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Work accidents among the traditional fishermen community in Bunaken Coast of Sulawesi

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Abstract

Purpose: Work accidents are commonly experienced by workers, including fishermen. This research examines the complex factors associated with work accidents in Bunaken's fishing community. **Methods:** The study encompasses 63 fishermen residing in the Bunaken District, employing a total sampling method to ensure comprehensive coverage. The research provides valuable insights into the dynamics of occupational hazards faced by Bunaken's fishermen by delving into the relationship between these variables. Carefully crafted questionnaires, the investigation focuses on several key aspects, including work stress and accidents. **Results:** All respondents were male, middle-aged, and had worked for more than five years, with a working day lasting over 9 hours. More than half of the respondents experienced work accidents (65%) and experienced moderate-high stress (73%). The multivariate analysis confirmed that age and education were statistically significant predictors of work accidents. **Conclusion:** The findings are expected to contribute to the development of targeted interventions and occupational safety measures, fostering a safer and healthier working environment for the fishing community.

Keywords: community empowerment; traditional fishermen; work accidents; work stress

INTRODUCTION

Occupational Health and Safety Assesment Series (OHSAS) 18001, 1999 defines an accident as a series of unanticipated events, one of which is undesirable because it is generally harmful or detrimental to the worker (such as death, injury, property damage, or loss of time). Therefore, to minimize unexpected events such as work accidents, especially for workers, it is necessary to implement a comprehensive and sustainable occupational health and safety (OHS) management system to ensure worker welfare. When looking at the number of cases globally, according to the International Labor Organization (ILO), more than 2.78 million people die each year worldwide due to occupational accidents or occupational diseases [1]. In addition, around 374 million non-fatal work-related accidents and illnesses occur each year. In 2016, according to data, there were approximately 502,800 fatal accidents and occupational diseases in the United States, and 314 workers died from work-related accidents that year.

More than 1.8 million work-related deaths occur annually in the Asia Pacific region, and about two-thirds of work-related deaths occur in Asia. The number of fatal accidents in developing countries is four times higher than in developed countries. In India, for example, the death rate of workers due to

industrial accidents is 40 per 100,000 workers. In developing countries like Indonesia, most occupational accidents and diseases occur in fisheries, agriculture, timber, mining, and construction [2]. Several studies in Indonesia on Fishermen found that the prevalence of work accidents is still high, such as the study in Tambala, which found 88% of work accidents [3], in Manado 70% [4], and in the Banyuasin District 56% [5].

The leading causes of work accidents are human error, work activities, and the workplace environment. Work accidents can occur due to unsafe actions and dangerous work environment conditions [2,3,6]. One example of informal work with a high risk of work accidents is fishermen. If the weather conditions are too bad at sea, it can increase fishermen's risk of accidents and death. The types of work accidents that often occur are injuries, pierced by thorns/fish fins and coral reefs, sprains/strains, falls/blows, almost drowned, and struck by lightning [7–9].

Bunaken Sub-district is located on the coastal area of Manado City, which is why most people make a living from fishing. Most fishermen in Bunaken are individual fishermen, from preparing fishing gear to operating alone. The stages of fishermen's work in the Bunaken sub-district start from the preparation of tools and materials to be used when going to sea as well as initial maintenance on the boat to be used, especially in the engine and sufficient fuel, then traveling to the sea, followed by netting or catching fish at sea, the last one back to land, sorting and unloading the catch and selling it at the auction/market. Fishermen often face unstable environmental conditions, bad weather, high waves, and other hazards. This harsh environment can trigger pressure and stress for fishermen while they are working. Fishermen also have to work under tight time pressure conditions, which can be approximately 24 hours used to catch fish or other marine products, and that can cause a high mental and physical burden, which in turn can increase the level of stress at work, which can also increase the risk of work accidents [10].

Work stress is a common problem in today's workplace. Many factors can cause job stress, including excessive workload, time pressure, lack of social support, task uncertainty, and role conflict. Prolonged working hours can lead to fatigue and burnout, leading to stress [10,11]. A survey conducted by the Health and Safety Executive (HSE) in 2018 reported that work-related stress affected 595,000 cases, with a prevalence rate of 1,800 per 100,000 workers. Work-related stress also accounted for 44% of all cases of work-related health problems and 57% of absenteeism due to illness [12].

Occupational stress in Indonesia is a serious problem, resulting in a fatal occupational stress rate of 35%. The results of a recent survey involving more than 1,000 workers in Indonesia found that 2 out of 5 workers experienced work-related stress. This situation illustrates that workers in Indonesia are vulnerable to occupational stress [7]. The impact of sustained stress can reduce one's concentration, responsiveness, and decision-making ability. It can negatively impact fishermen's alertness to their surroundings, increasing the likelihood of occupational accidents. Occupational accidents in fishermen's workplaces can have severe and even fatal consequences. Frequent accidents at work can also create a more stressful work environment. Conversely, high work stress can affect a person's ability to maintain vigilance and prevent accidents [13].

Therefore, it is necessary to understand the relationship between occupational stress complaints and occupational accidents to help fisherman managers, the government, and related institutions take proactive measures to identify risk factors and respond quickly, improving the safety and welfare of fishermen. And the welfare of the fishermen. There are also research results on fishermen in Manado City, North Sulawesi, who mostly have a working period of more than 5 years and make fishing their main livelihood [4]. The workload often experienced by fishermen is when lowering the net into the sea, tilting and lifting the fish, and sorting the catch, which is still done manually. The workload will also increase when the sea is choppy, along with conditions, and there are problems with the engine used on the boat [4,14].

In addition, fishermen also experience fatigue and stress during the fishing process [5,13]. The process takes a long time; fishermen must wait and monitor their fishing nets underwater every hour. It causes fishermen to become sleepy, which affects their concentration and accuracy when working, and can increase their risk of accidents [9,15].

Bunaken is a tourist destination with a population mainly engaged in fishing, and more studies are needed on occupational health and safety specific to its fishermen. No study assessed the accidents among fishermen in North Sulawesi, particularly in the Bunaken District. This research addresses this gap by examining the relationship between work-related stress and accidents among Bunaken fishermen, offering new insights for targeted safety interventions and improved occupational health strategies. Based on the description above, the researcher is interested in researching the effect of work stress complaints on work accidents among fishermen in Bunaken District.

METHODS

This study used a quantitative research design that uses analytical observational methods. The approach used was cross-sectional. Work accident is the dependent variable, while education, age, and work stress are the independent variables. The research was conducted from September to November in Bunaken District, Manado City (Tongkaina et al.). The population in this study was all fishermen residing in the Bunaken sub-district of Manado city (Tongkaina village and Bunaken island), totaling 63 fishermen and using a sampling technique that is total sampling or the number of samples is equal to the population.

Figure 1. Boats at the coast used by traditional Bunaken fishermen

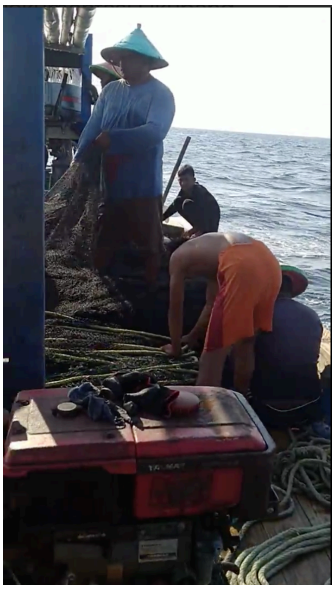

Figure 2. Unsafe actions among fishermen in their boats

RESULTS

Table 1 shows that out of 63 respondents, 44 had an elementary school education (69.8%), followed by 19 respondents with the highest level of junior high school education (30.2%). According to age, there were slightly more elderly respondents than adult respondents, with 50.8% being elderly and 49.2% being adults. Respondents' work durations are mostly more than 9 hours a day (77.8%), while the rest are less than 8 hours a day (22.2%). Then, in terms of length of employment, most have more than five years of experience (98.4%), while the rest have less than five years (1.6%). Work accidents are more common among fishermen (65%), and most have moderate to high levels of work stress (73.0%).

Table 1. Univariate analysis with frequency and percentage (n=63)

Variable	%
Work accidents in the last 30 days	
Yes	65
No	35
Age (years)	
≤45 (adult)	49.2
>45 (elderly)	50.8
Education	
Elementary school/equals	69.8
Junior-high school/equals	30.2
Duration of work (hours)	
≤8	22.2
>9	77.8
Length of employment (years)	
<5	1.6
≥5	98.4
Work stress	
Low	27.0
Moderate-high	73.0
Types of work accidents and injuries	
Poisoning/allergy from marine life	
Exposure to marine life venom/toxins	6.3
Sprains (muscle injury)	
Entangled in the net	15.9
Wound (cut/tear/burn/bruise)	
Knife hit	47.6
Pierced by spines or fins of fish and coral reefs	15.9
Exposed to a hot motorcycle engine	4.8
Musculoskeletal complaints (muscle/bone pain)	
Falling in the boat	9.5

* significant ≤ 0.05; ** ≤ 0.000

Table 2 shows that the type of work accident exposed to marine biota venom/poison can result in a type of injury, poisoning/allergies due to marine biota, with a case number of 4 cases (6.3%). Then, for the type of work, accidents entangled in the net can result in sprains (muscle injury/dislocation), with a case number

of 10 cases (16%). For the type of work, accidents exposed to a knife and coral reefs, as well as being hit by a hot motor engine, can result in injuries, wounds (cuts/tears/burns/bruises), in 43 cases (68.2%). For the type of work-related accident, falling in the boat can result in musculoskeletal complaints.

The bivariate analysis shows that variables associated with work accidents among the fishermen were age, education, and length of employment. This result was then adjusted with other variables in multivariate analysis. Table 3 shows a significant effect of education and age on work-related accidents ($p<0.05$). Fishermen's education and age were related to work accidents. Fishermen with lower levels of education and younger age groups were more likely to experience work accidents.

Table 2. Odds ratio of work accidents among fishermen (n=63)

Variables	OR (95%CI)	p value	Model 1 OR (95%CI)	p value
Age (years)	0.935	0.005**	0.898	0.029*
≤45 (adult)	(0.87-1.00)		(0.81-0.99)	
>45 (elderly)				
Education	0.158	0.000**	0.009	0.000**
Elementary school/equals	(14.76-435.81)		(0.001-0.07)	
Junior high school/equals				
Duration of work (hours)	0.815	0.341	1.034	0,621
≤8	(0.56-1.17)		(0.90-1.18)	
>9				
Length of employment	0.935	0.05*		
<5 years	(0.87-1.00)			
≥5 years				
Work stress	1.009	0.865		
Low	(0.91-1.119)			
Moderate-high				

* significant ≤ 0.05; ** ≤ 0.000

Table 3. Multivariate analysis with a binary logistic regression test

Variable	Model 1 OR (95%CI)	p-value
Age (years)		
26-45 (adult)	0.898 (0.81-0.99)	0.029*
45-65 (elderly)		
Education		
Elementary school	0.009 (0.001-0.07)	0.000**
Junior high school		
Length of employment (years)		
< 5	1.034 (0.90-1.18)	0,621
≥ 5		

* significant ≤ 0.05; ** ≤ 0.000

DISCUSSIONS

The study of fishers in Bunaken Subdistrict shows that a substantial number of its fishermen encounter occupational accidents (65%). This is lower than the occupational accidents in a previous study (70.8%) in Manado and 88% in Tambala [3,4], but higher than those of fishers in the Banyuasin district (56.2%) [5]. These studies show that work accidents among fishermen are still high, underscoring the need for increased awareness about the crucial role of implementing Occupational Safety and Health (OSH) measures [5,16]. It can be seen in Figures 1 and 2, depicting conditions related to the traditional fishing practices of Bunaken fishermen. Figure 1 shows multiple small boats docked along the coast, indicating reliance on modest, manually operated vessels. Figure 2 illustrates unsafe behavior among fishermen while working on their boats, such as standing near exposed machinery without proper protective gear. These images reflect both the limited resources and safety challenges faced by the local fishing community.

In this study, the fishermen had a moderate stress level (73%), lower than that in Jember, where 89% experienced moderate stress. The difference is that they have different perceptions about work stress and other cultures, challenges, and problems [5], or the fishermen in Bunaken underreport their work stress.

This study revealed that, in multivariate analysis, education and age emerge as significant determinants influencing the likelihood of fishermen experiencing work-related accidents. Findings indicate that individuals with lower educational attainment face a higher risk of work accidents compared to those with a more advanced educational background. A person's education is critical to increasing awareness of the importance of occupational health and safety [16]. A theory also suggests that a worker's education affects how they think about their work, including how to prevent and avoid accidents [5,17]. The Batam fishermen study supports this current finding [18]. However, another study found no significant relationship between the level of education and work accidents among fishermen, even though only 21% have good knowledge about occupational health and safety [5].

This study also revealed an age-related pattern, showing an elevated risk of work accidents among younger fishermen, different from those studied in Batam [18]. Younger fishermen typically have less experience on the job compared to the older ones. Fishing often requires skilled equipment handling, navigating vessels, and responding to unpredictable sea conditions. Inexperience may lead to errors in judgment or technique, increasing the likelihood of accidents. Moreover, they continually encounter situations where they must make decisions with highly uncertain financial outcomes [19].

Fishermen in their middle age were more prone to underestimating the risk than older age groups. This indicates a pattern where overconfidence increases and decreases as individuals age [19]. However, most of the 63 fishermen in Bunaken were middle-aged males, which limited the diversity of the sample and could affect the generalizability of the findings, as it does not consider younger or older fishermen. Future research should include a more diverse group to understand better work accidents across different demographics in the fishing community.

CONCLUSION

Work accidents are more common among fishermen with lower education and younger age. The government should develop educational programs focused on occupational health and safety for fishermen. Targeted interventions and safety measures should address the specific needs of various demographic groups, including younger and older fishermen. Fishermen must also increase their awareness of personal safety, such as using protective equipment, to reduce work accidents.

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