20-53 |
| Mean ± SD | 30.62 ± 7.24 |
| Marriage status | |
| Single | 31 (59.62) |
| Married | 21 (40.38) |
| Education level | |
| lower secondary school / higher secondary school / Professional certificate level | 35 (67.31) |
| Higher diploma level/Bachelor's degree or higher | 17 (32.69) |
| Duration of exposure to noise (hours) per day | |
| 1 - 5 | 5 (9.62) |
| 6 - 10 | 25 (48.08) |
| > 10 | 22 (42.31) |
| Mean ± SD | 9.33 ± 1.88 |
| Years of working in this department (years) | |
| 1 - 5 | 42 (80.77) |
| 6 - 10 | 10 (12.23) |
| Mean ± SD | 3.05 ± 2.49 |
| History of accidents affecting the ears | |
| Never had an accident that affected the ears | 42 (80.77) |
| Having an accident that affected the ears | 10 (12.23) |

**Table 2:** Number and percentage of the sample group classified according to their level of knowledge about noise from work and how to prevent it in general (n = 52).

| Level of knowledge about noise from work and how to prevent it | n (%) |
|---|---|
| Poor level (0-5 point) | 0 (0.00) |
| Moderate level (6-10 points) | 11 (21.15) |
| Good level (11-15 points) | 41 (78.85) |
| Mix-Max | 7 - 15 |
| Mean±SD | 11.60 ± 1.75 |

*Health beliefs*

The results of the study found that more than 90.00% of the sample group answered that they agreed and strongly agreed as follows; Perceived **risks of danger** such as believing that working in a noisy area will cause hearing loss; (96.15%) felt that the working environment was noisy (94.23%). Perception of **the severity of danger from noise,** including not wearing hearing protection equipment while working will lead to the possibility of hearing loss or deafness (96.2%). Long-term exposure to sounds of 85 decibels (A) or higher may impair work performance (94.3%). And working in a job that is frequently exposed to noise for long periods of time can cause hearing impairment (90.4%). Perceived **benefits of protection from noise,** including wearing earplugs or ear muffs can help reduce exposure to noise (98.07%). Believed that undergoing an annual hearing examination reduces the risk of hearing loss (94.23%). Believed that wearing hearing protection equipment correctly can make them work more efficiently (94.2%). Believed that preventing danger from noise at the source, at the pathway, and at the individual are all beneficial in preventing danger from noise. (90.4%). Perceived **difficulty to protecting** against noise hazards. More than 50.00% of the sample group answered that they agreed and strongly agreed that they felt that wearing hearing protection equipment. Reducing the efficiency of listening to sound decreases (73.0%). Work procedures make it inconvenient for you to wear hearing protection equipment (57.69%). Felt that wearing hearing protection equipment was a waste of time (51.9%). And felt that wearing hearing protection equipment made them feel obtrusive and made them unable to work efficiently (50.0%). The results of the study found that the majority of the sample had overall health beliefs at a good level (76.92%), followed by a moderate level (21.15%), and a poor level (1.92%), as shown in Table 3.

*Practices to prevent danger from occupational noise*

The results of the study found that more than 90.00% of the sample answered that they often combined with regularly in the following matters: **Compliance with work procedures,** including working according to safe work procedures in the manual provided by the business establishment (94.2%) And the readiness of the machines is checked before starting use. To prevent vibration, which is one of the causes of noise (92.3%). **Using equipment to protect against danger from noise,** including using appropriate hearing protection equipment provided by the factory (90.4%) and change hearing protection equipment immediately when old equipment is found to be damaged (90.4%). **Compliance with the rules and regulations** such as taking a hearing test as provided by the business establishment for hearing monitoring (90.38%). The results of the study found that most of the sample group had a level of practice in preventing dangers from occupational noise. Overall, it was at a good level (90.38%), followed by a moderate level (5.77%), and a poor level (3.85%) as shown in Table 4.

*The relationship between knowledge about occupational noise and practice in preventing dangers from occupational noise.*

Results from the analysis of the relationship between knowledge about occupational noise and practice in preventing dangers from occupational noise. It was found that knowledge about occupational noise, including knowledge about dangers from exposure to occupational noise, knowledge about prevention of dangers from occupational noise, and knowledge about the use of equipment to prevent dangers from occupational noise, did not have correlations with practices in preventing danger from occupational noise, as shown in Table 5.

**Table 3:** Number and percentage of the sample classified by level of overall health beliefs (n = 52).

| Level of health beliefs (n = 52) | n (%) |
|---|---|
| Poor level (16-37 points) | 1(1.92) |
| Moderate level (38-59 points) | 11 (21.15) |
| Good level (60-80 points) | 40 (76.92) |
| Mix - Max | 33 - 80 |
| Mean ± SD | 65.5 ± 9.08 |

**Table 4:** Number and percentage of the sample, classified according to the level of practice in preventing danger from occupational noise in general (n = 52).

| Level of practice in preventing danger from occupational noise | n (%) |
|---|---|
| Poor level (16-37 points) | 2 (3.85) |
| Moderate level (38-59 points) | 3 (5.77) |
| Good level (60-80 points) | 47 (90.38) |
| Mix - Max | 32-80 |
| Mean ± SD | 69.21 ± 10.42 |

**Table 5:** Correlation coefficient between knowledge about noise from work and prevention methods and practices to prevent danger from occupational noise (n = 52).

| Variable | Practices to prevent danger from occupational noise | |
|---|---|---|
| | r | *p* |
| Knowledge about noise from work and how to prevent it in general | -0.127 | 0.368 |
| Knowledge about the dangers of exposure to noise | 0.005 | 0.970 |
| Knowledge about preventing danger from noise | -0.001 | 0.993 |
| Knowledge about the use of equipment to prevent danger from noise | -0.207 | 0.140 |

** Statistically significant at the 0.01 level.


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*The relationship between health beliefs and practices in preventing dangers from occupational noise.*

Results from the analysis of the relationship between health beliefs and practices to prevent dangers from occupational noise found that overall health beliefs are positively correlated with practices in preventing dangers from occupational noise with statistical significance at the 0.01 level (r = 0.550, $p < 0.001$). For perception of the risk of danger from noise, perception of severity of danger from noise, and perception of benefits of danger prevention are positively related to behavior in preventing danger from noise at work with statistically significant at the 0.01 level (r = 0.526, $p < 0.001$, r = 0.677, $p < 0.001$ and r = 0.581, $p < 0.001$, respectively). But the perception of difficulty in preventing danger was not related to the practice of preventing danger from occupational noise, as shown in Table 6.

**Table 6:** Correlation coefficient between health beliefs and practices to prevent dangers from occupational noise (n = 52).

| Variable | Behaviors to prevent danger from occupational noise | |
|---|---|---|
| | r | *p* |
| Overall health beliefs | 0.550** | < 0.001 |
| Perception of the risk of danger from noise | 0.526** | < 0.001 |
| Perception of the severity of danger from noise | 0.581** | < 0.001 |
| Perception of benefits of protection against harm | 0.677** | < 0.001 |
| Perception of difficult to hazard prevention | 0.160 | 0.256 |

** Statistically significant at the 0.01 level.

## Discussion

Results from a study of knowledge and health beliefs related to practices in preventing dangers from occupational noise in workers at a small automotive parts factory in Chonburi Province, it was found that 78.85% of workers working at the aluminum melting department of this factory had a good level of knowledge about noise from work and how to prevent it, 76.92% had a good level of belief in their health, and 90.38% had good practices in preventing danger from occupational noise. This may be because the factory has good safety management, organizing refresher training activities on safe work procedures and the use of hearing protection equipment every year.

A manual for working safely is prepared, including safety discussion activities every morning before work, but the workers did not strictly implement it. The study of the results of the study of behavior in preventing dangers from occupational noise is consistent with past research that found that the behavior in preventing dangers from working among employees in the automobile parts manufacturing industry is at a high level, because the company has a good safety management system.[12]

The results of the analysis of the relationship between knowledge about occupational noise and practice in preventing danger from noise, it was found that knowledge about occupational noise was not related to the practice of protecting against danger from occupational noise. This may be because employees who already have knowledge about noise from work and how to prevent it may neglect to follow work procedures and comply with rules and regulations. Including the use of hearing protection equipment, which is consistent with research that found that 88.00 percent of employees did not wear hearing protection equipment.[14] And this is consistent with research that has previously been studied which has indicated that behavior is not related to the individual's knowledge of noise as well.[15] However, health promotion or training is one of the occupational health services that relevant people must pay attention to in order to keep employees healthy and behaving well.[16]

From the results of the analysis of the relationship between health beliefs and positive practices in preventing dangers from noise at work, it was found that health beliefs are related to practices in preventing dangers from occupational noise. This may be because when workers are aware of the risk of danger, the severity of the danger, and the benefits of preventing danger, they will be more aware of their own safety, resulting in improved behavior in preventing hazards from occupational noise. This is consistent with the theory of health belief patterns[17] which states that people who are aware of their risk of disease will see the importance of good health. People who perceive the severity of the disease believe that the disease will harm their body or affect their social status. And awareness of the benefits of practicing to prevent disease is knowing that by following the recommendations for disease prevention, one will be able to avoid illness or disease, and will cooperate in practicing to prevent disease and promote health. The results of this study are consistent with past research which has stated that health beliefs, perceived severity of noise hazards, and perceived benefits of hazard prevention were also positively related to occupational hazard prevention behaviors.[11-13]

## Conclusion

Based on these results, it was suggested that employees must be educated on noise prevention and the correct use of proper noise prevention methods on the job, such as noise protection devices. In addition, promoting awareness and practices for mitigating noise-related hazards is essential for addressing this pertinent issue in the future.

## Recommendation

Campaign activities should be implemented to increase awareness of the hazards associated with occupational noise exposure. This includes promoting better protective measures among workers, such as advocating for participation in hearing tests and organizing safety week activities within the factory. Additionally, there should be training provided on the proper use of hearing protection and selecting the most suitable type of protection based on the nature of the sound.

*For next research:* Additional research should explore other factors impacting practices aimed at mitigating the risks associated with occupational noise exposure, including social support mechanisms, organizational safety standards, and sound level measurements both in the workplace and at the individual level. Qualitative research, such as focus groups, should be employed to gather more detailed and insightful information in order to inform more efficient and targeted future research.

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