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# Analysis of Factors Related to Non-Auditory Effect Complaints in Rice Milling Workers in Kabila and Tilongkabila Districts, Bone Bolango Regency

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**ABSTRACT**

Non-auditory effect complaints are the effects of noise that are not related to the auditory effect hearing function, including physiological, psychological, and communication disorders such as fatigue, stress, and concentration disorders, which are common in workers with high noise exposure, including in the rice milling industry. This study aims to determine the relationship between noise intensity, working period, and duration of exposure with non-auditory complaints in rice milling workers in Kabila and Tilongkabila Districts, Bone Bolango Regency.
The type of research used in this study is Observational Analysis with a cross sectional research design. The population in this study used a total sampling technique. The number of samples in this study is as many as 70 workers in nine rice milling units in Kabila & Tilongkabila districts, Bone Bolango Regency. The data analysis method used is the Chi-square test.
The results showed that there was a significant relationship between working time with (p-value = 0.006), while noise intensity was not significantly related to (p-value = 0.946) and length of exposure there was a significant relationship with (p-value = 0.000) with non-auditory effect complaints rice mill workers in Kabila & Tilongkabila district, Bone Bolango Regency. Workers are expected to increase awareness in maintaining occupational health by using ear protection regularly, making good use of rest time, and immediately reporting complaints such as fatigue, stress, and concentration disorders.

## INTRODUCTION

Noise is a form of environmental pollution that is often overlooked but has a significant impact on human health. In the context of the work environment, noise is classified as a physical hazard that can affect the health and safety of the workforce, Industrial activities are one of the biggest contributors to noise. There are many types of jobs and work environments that are familiar with noise, one of which is the rice milling industry. (Rafa Zemy et al., 2025). Noise can cause two types of effects. These effects are the *auditory* and *non-auditory*. Hearing loss (*auditory effect*) is a condition in which a person has a decrease in hearing ability This can vary from mild to severe, and can affect one or both ears. While non-hearing impairment (*non-auditory effect)* It consists of three aspects, namely physiological disorders, psychological disorders, and communication disorders (Rahmadina, 2024) .

In addition to noise, there are several other factors that affect the occurrence of disturbances *non-auditory effect*. As we age, hearing function and hormonal balance will decrease which will later result in disorders *non-auditory effect*. Research conducted by Fiza et al., (2024) shows there is a relationship between age and the disorder *non-auditory* In fishermen in Bogak Village, Coal Regency, with the Fisher Exact test, a P-Value of 0.002 was obtained.

In addition, working period is another factor that can cause hearing loss or disorders *non-auditory effect*. This work period factor is also related to the aspect of the duration of noise exposure, so the likelihood of the person experiencing disturbances or complaints is also greater (Veza et al., 2019).

WHO reports that in 2019, 446 million workers worldwide suffered from hearing loss due to noise in the workplace. If this problem is not fixed, then by 2030 about 630 million people will suffer from hearing loss(Fiza et al., 2024). WHO states that the prevalence of hearing loss or damage in Indonesia reaches around 4.2% due to noise (Safitri, 2021). In 2007, about 23,000 cases were reported as disorders *non-audiotory effect* due to machines that produce noise intensity above NAV. It is estimated that the consequences of noise exposure can cause fatigue by 27.43%, hearing loss by 17.14% and balance disorders by 27.17%, the total number of disorders reaches 72.28% (Syahtiah, 2021).

At the local level, various studies in Gorontalo Province show that work noise is still a significant occupational health problem. The results of preliminary observations at one of the rice milling industries in Kabila District, Bone Bolango Regency showed a noise level of 93 dB, which means that it has exceeded the set threshold value.

Research by Amalia & Lanjahi (2015) shows that most of the people around PLTD Telaga Gorontalo City experience hearing loss due to noise. Of the 12 measurement points, 11 exceeded the threshold of 55 dB(A) (range 53–85 dB(A)). More than 80% of respondents experienced hearing loss, mainly mild (26–40 dB) and moderate (41–55 dB) categories, and there was a significant influence between noise intensity and degree of hearing loss ($p < 0.05$). In addition, research conducted by Atila Balgis Masiaga et al., (2025) in production workers in the Furniture Industry Pt. Faninda Jaya The results showed that the noise intensity in some work units exceeded NAV (>85 dB), and most workers with tinnitus (72.7%) were exposed to high noise. Statistical tests showed a significant relationship between noise and tinnitus ($p = 0.025$).

There are many types of jobs and work environments that are familiar with noise, one of which is the rice milling industry. The results of initial observations carried out at the rice mill in Kabila District, Bone Bolango Regency, showed that the noise level in the area of the skin crushing machine and rice polisher reached 93.84 dB, exceeding the threshold value according to Permenaker No. 5 of 2018. Operational activities take place at 08.00–17.00 WIB and can be longer during the harvest season. Workers are divided into the inner part (milling process) and the outer part (rice drying).

The results of interviews with 8 workers showed that all of them were ≥30 years old, with 2 workers having a working period of ≥5 years and 6 workers <5 years. A total of 4 workers were exposed to noise ≥8 hours/day and 4 workers <8 hours/day, and did not use ear protection. The majority of workers (5 people) experienced high category non-auditory complaints, such as discomfort, communication difficulties, irritability, and fatigue, while the other 3 workers experienced moderate category complaints. This condition shows that noise exposure in rice mills not only impacts hearing, but also causes non-auditory disorders such as fatigue, stress, concentration disorders, and decreased work comfort. This is suspected to be influenced by individual and occupational factors, so it is necessary to conduct research to analyze factors related to non-auditory complaints in rice milling workers in Kabila and Tilongkabila Districts, Bone Bolango Regency, as the basis for efforts to prevent and control occupational health risks.

**Research Objectives**

This study aims to determine the factors related to non-auditory effect complaints in rice milling workers in Kabila and Tilongkabila Districts, Bone Bolango Regency.

## RESEARCH METHODS

This research method is an observational analytical study, which is an observational study that collects data from a population or sample at a certain time with a cross sectional research design. The population in this study is all workers who work in nine rice milling units that are the research locations, namely Nurain, Mutiara, Oluhuta, Helumo and HP, Rifli, Putra, Mawar, Bebi. All workers in the nine rice milling units total 70 workers. The sample in this study uses a total sampling technique where the number of samples is equal to the number of population, which is 70 workers. The research instrument used a questionnaire through direct interviews.

## RESULTS

**Table 1 Respondents Based on Rice Milling Sites in Kabila & Tilongkabila District, Bone Bolango Regency**

| Mill Name | Quantity | |
|---|---|---|
| | n | % |
| Pearl Rice Mill | 4 | 5.7 |
| The Priest of Nurain | 9 | 12.8 |
| O'Neill Priest | 11 | 15.8 |
| Cell Phone Grinder | 6 | 8.5 |
| Helumo Priest Mill | 8 | 11.4 |
| Rice mill Rifli | 4 | 5.7 |
| A Priest's Funeral | 12 | 17.2 |
| The Son of a Priest | 4 | 5.7 |

| | | |
|---|---|---|
| The Rose Priest | 12 | 17.2 |
| **Total** | **70** | **100** |

Based on Table 1, it shows that out of a total of 70 respondents, Bebi Rice Mill and Mawar Rice Mill have the highest number of respondents, each as many as 12 people (17.2%). Followed **by** Oluhuta Rice Mill with 11 people (15.8%), Nurain Rice Mill with 9 people (12.8%), and Helumo Rice Mill with 8 people (11.4%). Meanwhile, the Cellphone Rice Mill had 6 respondents (8.5%), and the least were the Mutiara Rice Mill**,** Rifli Rice Mill**,** and Putra Rice Mill which each had only 4 people (5.7%).

**Table 2 Distribution of Respondents by Age**

| Age Group (Year) | Quantity | |
|---|---|---|
| | n | % |
| ≥ 30 Years | **50** | **71.5** |
| < 30 Years | **20** | **28.5** |
| **Total** | **70** | **100** |

Based on Table 2, it shows that respondents with the age category ≥ 30 years dominate as many as 50 people (71.5%) compared to respondents aged < 30 years as many as 20 people (28.5%).

**Table 3 Distribution of Respondents by Noise Intensity**

| Noise Level | Quantity | |
|---|---|---|
| | n | % |
| Qualified ≤ 85 dBA | 5 | 7.1 |
| Not Eligible > 85 dBa | 65 | 92.9 |
| **Total** | **70** | **100.0** |

Based on Table 3, it shows that most of the workers exposed to noise in the ineligible category (> 85 dBA), with a total of 65 people (92.9%), while 5 workers who are exposed to noise in the qualified category (≤ 85 dBA) as many as 5 workers (7.1%).

**Table 4 Distribution of Respondents by Tenure**

| Tenure | Quantity | |
|---|---|---|
| | n | % |
| Risky ( > 5 years) | 33 | 47,1 |
| No Risk (≤ 5 years) | 37 | 52.9 |
| **Total** | **70** | **100,0** |

Based on Table 4, it shows that most of the respondents have a non-risky working period (< 5 years), namely 37 respondents (52.9%), while respondents with a non-risky working period (> 5 years) as many as 33 (47.1%) respondents.

**Table 5 Distribution of Respondents by Duration of Exposure**

| Display Length | Quantity | |
|---|---|---|
| | n | % |
| Risky (≥ 8 hours) | 28 | 40.0 |
| No risk (< 8 hours) | 42 | 60.0 |
| **Total** | **70** | **100.0** |

Based on Table 5, it shows that most of the respondents had a non-risky exposure period (< 8 hours), namely 42 respondents (60.0%), while respondents with a risky exposure period (>8 hours) were 28 respondents (40.0%).

**Table 6 Distribution of Respondents by *Non-Auditory Effect Complaints***

| Keluhan *Non-Auditory effect* | Quantity | |
|---|---|---|
| | n | % |
| Low (24-47) | 29 | 41.4 |
| Height (48-72) | 41 | 58.6 |
| **Total** | **70** | **100.0** |

Based on Table 6, it shows that most of the respondents experienced *non-auditory effect* complaints in the high category (56-70), namely 41 respondents (58.6%), while the low category (24-39) as many as 29 respondents (41.4%).

**Table 7 Relationship of Working Time to *Non-Auditory Effect Complaints***

| Tenure | Keluhan *Non-Auditory Effect* | | | | Total | | *P-value* |
|---|---|---|---|---|---|---|---|
| | Low | | Height | | n | % | |
| | N | % | n | % | | | |
| No Risk | 21 | 56,8 | 16 | 43,2 | 37 | 100 | 0.006 |
| Risky | 8 | 24,2 | 25 | 75,8 | 33 | 100 | |
| **Total** | **29** | **41.4** | **41** | **58,6** | **70** | **100** | |

Based on Table 7, it is known that respondents with a period of service are not at risk of experiencing *non-auditory effect* complaints in the low category, which is 21 people (56.8%), while the high category is 16 people (43.2%). Meanwhile, respondents with a period of service at risk were dominated by complaints in the high category, which was 25 people (75.8%), followed by the low category as many as 8 people (24.2%). The p-value of 0.006 < 0.05 indicates that the working period has a significant relationship with *non-auditory effect* complaints in rice milling workers in Kabila and Tilongkabil Districts, Bone Bolango Regency.

**Table 8 Relationship of Long Exposure to *Non-Auditory Effect Complaints***

| Display Length | Keluhan *Non-Auditory Effect* | | | | Total | | *P-value* |
|---|---|---|---|---|---|---|---|
| | Low | | Height | | n | % | |
| | N | % | n | % | | | |
| No Risk | 28 | 66,7 | 14 | 33,3 | 42 | 100 | 0.000 |
| Risky | 1 | 3,6 | 27 | 96,4 | 28 | 100 | |
| **Total** | **29** | **41,4** | **41** | **58,6** | **70** | **100** | |

Based on Table 8, it is known that respondents with a period of exposure are not at risk of experiencing *most non-auditory effect* complaints in the low category, namely 28 people (66.7%), while the high category is 14 people (33.3%). Meanwhile, respondents with a long exposure period at risk were dominated by complaints in the high category, namely 27 people (96.4%), followed by the low category as many as 1 person (3.6%). The p-value of 0.000 < 0.05 indicates that the duration of exposure has a significant relationship with *non-auditory effect* complaints in rice milling workers in Kabila and Tilongkabil Districts, Bone Bolango Regency.

**Table 9 Relationship of Noise Intensity with *Non-Auditory Effect Complaints***

| Noise Intensity | Keluhan *Non-Auditory Effect* | | | | Total | | *P-value* |
|---|---|---|---|---|---|---|---|
| | Low | | Height | | n | % | |
| | N | % | n | % | | | |
| Eligible | 2 | 40 | 3 | 60 | 5 | 100 | 0.946 |
| NoEligible | 27 | 41,5 | 38 | 58,5 | 65 | 100 | |
| **Total** | **29** | **41.4** | **41** | **58,6** | **70** | **100** | |

Based on Table 9, it is known that respondents who were exposed to noise intensity qualified amounted to 5 people (7.1%). Of these, 2 people (40%) experienced *non-auditory effect* complaints in the low category and 3 people (60%) were in the high category. Meanwhile, respondents with ineligible noise intensity amounted to 65 people (100%). Of these, most of them experienced complaints in the high category, which was 38 people (58.5%), while the low category was 27 people (41.5%). The p-value of 0.946 > 0.05 showed that noise intensity was not significantly related to *non-auditory effect* complaints in rice milling workers in Kabila & Tilongkabil District, Bone Bolango Regency.

## DISCUSSION

### The relationship between working time and *non-auditory effect* complaints in rice mill workers in Kabila and Tilongkabila Districts, Bone Bolango Regency.

Based on the results of bivariate analysis through *the chi-square* test in Table 7, a p-value of 0.006 < 0.05 was obtained with a total of 70 respondents (N). These results show that there is a significant relationship between the length of service and the *non-auditory effect* complaints in workers. There is a significant relationship between working time and *non-auditory* complaints in this study because the working period is related to the length of time a person is exposed to noise at work, so the longer they work, the more noise exposure they receive.

This can be seen in Table 4.7 where workers with a risky working period (> 5 years) experience *more non-auditory* complaints in the high category, which is as many as 25 people (75.8%), compared to workers, a non-risk working period (≤ 5 years), which is 16 people (43.2%). This condition suggests that workers with longer working periods tend to be exposed to noise continuously over a long period of time, thus increasing the dose of exposure received. Continuous exposure to noise that exceeds the threshold value (> 85dB) and continues can trigger the appearance of *non-auditory* disorders such as fatigue, stress, concentration disorders, and communication disorders.

Therefore, the longer a person's working life in a noisy environment, the greater the risk of *non-auditory complaints*.

The working period is one of the factors that affect the occurrence of work-related diseases. The longer a person works in a place, the more likely they are to be exposed to physical and chemical factors in the work environment that can cause work-related disorders or illnesses. Working period is a condition that can increase the risk of hearing and non-hearing loss. Basically, the longer the working period, the longer the exposure will cause a great risk to health, namely both hearing and non-hearing (Fiza et al., 2024).

This is in line with research conducted by Tri Budiyanto (2019) The results of the statistical calculation stated that there was a significant relationship between working time and work stress in workers in the weaving sector. This can be seen from the value of *p-value* 0.019 (< 0.05). Biologically meaning states that there are workers who have a long working period have a higher risk of moderate work stress than workers who do not have a long working period.

**Long Exposure Relationship with Non-Auditory Effect Complaints in Rice Milling Workers in Kabila and Tilongkabila Districts, Bone Bolango Regency.**

Based on the results of bivariate analysis through the chi-square test in Table 4.8, a p-value of 0.000 < 0.05 was obtained with a total of 70 respondents (N). These results show that there is a significant relationship between the duration of exposure and *non-auditory effect complaints* in workers. There was a significant relationship between the duration of exposure and *non-auditory effect* complaints in this study because the duration of noise exposure has an important role in the emergence of complaints in workers. Based on the results of the study, workers who have a higher duration of exposure tend to experience *non-auditory* complaints in the high category. This is based on the data in Table 8, where in the group of workers with a period of risk exposure (> 8 hours) there were 27 (96.4%) people who experienced high-category complaints, while in the non-risk group (≤ 8 hours) only 14 (33.3%) people experienced high-category complaints. This condition shows that the longer workers are exposed to noise in a day, the greater the risk of *non-auditory complaints*.

This condition occurs because workers in rice mills are exposed to noise continuously during working hours, without sufficient recovery time from noise sources. In addition, most workers do not use personal protective equipment (PPE), so the noise received is not reduced. The closed working environment also causes machine noise to accumulate in one room, so that the noise is felt stronger and lasts continuously. and the absence of noise supervision and control in the workplace also worsens the condition.

This is in line with research conducted by Risky (2013) which states that the length of exposure is related to the occurrence of disturbances *non-auditory effect* in rock musicians, in accordance with Olisshifki's theory which states that the duration of exposure to noise, including the length of work, is a factor that causes the occurrence of hearing loss and non-hearing in the workforce.

**The Relationship of Noise Intensity with *Non-Auditory Effect* Complaints in Rice Milling Workers in Kabila and Tilongkabila Districts, Bone Bolango Regency.**

Based on the results of bivariate analysis through *the chi-square* test in Table 49, a p-value of 0.946 > 0.05 was obtained with a total of 70 respondents (N). These results show that there is no significant relationship between noise intensity and *non-auditory effect* complaints in workers. The absence of a relationship between noise intensity and *non-auditory effect* complaints in this study can be caused by several factors. One of them is the variation in individual responses, where each worker has a different ability to adapt to noise, so that not all workers feel *non-auditory* complaints such as stress, fatigue, or concentration disorders despite being exposed to noise that exceeds NAB (≥ 85 dB).

In addition, *non-auditory* complaints are not only affected by noise intensity, but also by other factors such as the length of daily exposure, working period, age, health conditions, workload, and work environment conditions. These factors may affect the degree of worker susceptibility to the impact of noise, so the relationship between noise intensity and *non-auditory* complaints was not significant in this study.

On the other hand, a relatively even distribution of complaint data in the low, medium, and high categories can also lead to the absence of a statistically significant relationship. Workers who are used to a noisy work environment tend to consider this condition as normal so that complaints are not felt in real terms. In addition, the measurement of *non-auditory complaints* that are subjective can also affect the results of the study because it is highly dependent on the perception of each individual.

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