

Analysis of Risk of Exposure to COVID-19 in Fishermen in Kenjeran

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ABSTRACT

Most of professions in the informal sector in Kenjeran area are fishermen, fish processors, marine craftsmen and makers of processed fish-based products. Fishermen are susceptible to Covid-19 transmission. This study aimed to identify the risk of being exposed to Covid-19 for fishermen in Kenjeran area. *Method:* The sample in this study were 70 fishermen taken through the total sampling method. The variables in this study were hazard, hazard identification, risk assessment and risk control. The data were collected using a questionnaire and observation. The results of risk identification were assigned a value (risk value) to determine the control. The risk assessment used the AS / NZS 4360: 2004 standard. *Result:* Based on the risk analysis table, it can be seen that fishermen's activities that carry medium and high risks include equipment preparation, weighing of fish haul, sales of fish and meeting with fellow fishermen. *Conclusion:* The risk of contracting Covid-19 for fishermen was higher outside their workplace. The fishermen do a lot of activities outside of their work.

Keywords: Covid-19, Fishermen, Risk

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BACKGROUND

The informal industrial sector is the source of livelihood for most people in Indonesia. Surabaya city, through its health office integrated with public health centers as the spearhead, conducts coaching for the informal sector in the prevention of occupational diseases and accidents. One service provided by these public health centers is occupational health initiative (OHI) posts. OHI posts established recently largely target the workforce of the informal sector. The reason for this is because this sector has been largely abandoned when it comes to occupational health and safety. This initiative would be more effective if OHI posts provide protection for the health aspects of workers in the informal sector. An occupational accident in one industry could lead to devastating loss to a business owner. If they own more than one industry, the loss will grow even bigger. Therefore, the occupational health and safety (OHS) aspect in informal industries must be enforced. Occupational accidents and diseases can be minimized by the presence of OHS in the midst of the informal sector workforce. Most of professions in the informal sector in Kenjeran area are fishermen, fish processors, marine craftsmen and makers of processed fish-based products. The management of informal workers in Kenjeran is the main subject of the Health Office of Surabaya City in developing the OHS program. Kenjeran is one of coastal areas that borders Surabaya city area which also doubles as one of tourism icons in Surabaya. Reflecting the geographical and location condition of Kenjeran which is a coastline, fishing is the predominant occupation of the community around the Kenjeran coastal area. This coastal border area located in the Tambak Wedi, Bulak District, Surabaya is an integrated area consisting of the Ria Kenjeran beach tourism area and also a fishing village settlement area.

Between these two areas, the development over the last 10 years did not transpire equally. In fact, Ria Kenjeran Beach kept improving as time goes by considering that it is one of the attractions of the city of Surabaya. The increasing number of tourists to Kenjeran Beach encouraged the

government to focus more on making various kinds of repairs, improvements and development to this tourist area. This is in contrast with the fishing village settlement area despite being in the same beach tourist area. This triggers the discrepancy between coastal tourism areas and residential areas. This glaring discrepancy between two locations in the same area could cause various long-term effects.

The results of hazard identification conducted suggested poor implementation of personal hygiene in the informal sector working community, which may aggravate diseases and accidents due to exposure to biological hazards. In this case, the serious, threatening biological hazard in question is Covid-19 virus. No vaccine has been formulated for this disease and this disease has led to a widespread pandemic in 2020. Per December 2, 2020, there have been 16,977 confirmed cases of Covid-19 in Surabaya, increasing by 38 cases per day and bringing it to Covid-19 Medium Risk Zone. This threat is particularly dangerous for workforce in the informal sector. Therefore, this study aimed to identify the risk of Covid-19 exposure for fishermen in Kenjeran area.

METHOD

Designed as a cross-sectional study, this study aimed to analyze the risk of biological hazards (COVID-19) to fishing profession. The population in this study were 70 fishermen. The samples were taken using the total sampling method in Kenjeran Village, Surabaya, Indonesia. The variables in this study were hazard, hazard identification, risk assessment and risk control. Primary data in this study were collected through the means of a questionnaire distributed to the fishermen. Observations were also carried out to identify daily activities and the work environment. The results of risk identification were assigned a value (risk value) to determine the control. The risk assessment used the AS / NZS 4360: 2004 standard. This study has already been granted a certificate of ethics from the Faculty of Dentistry, Universitas Airlangga, Surabaya. The certificate of ethics number is

362/HRECC.FODM/VIII/2020. A risk analysis is the determination of the magnitude of a risk based on the likelihood of occurrence and the severity that could result from these risks (Ramli, 2010). The following were steps that can be taken to analyze risk (Suardi, 2007):

a. Determine Likelihood

Likelihood was the probability of an accident occurring due to exposure to a hazard.

Table 1. Likelihood according to AS/NZS 4360:2004 standard

Level	Description	Commentary
A	Almost certain	It can happen at any time
B	Likely	Chances are it happens frequently
C	Possible	It can happen every now and then
D	Unlikely	Chances are it rarely happens
E	Rare	It almost never happened

Source: AS/NZS 4360:2004 Standard

b. Determine the severity of a risk

Severity was the level of seriousness arising from an event due to exposure to existing hazards. It may involve humans, environment and properties.

Table 2. Severity according to AS/NZS 4360:2004 standard

Value	Scale	Description
1	Insignificant	No injury occurs, insignificant financial loss
2	Minor	Mild injury, moderate financial loss
3	Moderate	Moderate injury, requiring medical treatment, significant financial loss
4	Major	Serious injuries to more than one-person, significant loss, disrupted production
5	Catastrophic	Fatal for more than one person, very substantial loss and far-reaching, prolonged impact, cessation of all activities

Source: AS/NZS 4360:2004 Standard

c. Determine risk levels

The probability and severity obtained from the risk assessment were used to determine the level or level of risk. After the score of each criterion has been determined, the calculation of the level of risk was performed using the formula:

$$\text{Risiko (Risk)} = \text{Likelihood} \times \text{Severity}$$

After the risk assessment was carried out, the category of each risk was determined.

Table 3. Matrix of Risk Assessment

Likelihood	Severity				
	Insignificant (1)	Minor (2)	Moderate (3)	Major (4)	Catastrophic (5)
Almost certain (A)	M	H	H	E	E
Likely (B)	L	M	H	H	E
Possible (C)	L	M	M	H	H
Unlikely (D)	L	L	M	M	H
Rare (E)	L	L	L	L	M

Source: AS/NZS 4360:2004 Standard

Description: L (Low), M (Medium), H (High), E (Extreme)

RESULT

Respondent Characteristics

Fisherman Age

Age is the length of time a fisherman lives, calculated from the time the fisherman was born until the research was

carried out which was stated in units of years. The distribution of respondents based on age is presented in table 4.

Table 4. Age Frequency Distribution of Fisherman Respondents in Kenjeran Village, Surabaya, East Java, Indonesia in 2020

No.	Age (Year)	Number	Percentage
1	17 – 40	25	35.7%
2	41 – 64	42	60%
3	65 – 89	3	4.5%
TOTAL		70	100%

Fisherman Education

In this study, education is the last education level taken by the fishermen. There were three levels of last education

taken namely elementary school, primary school and high school. The distribution of respondents based on their last education is presented in table 5.

Table 5. Education Frequency Distribution of Fisherman Respondents in Kenjeran Village, Surabaya, East Java, Indonesia in 2020

No.	Education	Number	Percentage
1	Elementary School	53	75.7%
2	Primary School	9	12.9%
3	High School/Equivalent	8	11.4%
TOTAL		70	100%

Fisherman Marital Status

Marital status in this study referred to the status that a person has as a citizen of the country which is classified as

a marriage bond. The distribution of respondents based on their last education is presented in table 6.

Table 6. Marital Status Frequency Distribution of Fisherman Respondents in Kenjeran Village, Surabaya, East Java, Indonesia in 2020

No.	Marital Status	Number	Percentage
1	Married	65	92.9%
2	Single	5	7.1%
TOTAL		70	100%

Risk Analysis and Control

An analysis was performed on the fishermen in the fishing village of Kenjeran, Surabaya. The result of the analysis is presented in table 7.

Table 7. Risk Analysis of Covid-19 Transmission in Fisherman Respondent Marriage in Kenjeran Village, Surabaya, East Java, Indonesia in 2020

No.	Activity	Location	Potential Hazard	Impact Consequence	Risk Value			Control
					L	S	L x S	
1	Equipment preparation (gas)	Gas station or retail gas	Exposed to Covid-19 from the gas seller	Exposed to Covid-19 without symptoms	B	2	M	Wear PPE such as masks and/or face shield/helm
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
			Exposed to Covid-19 from change for buying gasoline	Exposed to Covid-19 without symptoms	B	2	M	Paying with exact money
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
2	Food preparation	At home	There is no potential for contracting Covid-19		E	1	L	
3	Net bait preparation		There is no potential for contracting Covid-19		E	1	L	

4	Releasing the net	At sea	There is no potential for contracting Covid-19		E	1	L	
5	Waiting for the bait		There is no potential for contracting Covid-19		E	1	L	
6	Collecting fish in the net		There is no potential for contracting Covid-19		E	1	L	
7	Taking home equipment	On land	There is no potential for contracting Covid-19		E	1	L	
8	Cleaning equipment		There is no potential for contracting Covid-19		E	1	L	
9	Weighing the fish haul	At the fish collectors place	Exposed to Covid-19 from visitors	Exposed to Covid-19 without symptoms	B	2	M	Wear PPE such as masks and/or face shield, and keep their distance
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
			Exposed to Covid-19 when interacting with the fish collector	Exposed to Covid-19 without symptoms	B	2	M	Wear PPE such as masks and/or face shield, and keep their distance
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
			Exposed to Covid-19 from money used for transactions	Exposed to Covid-19 without symptoms	B	2	M	Cover money with plastic when making transactions and wash hands immediately.
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
10	Processed fish (smoked/salted fish)	At home	There is no potential for contracting Covid-19		E	1	L	
11	Take their family/wife to sell processed products	In the market	Exposed to Covid-19 when interacting with people in the market	Exposed to Covid-19 without symptoms	B	2	M	Wear a mask, keep distance and shower immediately after arriving home
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	
12	Meeting with fellow fishermen when not going to sea	At the gathering location/tavern	Exposed to Covid-19 from fellow fishermen and local people joining in	Exposed to Covid-19 without symptoms	B	2	M	Implement health protocols in meetings or stay at home
				Exposed to Covid-19 with symptoms	C	5	H	
				Passing Covid-19 to family at home	C	4	H	

Based on the risk analysis table, the fishermen are facing higher risk of exposure to Covid-19 outside of their work. The fishermen did a lot of activities outside of their work. These medium- and high-risk activities included equipment preparation, weighing the fish haul, selling fish and meeting with fellow fishermen. While the fishermen were not exposed to overly high risks, they were still exposed to Covid-19 nonetheless since some fishermen did not wear a mask when engaging in activities outside of fishing. To minimize the risk of exposure to the Covid-19

virus to fishermen, a hierarchy of control approach is needed.

DISCUSSION

Covid-19 Cases

Covid-19 is an infectious disease, caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) (The Ministry of Health of the Republic of Indonesia, 2020). The transmission of Covid-19 can occur through direct contact, indirect contact or close contact with people infected with Covid-19, saliva or droplets emitted when a person talks,

coughs, sneezes or sings. The transmission may also occur through air, due to airborne droplets that remain infectious and can travel a great distance (WHO, 2020b). The first ever case was reported in Wuhan City, China on December 31, 2019 and on March 11, 2020 it is declared as a pandemic by WHO (The Ministry of Health of the Republic of Indonesia, 2020). Per December 1, 2020, there were 62,844,837 confirmed cases with 1,465,144 deaths worldwide (WHO, 2020c). The pandemic brings significant effects on the working world, such as closure of workplaces and reduced work hours. Over time, the policy of temporary closure has loosened up and workers are gradually coming back to work with new policies in place to protect worker health (ILO, 2020b). likewise, the fishermen in Kenjeran fishing village are gradually resuming their work activities, however, this is not counterbalanced with proper implementation of personal hygiene, leading to high risk of contracting Covid-19. In Surabaya, as of December 2, 2020, there have been 16,977 confirmed cases of Covid-19, which increased by 38 cases per day and brought it to Covid-19 Medium Risk Zone. Covid-19 contracted through occupational exposure can be categorized as an occupational disease (ILO, 2020a). In Vietnam, nearly a third of all Covid-19 cases were workplace infections (Huynh *et al.*, 2020). Based on studies conducted in six Asian countries, it was also found that work-related transmission of Covid-19 contributed to a large number of cases in the early days of the Covid-19 pandemic (Lan, Wei, Hsu, Christiani, & Kales, 2020). Potential causes that allow the transmission of Covid-19 among groups of workers in the field of food production include working in narrow places where physical distancing cannot be implemented properly, riding the same transportation, and working in areas with high Covid-19 cases (ECDC, 2020). It is known that there is a high risk of Covid-19 exposure at work. This was in line with the results of the analysis of Covid-19 transmission risk among fishermen in Kenjeran fishing village, showing that activities related to their work have the potential to expose them to and transmit Covid-19.

Analysis of the Risk of Covid-19 Transmission Among Fishermen

Most of activities with the potential of transmitting Covid-19 to the fishermen are activities outside of their workplace, such as gas station, roads, fish collector places, markets and fishermen gathering places. In general, the risk of Covid-19 transmission, both at work and outside the workplace, arises from direct or indirect contacts with a person infected with Covid-19. In principle, the main method of transmission for SARS-CoV-2 is human-to-human transmission (Han & Yang, 2020). This virus can also survive in aerosols for at least 3 hours ((Neeltje *et al.*, 2020 and may be inhaled by human respiratory tract. In addition, SARS-CoV-2 can be found on inanimate objects that have been touched by a person infected with Covid-19 (Ong *et al.*, 2020). This is why money used for transactions carries the risk of exposing to Fishermen to Covid-19.

The fishermen in Kenjeran fishing village are also at risk of transmitting Covid-19 to their family at home. This is because close contact is one of Covid-19 risk factor and it includes living under the same roof with a person infected with Covid-19 (Chen *et al.*, 2020). Observations made on a family showed that a family member who was previously healthy was infected with Covid-19 after having contact for several days with a family member in a house infected with Covid-19 (Chen *et al.*, 2020). In addition, there was also a report of a person infected with Covid-19 attending a family meeting and transmitting the disease to 15 people

in their family (Ghinai *et al.*, 2020). Therefore, family members who live under the same roof are at risk of contracting Covid-19 from the fishermen.

The potential danger for the fishermen when carrying out their work activities is being exposed to symptomatic or asymptomatic Covid-19. A person infected with Covid-19 shows a wide spectrum of clinical manifestations, starting from asymptomatic, mild symptoms, to septic shock (WHO, 2020a). In general, Covid-19 patients show symptoms such as fever, cough, sneezes, and breathing difficulties (Rothan & Byrareddy, 2020). Fever in Covid-19 patients ranges from 38.1-39°C, even more in some cases (Huang *et al.*, 2020).

Prevention of Covid-19

According to KBBI (2007), prevention is a process, means, action to prevent or act to restrain something from happening. Therefore, prevention is an action. A prevention is analogous to behavior. According to Noor (2008), preventive behavior is to take action before the incident. There are basically four levels of disease prevention in general, namely: Primordial prevention, Primary prevention, Secondary prevention, and Tertiary prevention.

Preventive measures need to be implemented among the fishermen of Kenjeran fishing village to avoid being infected by Covid-19. Some basic precautions the fishermen can take according to OSHA recommendations are washing hands frequently, staying at home when feeling unwell, implementing respiratory etiquette (coughing and sneezing), practicing physical distancing, reducing shared use of things and implementing proper housekeeping, including cleaning and disinfecting work equipment on a regular basis (OSHA, 2020).

Hierarchy of Control

According to Barbara A. Plog (2012), hierarchy of control is stages of control that are implemented in order. This means that if after the first control is carried out, the danger in the work area is not completely eliminated, then the next stage of control is carried out. The stages are as follows:

- a. Elimination activities are carried out by ensuring proper ventilation in the work environment and in household areas, and environmental hygiene. All houses normally have natural ventilation which includes windows and fans.
- b. Substitution. Fishermen work with ships and fish catching instruments such as nets. Ships and nets are essential and standard working instruments that cannot be substituted with other tools.
- c. Technical Engineering is impractical for fishing work. Fishermen work with ships and fish catching instruments such as nets. These are standard working instruments that cannot be substituted with other tools.
- d. Administrative Control may be enforced by establishing a Covid-19 prevention team in fishing settlement, implementing rapid test for fishermen free of charge, providing outreach and counselling program focusing on the prevention of Covid-19 transmission.
- e. The Use of PPE refers to Infection Control Technical Guidelines covering contact awareness, droplets and airborne. Protective footwear may be made of rubber or waterproof materials or covered with water resistant fabric to protect feet from the splash of infectious liquid. Masks can reduce exposure to airborne contaminants.

CONCLUSION

The results of the study on the fishermen in Kenjeran coastal fishing village lead to a conclusion that the

fishermen face higher risk of contracting Covid-19 outside of their workplace. The fishermen did a lot of activities outside of their work. While the fishermen were not exposed to overly high risks, they were still exposed to Covid-19 nonetheless since some fishermen did not wear a mask when engaging in activities outside of fishing. One preventive measure that can be taken to suppress Covid-19 exposure is hierarchy of control. Of the five stages of the hierarchy of control, the most practical steps that fishermen can do effectively as an effort to prevent exposure to Covid-19 are administrative control and the use of personal protective equipment (PPE).

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