# Factors Related to Hearing Disorder on Traditional Fishermen in Namrole Sub-District South Buru Regency

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## Abstract

Namrole sub-district, South Buru regency, is one of the sub-districts in Maluku province where the majority of the people have a livelihood as fishermen. The process of fishing is done by diving using a compressor at depths exceeding 10 meters. This causes various complaints such as headaches, spasms and hearing disorder. The purpose of this study was to determine the factors associated with a hearing disorder in traditional fishermen. The research method used is quantitative descriptive. Statistical test results using the chi-square test showed that the depth of diving has a significant correlation with a hearing disorder with a value of $\alpha = 0.01$, while the period of work, duration of work, and frequency of diving do not correlate with the hearing disorder in traditional fishermen in Namrole district, South Buru Regency.

***Keywords**: Fishermen, Divers, Period of Work, Depth, Hearing Disorder*

## Introduction

Maluku Province is an archipelago that is included in 7 island provinces out of 34 provinces in Indonesia. Maluku Province has 11 city districts that are surrounded by oceans and have very promising water resources, including South Buru Regency. South Buru Regency is a district with an administrative area of 6723 Km2 with a water area of 1,603 Km2. South Buru Regency has the potential of marine natural resources which has a large contribution to regional development, especially in the fisheries and marine sector.

This is what causes many people in the South Buru district, especially Namrole district, to have a livelihood as fishermen. These fishermen are generally more focused on catching tuna because besides its sale value is higher than other types of fish, this fish can also be exported to other countries. The fishing process carried out by the fishermen is still traditional by using simple fishing gear and carried out by diving using a compressor.

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Diving is done in calm weather or during extreme weather. This results in the emergence of disease and cause accidents. The average dive process is more than 2 hours with the frequency of diving above 3 times. The duration of dive frequency causes the fishermen often experience complaints in the form of headaches, spasms, ear pain, and hearing disorder. Diseases that can be caused by diving are decompression, poisoning, vertigo, hyportemia and barotrauma.(1) The factors that cause frequent accidents are the process of diving by using a compressor for a long time. Previous studies have shown that the number of accidents of fishermen using compressors is higher than not using compressors. (2) Other factors that influence the occurrence of accidents in traditional divers are the depth of diving and the duration of diving. Both of these factors can cause decompression.(3) Another disease caused by traditional diving is ear barotrauma. According to research (4), there is a significant correlation between the use of the compressor as a diver and the occurrence of ear barotrauma. Another factor that can cause barotrauma is the depth and duration of diving.(5) For this reason, research is needed to determine the correlation between the period of work, duration of work, frequency of diving and depth of diving with the hearing disorder on traditional fishermen in Namrole Sub-district, South

Buru Regency.

## Methods

This research was a quantitative descriptive study that aimed to determine the factors associated with hearing disorders in traditional divers in Namrole Sub-district, South Buru Regency. This research was conducted in Namrole Sub-district, South Buru Regency for one month.

The population in this study were 50 fishermen with active diving activities in archery fish in Namrole Sub-district, South Buru Regency. The sample in this study were divers who have the qualifications and meet the inclusion criteria. The samples size studied was 35 fishermen who actively dive.

This research was carried out through several stages as follows:

1. Initial Survey

This stage aimed to find out the problems in the field.

2. Problem Statement

In this stage, the discussion was formulated based on the field and literature review conducted.

3. Distribution of Questionnaires

Questionnaires were distributed to capture information about the characteristics of respondents, duration of diving, frequency of diving and other information related to research.

4. Data Processing

In this stage, the questionnaire data processing was done.

5. Analysis

In this stage, an analysis was carried out with considering the results of research and supporting theories and also prior research which is related to this research. The analysis was performed using chi-square statistical analysis to see the correlation between the period of work, duration of work, frequency of diving and depth of diving with a hearing disorder.

## Findings

Characteristics of Respondents

After calculating, a frequency distribution was obtained based on the characteristics of the respondents as shown in table 1.

**Table 1. Distribution of Respondents' Characteristics (Age, Education, Occupation, Marital Status)**

| **Age** | **Frequency** | **Percentage** |
|---|---|---|
| · 20-25 | 6 | 17.1 |
| · 26-30 | 14 | 40 |
| · 31-35 | 5 | 14.3 |
| · 36-40 | 7 | 20 |
| · 46-50 | 3 | 8.6 |
| Education | Frequency | Percentage |
| · Primary School | 17 | 48.6 |
| · Junior High | 14 | 40 |
| · Senior High | 4 | 11.4 |
| Occupation | Frequency | Percentage |
| · Traditional Diver | 35 | 100 |
| Marital Status | F | Percentage |
| · Married | 32 | 91.4 |
| · Unmarried | 3 | 8.6 |

From table 1 it can be seen that based on the age characteristics, the most respondents are respondents with an age interval of 26-30 years totaling 14 people (40%) and the least are respondents with an age interval of 46-50 years which amounted to 3 people (8.6%). Based on the level of education, the majority of respondents in this study had an elementary school level (SD) with a total of 17 people (48.6%) and the least were respondents with an education level of high school (SMA) with a total of 4 people (11.4%). Based on work, all respondents are 35 traditional divers (100%). Based on marital status, respondents who were married were 32 people (91.4%) and not yet married were 3 people (8.6%).

Correlation Between Period of Work, Duration of Work, Depth of Diving, and Frequency of Diving with Hearing Disorders

The correlation between the period of work, duration of work, depth of diving and frequency of diving with the hearing disorder are described in the following tables 2, 3, 4, and 5.

**Table 2. Correlation Between Period of Work with Hearing Disorders**

| Period of Work (year) | Hearing Disorder Complaint | | Total | p-value |
|---|---|---|---|---|
| | Yes | No | | |
| > 6<br>< 6 | 0<br>9 | 2<br>24 | 2<br>33 | 0.39 |
| Total | 9 | 26 | 35 | |

From table 2 it is known that there was no significant correlation between the period of work with the hearing disorder (p>0.05).

**Table 3. Correlation Between Duration of Work with Hearing Disorders**

| Duration of Work | Hearing Disorder Complaint | | Total | p-value |
|---|---|---|---|---|
| | Yes | No | | |
| ≥6 hours<br>≤6 hours | 0<br>9 | 2<br>24 | 2<br>33 | 0.39 |
| Total | 9 | 26 | 35 | |

Based on table 3, it is known that there was no significant correlation between the duration of diving with a complaint of hearing disorder (p>0.05).

**Table 4. Correlation Between Depth of Diving with Hearing Disorders**

| Depth of Diving | Hearing Disorder Complaint | | Total | p-value |
|---|---|---|---|---|
| | Yes | No | | |
| >10 metres<br><10 metres | 2<br>7 | 0<br>26 | 2<br>33 | 0.01 |
| Total | 9 | 26 | 35 | |

Based on table 4, it is known that there was a significant correlation between the depth of diving with complaints of hearing disorder (p <0.05).

**Table 5. Correlation Between Frequency of Diving with Hearing Disorders**

| Frequency of Diving | Hearing Disorder Complaint | | Total | p-value |
|---|---|---|---|---|
| | Yes | No | | |
| >3x / day<br><3x / day | 0<br>9 | 2<br>24 | 2<br>33 | 0.39 |
| Total | 9 | 26 | 35 | |

Table 5 shows that there was no correlation between the frequency of diving with complaints of hearing disorder (p> 0.05).

## Discussion

Characteristics of Respondents

Based on the results of the study in table 1, most divers are 26-30 years old. According to [6], increasing age will be followed by a decrease in maximal oxygen volume, sharpness of hearing and vision, speed of distinguishing things, making decisions and the ability to remember long-term.

The education of respondents in this study was dominated by workers with primary school education. Worker education influences the knowledge or willingness of workers to carry out their work following occupational safety and health rules.

Correlation between the period of diving with the hearing disorder

In the research that has been done, the results show that from 35 respondents, 2 respondents are included in the category of long-time workers (have worked ≥ 6 years). Of all respondents who were old workers, none had complaints of hearing disorder. Whereas for the category of respondents as new workers there were 33 people, 9 of them had complaints of hearing disorder and 24 others did not experience the hearing disorder. The results showed a value of α = 0.39 or the absence of a significant correlation between the period of work and hearing disorder. This study is in line with research[7] and research[8] that there is no correlation between the period of work and hearing disorder.

Correlation between duration of diving with the hearing disorder

The duration of the dive is the length of the diver under the sea from the first down to the surface before making the next dive. Based on the results of research that has been done, it is obtained that from 35 divers who became respondents in this study, as many as 2 people included in the duration of diving ≥6 hours did not experience complaints of hearing disorder. As for the category of respondents with a dive duration of ≤6 hours who experienced complaints of hearing disorders as many as 9 and who did not experience complaints of hearing disorder were 24 people. After an analytical test using the Chi-Square statistical test, a value of 0.392> α (0.05) was obtained. This shows that there is no significant correlation between the duration of diving with a hearing disorder in traditional divers in the Namrole Sub-district, South Buru Regency. The results of this study are supported by previous studies which stated there was no long-standing correlation with the hearing disorder. [9]

Correlation between depth of diving with a hearing disorder

The depth and stability of the depth must be planned carefully before diving. Diving using a compressor is also very susceptible to oxygen poisoning. Although oxygen is a substance that the body needs for metabolism. But if the inhaled gas mixture consists of O = 20%, then the oxygen used by the body is 4% while 16% is exhaled. Although it is needed by the body, an increase in the partial pressure of oxygen causes poisoning.

By Dalton's law, high pressure on the diver increases the partial pressure of oxygen. Therefore, don't dive too deep and use clean, normal air instead of pure $CO_2$. After an analytical test using the Chi-Square statistical test, a value of 0.013 <α (0.05) was obtained. This shows a significant correlation between the depth of diving with complaints of hearing disorder in traditional divers in the Namrole Sub-district, South Buru Regency. This research is in line with research conducted by.[7]

Correlation between the frequency of diving with a hearing disorder

The frequency of diving is the number of times the respondent dives in a day. According to Edmonds et. al (in Ekawati, 2005), a diver who frequently dives will more often experience trauma to the repetitive pressure on the eardrum. This will cause the balance organ in the inner ear to experience tissue swelling and blockage of the Eustachian Tubes until the perforation of the tympanic can even cause the eardrum to bleed and tear. Therefore, the more often the frequency of diving is done, the more dangerous it is to the health of the divers because they will increasingly receive pressure and they must try to equate the pressure in the ear cavity with the pressure of the surrounding water. In the research that has been done, the results show that out of 35 respondents, 2 people who have a diving frequency> 3x a day, do not experience complaints of hearing disorder, while 9 people who have a diving frequency <3x a day, experience complaints of hearing disorder. Meanwhile, 24 other people did not experience complaints of

hearing disorder. Another thing that can affect hearing is the physical condition at the time of diving. From interviews at the time of the study, information was obtained that sometimes divers forced to dive even though they felt unwell. After an analytical test using the Chi-Square statistical test, a value of 0.392> α (0.05) was obtained. This shows that there is no significant correlation between the frequencies of diving with the hearing disorder in traditional divers in the Namrole Sub-district, South Buru Regency. The results of this study contradict the research conducted by Fatmawati. [10] This is caused by the lack of open character of the respondents and motivation factors in carrying out the work of fishermen as a source of livelihood so that sometimes traditional fishing communities override perceived complaints. Traditional fishermen who do not use personal protective equipment such as earplugs are not good for hearing. Ear protection devices are proven effective in protecting against hearing loss. Research by Utami (2019) through his research on the use of earplugs as protectors against noise exposure, the results of research shows that workers who use ear protection equipment, due to noise exposure in the industry, do not experience hearing loss. Earplugs are useful as a barrier to entry of noise intensity. Audiometry results have a relationship between hearing loss in the right and left ear. [11]

## Conclusion

Based on the results of the study it can be concluded that the variable that has a significant correlation with the hearing disorder is the diving depth variable while the period of work, duration of work, and frequency of diving do not correlate with the hearing disorder in traditional fishermen in Namrole Sub-district, South Buru Regency.

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**Ethical Clearance**- Yes

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