

ARTICLE INFORMATION

Received: May, 23, 2025

Revised: September, 28, 2025

Available online: September, 29, 2025

at : <https://e-jurnal.ipphor.com/index.php/minh>

Investigating the causes of occupational diseases among fishermen

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Abstract

Background: The informal sector, characterized by its lack of structure, formality, and legal recognition, often receives inadequate attention regarding occupational health. In Indonesia, over 60% of the population resides in coastal areas, with the majority working as fishermen. Due to the inherently high-risk nature of fishing at sea, fishermen are frequently exposed to unpredictable ocean conditions, making them susceptible to various work-related health issues, including musculoskeletal disorders, dermatitis, keratopathy, and barotrauma.

Purpose: To investigate the factors linked to the occurrence of occupational diseases among fishermen.

Method: A descriptive correlational, specially focusing on cross-sectional method. The study took place in December 2024 in Kupang City. The independent variable was knowledge, duration of work, unsafe behaviors, and unsafe working conditions. The dependent variable included the incidence of occupational diseases. Using random sampling and Lameshow formula 89 respondents were selected who meet specific inclusion and exclusion criteria. The analysis proceeded with a univariate test to determine the frequency distribution of respondent's characteristics, followed by bivariate analysis using chi-square test.

Results: The study found significant associations between length of work and occupational diseases ($p = 0.011$), and between behavior and occupational diseases ($p = 0.001$), while knowledge and environmental conditions showed no significant effects.

Conclusion: Occupational diseases result from multifactorial determinants, including exposure duration, behavior, and environmental conditions. For informal workers such as fishermen, government involvement in risk management and safety governance is essential. Preventive measures should focus on skill development, occupational safety culture, proper use of protective equipment, health education, and access to health insurance.

Keywords: Fishermen; Occupational Diseases; Preventive Strategies; Work Behavior.

INTRODUCTION

Indonesia, the world's fourth most populous country, has more than 60% of its population residing in coastal regions, where many are employed as fishermen or divers. Across the nation, approximately 8.090 coastal villages are dispersed over 300 districts or municipalities. Of the country's 234.2 million inhabitants, around 67.87 million are engaged in informal employment, with fishermen comprising nearly 30% of this segment. In many developing nations, including Indonesia, the informal sector

remains vital to the economy, yet it often operates without formal structure or legal recognition factors that contribute to the lack of occupational health attention for workers in this sector (Rahamwati, Suroto, & Setyaningsih, 2022)

Fishing, particularly offshore, involves considerable hazards due to unpredictable marine conditions such as high waves, strong winds, and rapidly changing weather. Ensuring both vessel and crew safety is therefore critical for operational

success (Noviyanti, 2019). Various occupational risks faced by fishermen can be attributed to environmental and organizational factors. These include unsafe working conditions such as extreme temperatures and inadequate lighting as well as work-related stress, insufficient rest, and high physical demands. Psychological stress and individual health vulnerabilities, including existing conditions or susceptibility to certain risks, further exacerbate the danger of occupational illnesses (Kincl, Syron, Lucas, Vaughan, & Bovbjerg, 2023).

Studies indicate that many small-scale fishermen suffer from health problems caused by chemical, physical, biological, psychological, and ergonomic hazards. Commonly reported issues include fever, chills, skin rashes, allergic reactions, body aches, and vision impairments. These health concerns are especially prevalent among older fishermen those over the age of 40 and particularly among smokers. Identifying and addressing occupational diseases is crucial to improving the wellbeing and productivity of these small-scale fishermen (Joseph, Sumampouw, & Kandou, 2023).

According to the Kupang City Health Office many public health centers have yet to establish Occupational Health and Safety (OHS) monitoring posts, which are essential for carrying out preventive and promotive health efforts targeting informal workers. This lack of infrastructure results in minimal health supervision for informal sector workers, especially fishermen (Dewi, Kusnopranto, Purwana, & Soesilo, 2023).

RESEARCH METHOD

A descriptive correlational, specially focusing on cross-sectional method. The study took place in December 2024 in Kupang City. The independent variable was knowledge, duration of work, unsafe behaviors, and unsafe working conditions. The dependent variable included the incidence of occupational diseases. Using random sampling and Lameshow formula 89 respondents were selected who meet specific inclusion and exclusion criteria.

The inclusion criteria included active fishermen who have been working in the fishing sector for at

least one year, male or female fishermen aged 18 years and above, fishermen who are directly involved in fishing activities (e.g., catching, handling, or processing fish at sea), willing to participate and provide informed consent. Exclusion criteria required fishermen with less than one year of work experience, individuals who only work in fish trading or marketing without direct involvement in fishing activities, respondents with incomplete data or who withdraw from participation during the study, fishermen with a history of non-occupational chronic diseases that may bias the results (e.g., congenital disorders).

Data obtained from measurement. The Occupational Health and Safety (OHS) Knowledge Questionnaire is an instrument used to assess respondents' level of knowledge regarding occupational safety and health principles, procedures, and practices. The results of this questionnaire are in the form of knowledge scores, which are usually categorized into levels good if it scores 76-100, moderate if it scores 56-75. The Environmental Conditions Questionnaire is an instrument used to assess working conditions that can affect workers' health and comfort, such as lighting, noise, temperature, humidity, ventilation, and cleanliness. The scores from the Environmental Conditions questionnaire generally use a Likert scale (1-4 or 1-5), where lower numbers indicate poor or uncomfortable conditions, while higher numbers indicate good or comfortable conditions. These scores can be interpreted into categories safe if score 4-5 and unsafe score 0-3.

The behavior questionnaire is an instrument used to assess an individual's behavioral standards or habits, whether related to health, lifestyle, or psychosocial aspects. The measurement is carried out by providing a series of questions that respondents must answer according to their circumstances, usually using yes/no options. These scores can be interpreted into categories safe if score 76-100 and <55 unsafe.

The analysis proceeded with a univariate test to determine the frequency distribution of respondent's characteristics, followed by bivariate analysis using chi square test.

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DOI: <https://doi.org/10.33024/minh.v8i7.973>

RESEARCH RESULTS

Table 1. Characteristics of the Respondents (N=89)

Variable	Results	p- value
Age (Mean±SD)(Range)(Year)	(37.69±4.031) (14-45)	
14-20	18/20.2	
21-28	29/32.6	
30-40	36/40.5	
41-45	6/6.7	
Gender (n/%)		
Male	89/100.0	
Female	0/0	
Education (n/%)		
Uneducated	4/4.5	
Elementary School	25/28.1	
Junior High School	50/56.2	
Senior High School	10/11.2	
Boat Possession (n/%)		
Yes	7/7.9	
No	82/92.1	
Working Experience (n/%)		
0-5 years	28/42.7	0.011
5-10 years	37/41.6	
10-15 years	14/15.7	
Knowledge (n/%)		
Good	86/96.6	0.681
Moderate	3/3.4	
Environment (n/%)		
Safe	4/4.5	0.835
Unsafe	85/95.5	
Behavior (n/%)		
Safe	32/36.0	0.001
Unsafe	57/64.0	
Occupational Disease Incident (n/%)		
Yes	48/53.9	
No	41/46.1	

Table 1 shows the demographic and occupational characteristics of the respondents with. The participants had a mean age of 37.69 years with

a standard deviation of ± 4.031 ranging from 14 to 45 years. All respondents were male 89 (100%) and most had completed junior high school education 50

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(56.2%). The majority did not own a boat 82 (92.1%) and had worked for 5–10 years 37 (41.6%). Most respondents demonstrated good knowledge 86 (96.6%), lived in unsafe environments 85 (95.5%), exhibited unsafe behaviors 57 (64%), and experienced occupational accidents 48 (53.9%).

The bivariate analysis shows that the level of knowledge is not significantly related to the occurrence of occupational diseases among fishermen ($p = 0.681$). In contrast, a longer length of employment is significantly associated with higher rates of work-related complaints, with 15.7% of fishermen with ≤ 5 years of employment and 38.2% with > 5 years reporting complaints ($p = 0.011$). Unsafe behavior is also significantly related to the incidence of occupational diseases ($p = 0.001$), while unsafe environmental conditions do not show a significant relationship ($p = 0.835$).

DISCUSSION

The study revealed that the majority of fishermen possess a good level of knowledge regarding occupational health and safety (OHS). Out of 89 respondents, 96.6% demonstrated good knowledge, while only 3.4% had moderate knowledge. This suggests that most participants are aware of the potential health risks associated with fishing and are familiar with relevant safety practices. Despite this high level of knowledge, statistical analysis showed no significant association between knowledge and the incidence of occupational accidents, as indicated by a p -value of 0.681 (> 0.05).

This outcome aligns with the loss causation model, which posits that knowledge is just one of many personal factors contributing to occupational injuries or diseases. Supporting this, a study using Partial Least Squares-Structural Equation Modeling (PLS-SEM) demonstrated that while knowledge affects both skills and attitude, it is skills that have a more substantial impact on occupational competence (Indrayani, Syamila, Hartanti, & Sujoso, 2023). Similarly, another study found no significant relationship between OHS knowledge and the incidence of occupational illnesses among sea cucumber fishermen. Research involving construction workers also found no link between OHS knowledge and workplace accidents (Basya, Bambang, & Boesono, 2019).

The knowledge-attitude-practice (KAP) theory

model is a theoretical framework widely used in the fields of health education and behavioral intervention. The theory believes that knowledge is the basis for forming correct attitudes and practice changes, while attitude is the driving force behind practice changes. The KAP theory explains that individual knowledge does not necessarily lead to changes in attitude and behavior (Kang, Bagaoisan, & Kang, 2024). Even if a fisherman knows the importance of wearing gloves or masks when handling catch, he may choose not to use them due to convenience, ingrained work habits, or even lack of available protective equipment. Having high knowledge does not mean that safe and healthy work practices will be carried out in daily life. These findings suggest that even with adequate knowledge, other factors such as environmental instability, poor equipment, and non-compliance with safety protocols may still lead to occupational health issues (Thamrin, Pasinringi, Darwis, & Putra, 2021).

The study revealed a significant relationship between fishermen's length of service and the incidence of occupational diseases ($p = 0.011$). Notably, 69.4% of respondents who experienced work accidents had worked for more than five years. Consequently, regular health assessments before and after fishing activities are crucial to identify risk factors and ensure fitness for work (Nabila & Widowati, 2022).

These findings highlight the cumulative impact of occupational exposure in the fishing sector, where prolonged service is strongly associated with musculoskeletal disorders, skin diseases, and other work-related conditions. The relationship between duration of service and occupational health problems is consistent with the dose-response theory, which emphasizes that the likelihood of disease increases proportionally with the intensity and duration of exposure. Fishermen with longer work histories are more susceptible to health problems due to chronic exposure to physical strain, ultraviolet radiation, and harsh marine environments (Alibrahim, Tamrin, & Bahri, 2017).

The results emphasize the importance of preventive strategies within occupational health frameworks. Regular health screenings, health education, and the provision of protective equipment can help reduce the risk of long-term health consequences among fishermen. Policy

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interventions, including regulations for routine medical examinations and programs promoting safe work practices, are also essential. By integrating preventive healthcare measures with occupational safety strategies, the overall well-being and productivity of fishermen can be maintained, while reducing the burden of work-related diseases in this high-risk population (Doza, Bovbjerg, Vaughan, Nahomiak, Case, & Kincl, 2022).

The study also found a significant relationship between unsafe behavior and the occurrence of occupational diseases among fishermen. Among all cases of occupational diseases, 79.6% of respondents exhibited unsafe behavior while working as fishermen, especially during the work phase. This indicates that fishermen who often ignore occupational safety standards are more vulnerable to health disorders due to work compared to those who practice safer work behaviors. Commercial fishing is physically demanding and strenuous work where the tasks often comprise continuous repetitive activities (e.g. using a line with a net, hooks, or pots to harvest the fish) in long cycles. Routine tasks include loading bait, hauling frozen blocks, unloading the catch, and boat clean-up. Repeated strenuous movements contribute to musculoskeletal conditions including low-back pain and carpal tunnel syndrome, and fishing tasks with ergonomic stressors have been associated with low-back pain (Boonstra, Dahlet, Eriksson, Selim, & Van Putten, 2023).

That ergonomic factors such as appropriate working hours, suitable work facilities, and good working posture can improve fishermen's productivity, enabling them to work effectively and efficiently while maintaining good health due to ergonomic work positions and good work capacity. Having good work productivity can reduce health risks such as physical fatigue, work stress, and injury. To reduce the risk of accidents at sea, various factors are important, including good fishermen's lifestyles, ergonomic work factors, and good work productivity (Tafui, Roga, & Hinga, 2021).

Gloves are considered essential personal protective equipment (PPE) for fishermen. They may be made from materials such as rubber, thick cloth, or plastic, and serve to shield the hands and fingers from various occupational hazards. These hazards include exposure to heat, water, low temperatures, chemicals, impacts, abrasions, and infections from

pathogens like viruses, bacteria, fungi, and other microorganisms. Proper use of gloves can significantly reduce the risk of occupational injuries and diseases. Despite their importance, the provision of gloves is often left to individual fishermen, as boat owners typically do not supply them. This finding is consistent with earlier studies that revealed only 15% of fishermen use gloves as part of their PPE. It is crucial that gloves are worn especially during fish handling and while working with fishing line (Frantzeskou, Jensen, & Linos, 2016). Other studies have shown the relationship of chronic exposure to the sun and ocean to the development and pathogenesis of solar keratopathy, with respondents who used sunglasses and hats having lower rates of blindness compared to those who did not (Tesfai, Kebede, Kibreab, Fessehatsion, Asmelash, & Guelay, 2021).

To reduce the incidence of work-related illnesses, it is important to implement behavior-focused strategies. These include conducting training on occupational health and safety, ensuring the availability of PPE, and fostering awareness about safe work practices. Such efforts are aimed at enabling fishermen to maintain long-term health, minimize occupational diseases, and support both productivity and economic well-being (Lucas, Greta, Bygvraa, Canals, Adam, Lux, & Jensen, 2023).

Although fishermen often contend with difficult environmental conditions such as rough seas, extreme weather, and limited access to standardized PPE statistical analysis using the chi-square test revealed no significant correlation between hazardous environmental conditions and the prevalence of occupational diseases ($p = 0.835$). This suggests that health outcomes are not solely dependent on environmental risk. Some fishermen still experience illness under safe conditions, while others remain unaffected despite facing unsafe environments (Efendi & Suryani, 2022). This observation is in line with Blum's model of public health determinants, which outlines four key factors influencing health: behavior/lifestyle, environment (including social, economic, political, and cultural aspects), healthcare services (type, accessibility, quality), and heredity. These factors are interrelated and collectively influence individual and public health. Among them, human behavior is recognized as the most influential and difficult to control,

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followed by environmental factors. Since human behavior also shapes the environment, behavioral patterns often exert more influence on health outcomes than the physical environment itself (Raghuramumar, Sindhuri, Muruganandham, Surendran, & Mohan, 2025).

Work-related accidents and illnesses are the result of multiple factors, rather than one single factor, such as human, technical, and environmental elements (Grose, 1971). In this case, although fishermen's work environment has the potential to negatively impact their health, behavioral factors such as work practices, hygiene habits, and access to health care are likely to have a greater effect in determining whether a fisherman suffers from a work-related illness (Remmen, Heiberg, Christiansen, Herttua, & Berg, 2021).

CONCLUSION

The study found significant associations between length of work and occupational diseases ($p = 0.011$), and between behavior and occupational diseases ($p = 0.001$), while knowledge and environmental conditions showed no significant effects. Occupational diseases result from multifactorial determinants, including exposure duration, behavior, and environmental conditions. For informal workers such as fishermen, government involvement in risk management and safety governance is essential. Preventive measures should focus on skill development, occupational safety culture, proper use of protective equipment, health education, and access to health insurance.

REFERENCES

- Alibrahim, A., Tamrin, M., & Bahri, S. (2017). Prevalence of cataract, climatic droplet keratopathy and eyelid diseases among fishermen in Jazan in Saudi Arabia, and the association of risk factors. *Malaysian J Hum Fact Ergon J*, 1(2), 58-63.
- Basya, I. F., Bambang, A. N., & Boesono, H. (2019). Perception and Participation about Work Safety in Fisheries of Vertical Longline Ship Fishing at PPN Prigi Trenggalek Regency, East Jawa.
- Boonstra, W. J., Dahlet, L., Eriksson, B., Selim, S. A., & Van Putten, E. I. (2023). Understanding and Analysing the Complex Causality of Conflicts over Marine Environments through Process Tracing. *Maritime Studies*, 22(2), 19.
- Dewi, F. S., Kusnopranto, H., Purwana, R., & Soesilo, T. E. B. (2023). Identification of Work-Related Diseases in Small-Scale Fishermen in Batam Island, Indonesia. *The Open Public Health Journal*, 16(1).
- Doza, S., Bovbjerg, V. E., Vaughan, A., Nahorniak, J. S., Case, S., & Kincl, L. D. (2022). Health-Related Exposures and Conditions Among Us Fishermen. *Journal of Agromedicine*, 27(3), 284-291.
- Efendi, I. N., & Suryani, D. (2022). Tingkat Pengetahuan Nelayan Tentang Keselamatan Pelayaran. *Majalah Ilmiah Bahari Jogja*, 20(2), 187-194.
- Frantzeskou, E., Jensen, O. C., & Linos, A. (2016). Health status and occupational risk factors in Greek small fisheries workers. *International maritime health*, 67(3), 137-143.
- Grose, V. L. (1971, May). System safety education focused on system management. In *Proceedings of the NASA Government-Industry System Safety Conference*. National Aeronautics and Space Administration.
- Indrayani, R., Syamila, A. I., Hartanti, R. I., & Sujoso, A. D. P. (2023). Work safety aspects on the sea on small-scale fishermen in Jember Regency, Indonesia. *The Indonesian Journal of Occupational Safety and Health*, 12(3), 337-348.
- Joseph, G., Sumampouw, O. J., & Kandou, G. D. (2023). Keluhan Muskuloskeletal Pada Nelayan. *Kesmas: Jurnal Kesehatan Masyarakat Universitas Sam Ratulangi*, 12(1), 34-40.

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- Kang, K., Bagaoisan, M. A. P., & Kang, K. (2024). Research Status Of The Knowledge-Attitude-Practice Theory Model In Gastric Cancer Prevention. *Cureus*, 16(7).
- Kincl, L., Syron, L., Lucas, D., Vaughan, A., & Bovbjerg, V. (2023). Relationship Of Personal, Situational, And Environmental Factors To Injury Experience In Commercial Fishing. *Journal Of Safety Research*, 87, 375-381.
- Lucas, D., Greta, G., Bygvraa, D. A., Canals, M. L., Adam, B., Lux, H., & Jensen, O. C. (2023). Occupational Allergic Diseases Among Harvesting Fishermen On The Open Sea: A Systematic Review. *Annals Of Allergy, Asthma & Immunology*, 131(2), 253-265.
- Nabila, S. P. N., & Widowati, E. (2022). Correlation Between The Factors of Unsafe Acts and Unsafe Conditions and the Occurrence of Work Accidents among Construction Workers (A Case Study of PT X At Hospital Y Project). *Periodicals of Occupational Safety and Health*, 1(2).
- Noviyanti, R. (2019). Faktor yang Mempengaruhi Kompetensi Nelayan di Teluk Banten: Menggunakan Partial Least Square-Structural Equation Modelling (PLS-SEM). *Marine Fisheries: Journal of Marine Fisheries Technology and Management*, 10(1), 33-44.
- Raghuramumar, B., Sindhuri, R., Muruganandham, R., Surendran, P., & Mohan, R. (2025). Occupational Injuries Among Fisherman In Tamil Nadu-An Explanatory Mixed Methods Study. *Journal Of Current Research In Scientific Medicine*, 11(1), 25-31.
- Rahmawati, J., Suroto, S., & Setyaningsih, Y. (2022). Apakah *Unsafe Action* dan *Unsafe Condition* Berpengaruh Terhadap Kecelakaan Nelayan?. *Jurnal Keperawatan*, 14(1), 301-312.
- Remmen, L. N., Heiberg, R. F., Christiansen, D. H., Herttua, K., & Berg-Beckhoff, G. (2021). Work-Related Musculoskeletal Disorders among Occupational Fishermen: A Systematic Literature Review. *Occupational and Environmental Medicine*, 78(7), 522-529.
- Taufi, M. A., Roga, A. U., & Hinga, I. A. T. (2021). Faktor yang Berhubungan dengan Kecelakaan Kerja dan Penyakit Akibat Kerja pada Nelayan Pencari Teripang di Kelurahan Namosain Kota Kupang. *Media Kesehatan Masyarakat*, 3(3), 322-330.
- Tesfai, B., Kebede, S., Kibreab, F., Fessehatsion, K., Asmelash, S., & Guelay, Y. (2021). Prevalence of Solar Keratopathy, Pterygium and Cataract in The Islands of Northern Red Sea Zone, Eritrea: Cross-Sectional Study. *Clinical Ophthalmology*, 2983-2991.
- Thamrin, Y., Pasinringi, S., Darwis, A. M., & Putra, I. S. (2021). Musculoskeletal Disorders Problems And Its Relation To Age, Working Periods, And Smoking Habit Among Fishermen. *Gaceta Sanitaria*, 35, S417-S420.

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