

# Does Having Insurance Beneficial for The Indonesian Fisher's Welfare?

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## ABSTRACT

Fishing is one of the occupations with a significant risk of occupational accidents, which is compounded by the advent of health problems resulting from the Covid-19 pandemic. Both of these risks can lower fisher's earnings and affect their welfare. This research aims to examine how insurance ownership affected the degree of welfare among Indonesian fishers during the Covid-19 Pandemic. The author uses two different datasets from the National Socioeconomic Survey (Susenas) and applies the Propensity Score Matching (PSM) approach to address the research questions. The PSM method, one of the quasi-experiments approaches, ensures a causal relationship between the dependent variable and the independent variable. The fisher's household expenditures serve as a proxy for its revenue, hence the greater the value, the more prosperous the fisher's household. According to the study's findings, owning health and occupational accident insurance can raise household expenses for fishers, which indicates that insurance ownership may have an impact on the degree of the well-being of Indonesian fishers. Furthermore, it was discovered by this study that the advantages enjoyed by a fishers in Western Indonesia and Eastern Indonesia differed significantly. Another finding was that the percentage of fishers in Indonesia who are covered by insurance is still relatively low. On the other hand, the value of the benefits that come with insurance ownership in fisher's households is relatively high. As a result, the best advice that can be provided to the government of Indonesia is to encourage insurance ownership on the part of the fishers.

**Keywords:** insurance; occupational accident; health; fisher; welfare

## INTRODUCTION

Given that Indonesia is an archipelagic nation with two-thirds of its territory covered by oceans and the second-largest producer of catch-based fisheries in the world after China, it is clear that the country has tremendous economic potential in the fisheries industry. Given that fishing is a job that depends on the availability of fish in the sea, this should benefit a fisher, but the term "fisher" is nevertheless associated with the underprivileged (Pranata, 2019; Rinaldi & Harahap, 2019). The average poverty rate among Indonesians employed in the fishing industry is still greater than the average poverty rate in several other occupations (Anna et al., 2019). The unpredictability of natural conditions or drastic weather changes, which are occurring more frequently, leads to the danger of occupational accidents experienced by fishers being

significant, which is one of the reasons why it is difficult for fishers to escape poverty. Compared to other industries, the fishing industry has a higher-than-average death rate from workplace accidents (FAO, 2019; Ye & Liu, 2014). Extreme weather that happens more frequently leads to unstable fish catches and erratic fish prices. Therefore, one thing that makes it harder for fishers to overcome poverty is the drastic weather changes that happen more regularly (Bene et al., 2015).

Fishing communities in Indonesia were also affected by the Covid-19 outbreak that swept the country earlier in March 2020. Fish prices decline as a result of changes in people's consumption habits, market demand changes, and disruptions in access to fish distribution due to the government's strategy of restricting community activities. Due to this, fish are now cheaper than they normally are, which lowers

fisher's income. Furthermore, the Covid-19 pandemic impacts the fishing community's health in addition to the economic concerns because of the propensity of fisher to congregate near the port or fish auction site and the inadequate sanitary facilities in these locations (FAO, 2020; Grillo-Núñez et al., 2021; Okyere et al., 2020). Fishers have little alternative but to continue searching the sea for fish and selling their harvest at the port or fish auction location despite the risk posed by the Covid-19 outbreak since the majority of fishers have no other source of income outside fish catch. Therefore, the risks encountered by fisher, which were already high from the start due to a large number of fatalities from workplace accidents, are increasing concurrently with the appearance of health hazards faced by fishers for developing the Covid-19 disease.

Owning insurance is one policy option for dealing with the potentially disastrous outcomes of high-risk work (Monirul Islam et al., 2014; Shaffril et al., 2017; Thomas & Leichenko, 2011). A descriptive technique has been used in previous research on the subject of the connection between insurance ownership and the degree of welfare among fishers, and the results show that insurance can lower the risk associated with their line of work. Because owning insurance would ensure their basic requirements are met, some insurance products act as social protection by smoothing consumption (Chen et al., 2022; Ye & Liu, 2014). In addition to serving as a social protection, insurance ownership can enhance people's well-being by enticing them to seize the possibilities at hand in order to raise their income (Janzen et al., 2021; Morduch, 1999; Ouadika, 2020). The fish caught in coastal locations decreases over time as fish supplies become less abundant. Fishers who have insurance are more likely to venture further from the coast in search of fish, improving their odds of landing more fish and their chances of making more money. As for managing insurance, having commercial insurance and managing insurance jointly (risk sharing) enables fishers to suffer fewer losses, which lowers business debts and production expenses (Jiang & Faure, 2020; Liao et al., 2020). In a macroeconomic sense, insurance will also promote economic expansion and create new jobs for the neighborhood (Zheng, Li, et al., 2021; Zheng, Zhang, et al., 2021).

Unfortunately, only some fishing communities can afford insurance (Kovacevic & Pflug, 2011; Liao et al., 2020). This issue is connected to the elastic nature of insurance premium prices for fishers, especially subsistence fishers on a tight budget (Chen et al., 2022). Because the vast majority of

fisher are small-scale operations, a rise in insurance premium prices typically leads to a decline in the number of larger insurance participants, meaning that insurance coverage for fisher as a whole remains quite low (Parappurathu et al., 2017; Ye & Liu, 2014; Zekri et al., 2008). Basic needs (food, shelter, and clothes) are of utmost importance to fishers, the majority of whom are small-scale and poor. Expenses for investments, savings, and insurance are next in line for their attention. These circumstances suggest that the financial situation of the fisher families has a significant impact on their decision to get insurance. The income level of fishers and the number of trips they take are economic factors that influence insurance ownership behavior in addition to insurance premium prices (Parappurathu et al., 2017; Suharno et al., 2022). In addition to economic factors, risk tolerance and the social circumstances of fishing families influence whether fishers own insurance (Schaap, 2021; Suharno et al., 2022; Zekri et al., 2008).

Therefore, as determined by FAO (2019) and Ye & Liu (2014), fishing work is a type of job that has a high risk of occupational injuries. This high risk is made more worse by the Covid-19 pandemic's health hazards, which render fishermen more susceptible to getting the virus. These two risks will lower the revenue of fishermen and eventually disrupt their degree of economic welfare. Having insurance, both in the form of health insurance and occupational accident insurance, is one strategy that fishers can employ to prevent any disruptions to their economic well-being. This study measures the level of fishers well-being based on the economic capacity of their households. Therefore the authors utilized the fisher's household expenditures as a proxy for its revenue, hence the greater the value, the more prosperous the fisher's household.

Previous studies have been done on the correlation between insurance ownership and welfare level, and the findings indicate a positive association. However, because the vast majority of research is undertaken outside the fishing industry as was done by Cariappa et al (2021), Liao et al (2020) and Visser et al (2020) or takes a descriptive method as was done by Monirul et al (2014), Rangeley & Davies (2012) and Thanh Pham et al (2021), it is yet unclear how having insurance will impact the degree of welfare for Indonesian fishers. Therefore, this study aims to find out and to obtain empirical evidence regarding the effect of insurance ownership on Indonesian fisher's household level of welfare.

## RESEARCH METHODS

### Location and Time of Research

During the years 2020–2021, this study was carried out throughout Indonesia. The fishers of Indonesia who own boats or motorized boats will serve as the subject of this study's investigation. Therefore, the findings of this study can only be applied to fishers who own boats or motorized boats.

### Types and Methods of Data Collection

The two Survei Sosial Ekonomi Nasional (Susenas) datasets used in this analysis were the March 2020 Susenas and March 2021 Susenas. These surveys were conducted by the Badan Pusat Statistik (BPS). Fishers who owned boats or motorboats were the units of observation in this study, hence not all samples from the Susenas dataset were included. Thus, the authors exclusively use a subset of respondents from the 2 Susenas datasets which are employed in the fisheries sector and own boats or motorized boats as stand-ins for fishing-related assets.

This study measures the level of fishers well-being based on the economic capacity of their households. Therefore the authors utilized the fisher's household expenditures as a proxy for its revenue, hence the greater the value, the more prosperous the fisher's household. To represent the Fisher Insurance Premium Assistance policy offered by the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia, the author substitutes ownership of occupational accident insurance. The ownership of health insurance is also used by the authors as a proxy for another insurance item that fishermen must

own. Fisher's households are regarded to have health insurance if the health insurance owned by fishers is not health insurance for Contribution Assistance Recipients. Therefore, occupational accident insurance and health insurance are the types of insurance used in this study.

In this analysis, we measure fisher's well-being based on their discretionary spending as our dependent variable. The possession of health and occupational accident insurance, expressed as a dummy variable with a value of 1 indicating ownership and 0 indicating non-ownership, serves as the study's independent variable. This study also employs several control variables in an effort to pinpoint the elements that affect fisher's decisions regarding insurance. Table 1 displays the data and variables that were considered.

### Analysis Method

A descriptive analysis technique and an inferential analysis by applying the Propensity Score Matching (PSM) method were utilized by the authors in this study. These analyses were carried out in the same way that Cariappa et al. (2021) had previously done so. A descriptive study was carried out with the goal of gaining insight into the circumstances and traits of fisher in Indonesia throughout the time period covered by the research. While the PSM approach is utilized to obtain empirical evidence of the correlation between insurance ownership and the degree of welfare of Indonesian fisher. The authors choose the PSM approach because the PSM method is a form of quasi-experiments design method, resulting in causal estimates, and the PSM method may solve endogeneity difficulties that may arise in this study, such as reverse causality and selection bias.

**Table 1** The research's data and variables.

Variables	Description and unit of measurement	Expected sign
Expend	Fisher's household monthly expenditure, in Rupiah.	
Accident	Ownership of occupational accident insurance, 1 if fishers have insurance and 0 if fishers do not.	+
Health	Ownership of health insurance, 1 if fishers have insurance and 0 if fishers do not.	+
Age	Fisher's age, in years.	+/-
Gender	Gender of the fisher, 1 if male and 0 if female.	-
Education	The last level of education completed by fishers, 1 if education is above senior high school and 0 if education is at most senior high school.	+
Hours	The average working hours per week, in hours.	+
Married	Fisher's marital status, 1 if the fisherman has ever been married and 0 if the fisherman has never been married.	-
Size	Number of fishers household members	-

Source: Central Bureau of Statistics of Indonesia

The PSM approach relies on two fundamental assumptions: conditional independence assumption (CIA) and common support assumption (Guo & Fraser, 2010; Pan & Bai, 2015). The CIA assumption asserts that the outcome of the dependent variable is impacted solely by the treatment variable, with no other variables having any effect. The common support assumption states that there are samples in the treatment group with similar features to those in the control group, allowing for comparison between the two samples. The propensity score, also known as the p-score, is a score that may be derived by running a probability regression between an independent variable and a control variable. This score is then used to explain the features of the sample in question.

In order to calculate p-scores, the authors employed logistic regression. The variables ownership of occupational accident insurance (accident) and health insurance (health) are treatment/independent variables ( $Y_i$ ) in binary form, with  $Y_i = 1$  if the sample has insurance and  $Y_i = 0$  otherwise. While  $X_i$  is the control variable vector consisting of fisher's age (age), fisher's sex (gender), fisher's education level (educ), fisher's working time (hours), fisher's marital status (married) and number of household members (size).  $\alpha$  is the intercept and  $\beta_i$  is the vector of the logistic regression parameters; hence, the logistic regression model is as follows:

$$P(Y_i|X_i = x_i) = \frac{e^{\alpha + \beta_i x_i}}{1 + e^{\alpha + \beta_i x_i}} \dots\dots\dots 1$$

then, by employing the variable transformation so that equation (1) can become a linear equation, then equation (1) becomes:

$$\text{logit}(Y_i) = \ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 \text{age}_i + \beta_2 \text{age}_i^2 + \beta_3 \text{educ}_i + \beta_4 \text{gender}_i + \beta_5 \text{hours}_i + \beta_6 \text{married}_i + \beta_7 \text{size}_i + \varepsilon_i \dots\dots\dots 2$$

$\pi$  represents the probability that the sample possesses insurance, and p-score represents the value of the estimated opportunity that was generated by the logit  $Y_i$  function.

After obtaining the propensity value (p-score), the next step is to match the sample group of fishers who have insurance with those who do not. Nearest neighbor matching (NNM), radius caliper, and kernel epanechnikov are the matching methods employed in this work. According to Caliendo's (2008) recommendation, the author applies the bootstrap method to obtain a more standard error. However, the bootstrap method poses a problem: the more repetitions that are performed, the longer the process will take. The final step is to perform a

postmatching analysis, which in this study compares the average household expenditures of insured and uninsured fisher and determines the difference. Calculation of the difference in the fisher's household expenditure using the value of the average treatment effects on the treated (ATTs), which are as follows:

$$ATT = E(\text{expend}_i^1 - \text{expend}_i^0) \dots\dots\dots 3$$

$E(\text{expend})$  represents the expected value or average expenditure level of fisher's households, 1 indicates that fishing households have insurance and 0 indicates that they do not have insurance.

## RESULTS AND DISCUSSION

### Descriptive analysis

Based on Tables 2 and 3, which provide the annual number of insured fishers, it is clear that the coverage of insured fishers is still relatively constrained. Only 2,01% of fishers in 2020 and 1,72% in 2021 had occupational accident insurance. In 2020 and 2021, 5,48% and 5,04% of fishers will be covered by health insurance, respectively. Both Tables show a downward trend in the proportion of fisher with coverage during the study period. The Covid-19 pandemic that has swept throughout Indonesia since early March 2020 has altered people's consumption patterns, and then aggravated by the social and physical distance policy implemented in early April 2020, which hampered the distribution of goods. The combination of these factors, together with the perishable nature of fish commodities in general, causes a decline in fish prices, which, in turn, brings about a loss of income for the fishers. Most of a fisher's household income will go toward satisfying basic demands, and only after they have been met will they consider saving or investing any excess money. This is why, following the Covid-19 outbreak in Indonesia, fewer fishers likely to carry insurance. These criteria confirm the findings of Chen et al. (2022) and Grillo-Nunez et al. (2021) that insurance ownership is elastic to the price of insurance premiums and income from the fishers.

Additionally, the author separates Indonesian fishers into two categories according to where they live: in Western Indonesia, which includes Sumatra, Java, and Kalimantan, and in Eastern Indonesia, which includes Bali, Nusa Tenggara, Sulawesi, Maluku, and Papua. Tables 2 and 3 demonstrate that there are no statistically significant differences between the state of insurance ownership and the trend based on the region of residence. What needs

to be taken into consideration from the two Tables is that insurance ownership, both in the form of work accident insurance and health insurance, is free from government intervention.

Even though the Indonesian government has a Fishermen Insurance Premium Assistance (BPAN) policy that assists fishermen in obtaining occupational accident insurance, this policy is only applicable for a single year. In light of the fact that the majority of fishers are poor or vulnerable to poverty, it is unlikely that they will continue to purchase occupational accident insurance once the government's intervention is complete. That is why the coverage of fishers with occupational accident insurance is still quite low. Different situations can be noticed in the coverage of health insurance ownership by fisher. Government initiatives in the form of Contribution Assistance Recipients allow fishers to continue to have health insurance even if they cannot afford it. Basically, these policies only aid individuals who are poor or at risk of becoming poor, and they have been in place for a long time. But most fishers in Indonesia are poor or on the verge of poverty, so they are eligible for the Contribution Assistance Recipient policy. This means that if you look at how many fishers have health insurance in general,

it will be more than 75%. On the one hand, this fact assists fishers by ensuring ownership of health insurance, but it also demonstrates that there are still a considerable number of Indonesian fishers who are deemed poor.

Table 4 and Table 5 demonstrates that, between 2020 and 2021, fisher's households with health and occupational accident insurance spend on average more than fisher's households without insurance. This fact supports the findings of Chen et al. (2022) and Ye & Liu (2014) and provides preliminary evidence that insurance ownership can satisfy basic needs and boost household incomes in the fishing industry. When Covid-19 or other illnesses prevent fishers from going out to sea as often, their income are disturbed, and at the same time, their spending on health rises due to increased medical costs. By obtaining health insurance, the necessity for medical costs can be secured in the hopes that the fisher will recover quickly and resume fishing soon. Similar circumstances arise with the ownership of occupational accident insurance when fishers receive compensation that may be utilized as a replacement for lost sources of income while unable to work as usual when they are prevented from doing so by a work-related accident.

**Table 2 Number of fishers by year and ownership of occupational accident insurance**

Occupational accident insurance	2020			2021		
	Western	Eastern	Total	Western	Eastern	Total
Non-Insurance	2.896	5.157	8.053	2.952	5.203	8.155
	97,64 %	98,19%	97,99%	97,68%	98,62%	98,28%
Insurance	70	95	165	70	73	143
	2,36 %	1,81%	2,01%	2,32%	1,38 %	1,72%
Total	2.966	5.252	8.218	3.022	5.276	8.298
	100 %	100%	100%	100 %	100 %	100%

Source: Central Bureau of Statistics of Indonesia

**Table 3 Number of fishers by year and ownership of health insurance**

Health insurance	2020			2021		
	Western	Eastern	Total	Western	Eastern	Total
Non-Insurance	2721	5.252	7.767	2.806	5.074	7.880
	91,74%	96,08%	94,52%	92,85%	96,17%	94,96%
Insurance	245	206	451	216	202	418
	8,26%	3,92%	5,48%	7,15%	3,83%	5,04%
Total	2.966	5.252	8.218	3.022	5.276	8.298
	100 %	100%	100%	100 %	100 %	100%

Source: Central Bureau of Statistics of Indonesia

**Table 4 Descriptive statistics on the characteristics of fishers in 2020**

Variable	Occupational accident insurance				Health insurance			
	Mean		t-test		Mean		t-test	
	Insurance	Non-Insurance	t	p >  t	Insurance	Non-Insurance	t	p >  t
Monthly household expenditure, in Rupiah	6.412.068	5.130.581	3,15	0,002	5.630.292	4.122.935	7,81	0,000
Age, in year	42,042	41,352	0,51	0,607	43,805	43,364	0,54	0,589
The percentage of fisherman who have completed senior high school or above	0,0546	0,0606	-0,24	0,814	0,0377	0,0310	0,55	0,584
The percentage of fisherman who are male	0,8909	0,9333	-1,36	0,175	0,9157	0,9401	-1,42	0,157
Average working hours per week, in hours	43,485	41,03	1,62	0,105	41,922	41,093	0,95	0,340
The percentage of fisherman who have been married	0,8242	0,8546	-0,75	0,455	0,8891	0,8914	-0,11	0,915
Number of household members	5,3879	5,4606	-0,29	0,771	4,5743	4,4989	0,57	0,567

Source: Central Bureau of Statistics of Indonesia

In addition, Table 4 and Table 5 indicates that there is no significant difference between the characteristics of fisher who have health insurance and those who do not. This is due to the significant number of fishers who have health insurance through the Contribution Assistance Recipient program (BPJS-PBI), allowing low-income fishers to also receive health insurance. In contrast, when it comes to occupational accident insurance, the majority of fisher in Indonesia are male, have been married, and have an average of five family members. The disparities in fisher's characteristics can be observed in the average age of fisher and the average length of work. Fishers with occupational accident insurance tend to be 1-2 years older on average than fishers without insurance. This finding contradicts the results

obtained by Schaap (2021), who uses fisher's age as a surrogate for risk choice. According to Schaap's results, fishers will generally act less prudent as they get older. Fishers are typically more cautious when they are younger and have less experience catching fish. For example, they might check the weather report before heading out to work. However, as fishers get older and gain more experience, they rarely check weather reports before to going fishing on the open sea. Meanwhile, fishers with insurance typically put in 2-5 more hours each week than fishers without insurance. This suggests that fishers with insurance are more ready to take risks by staying at sea longer or searching for fish in farther-flung areas, which increases the likelihood that these fishers will earn more money.

**Table 5 Descriptive statistics on the characteristics of fishers in 2021**

Variable	Occupational accident insurance				Health insurance			
	Mean		t-test		Mean		t-test	
	Insurance	Non-Insurance	t	p >  t	Insurance	Non-Insurance	t	p >  t
Monthly household expenditure, in Rupiah	6.132.018	4.619.232	4,82	0,000	5.966.649	4.227.417	7,86	0,000
Age, in year	42,049	40,329	1,51	0,132	42,742	42,215	0,58	0,562
The percentage of fisherman who have completed senior high school or above	0,0493	0,0423	0,28	0,777	0,055	0,0598	-0,30	0,767
The percentage of fisherman who are male	0,9155	0,9366	-0,68	0,498	0,9378	0,9306	0,42	0,676
Average working hours per week, in hours	45,81	40,783	3,19	0,001	41,768	40,822	1,01	0,313
The percentage of fisherman who have been married	0,8451	0,8451	0,00	1,000	0,8708	0,8636	0,31	0,760
Number of household members	5,655	5,028	1,73	0,084	4,622	4,603	0,15	0,882

Source: Central Bureau of Statistics of Indonesia

### Propensity Score Matching estimation

Table 6 verifies the conclusions of descriptive statistics in Table 4 and Table 5 that there is a positive correlation between occupational accident and health insurance ownership and fisher's household expenditures. The estimation results of the Propensity Score Model (PSM) indicate that ownership of occupational accident insurance will increase fisher's household expenses by a coefficient of 24,5% to 35,8% in 2020, or the equivalent of 1.281.487,03 rupiah to 2.029.062,42 rupiah. While in 2021, ownership of occupational accident insurance will increase the average spending of fisher's households by 27,6% to 28,2%, which is the equivalent of 1.274.509,57 rupiah to 1.309.562,36 rupiah. According to their

location, fisher's households in Western Indonesia will generally have bigger increase in their average spending as a result of having occupational accident insurance than those in Eastern Indonesia, on average.

According to Table 7, having health insurance will increase the average expenditures of fisher's households by 29,2% to 32,1% in 2020, or by 1.507.356,59 rupiah to 1.586.921,81 rupiah. Whereas in 2021, health insurance will increase the average expenditures of fisher's households by 30,2% to 30,7%, or by 1.656.418,90 rupiah to 1.751.333,21 rupiah. In nominal terms, the value of the benefits of having health insurance in 2021 is slightly greater than in 2020. The findings regarding the advantages of having health insurance and the advantages of having

**Table 6 PSM regression analysis of fisher's household expenditure by occupational accident insurance and area of residence**

Matching Methods	2020			2021		
	Total	Western	Eastern	Total	Western	Eastern
NNM with Replacement	0,245*** (0,078)	0,401*** (0,076)	0,268*** (0,089)	0,277*** (0,064)	0,289*** (0,086)	0,233*** (0,090)
NNM without Replacement	0,271*** (0,060)	0,386*** (0,063)	0,270*** (0,060)	0,280*** (0,050)	0,268*** (0,087)	0,229*** (0,085)
Radius Caliper	0,358*** (0,051)	0,424*** (0,058)	0,265*** (0,068)	0,282*** (0,046)	0,197*** (0,051)	0,328*** (0,059)
Kernel Epanechnikov	0,353*** (0,048)	0,419*** (0,061)	0,261*** (0,054)	0,276*** (0,044)	0,195*** (0,052)	0,325*** (0,063)
Constant	15,127*** (0,006)	15,241*** (0,009)	15,063*** (0,007)	15,179*** (0,006)	15,256*** (0,009)	15,136*** (0,007)

Standard errors in parentheses

\* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Source: Central Bureau of Statistics of Indonesia

**Table 7 PSM regression analysis of fisher's household expenditure by health insurance and area of residence**

Matching Methods	2020			2021		
	Total	Western	Eastern	Total	Western	Eastern
NNM with Replacement	0,292*** (0,037)	0,299*** (0,044)	0,276*** (0,067)	0,307*** (0,042)	0,273*** (0,060)	0,237*** (0,057)
NNM without Replacement	0,305*** (0,032)	0,299*** (0,044)	0,276*** (0,067)	0,307*** (0,042)	0,273*** (0,060)	0,237*** (0,057)
Radius Caliper	0,318*** (0,025)	0,304*** (0,030)	0,266*** (0,039)	0,302*** (0,026)	0,264*** (0,039)	0,288*** (0,041)
Kernel Epanechnikov	0,321*** (0,022)	0,302*** (0,030)	0,268*** (0,040)	0,303*** (0,028)	0,264*** (0,037)	0,290*** (0,044)
Constant	15,119*** (0,006)	15,231*** (0,009)	15,059*** (0,007)	15,172*** (0,006)	15,244*** (0,009)	15,132*** (0,007)

Standard errors in parentheses

\* $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Source: Central Bureau of Statistics of Indonesia

work accident insurance are the same regardless of where one lives; fishers in Western Indonesia will still gain more from having insurance than fishers in Eastern Indonesia.

## Discussion

Tables 2 and 3 show that the coverage of Indonesian fishers with insurance is still quite low. This low insurance penetration rates show that there is still a significant lack of insurance knowledge and availability among fishers. The Indonesian

government established BPJS Ketenagakerjaan in 2014 in an effort to promote the growth of the insurance sector. However, at the time of its founding, BPJS Ketenagakerjaan emphasized the involvement of Wage Recipients (PU) or employees of private enterprises who routinely get wages or salaries. While this is happening, the Non-Wage Recipient Employment BPJS (BPU) program, which covers fisher's labor, is subpar because the fishers groups do not receive enough socialization. Then, in 2017, the Republic of Indonesia's Ministry of Maritime Affairs and Fisheries also released a Fisher Insurance



Premium Assistance (BPAN) policy, which was granted exclusively to small-scale fishers in the form of occupational accident insurance products.

However, the duration of the BPAN policy is extremely short, as it is only applicable for a single year. Then, fisher who receive benefits under the BPAN policy are expected to pay for work accident insurance out of their own pockets. Yet, the majority of fishermen are poor and vulnerable individuals that spend the majority of their earnings on basic family requirements such as food, clothes, and housing. Due to the features of insurance that are sensitive to premium costs and one's income, the likelihood of fishermen acquiring BPAN policies to purchase work accident insurance using their personal income is therefore quite low. This is consistent with the findings of Zekri et al. (2008), who conducted research in Oman, and Parappurathu et al. (2017), who conducted research in India, and discovered that the failure to develop insurance in the fisheries sector was due to the low income of fishermen, resulting in low insurance coverage.

The estimation outcomes of the PSM model are consistent with Ye and Liu's (2014) findings, which indicated that insurance could raise fisher's income. Severe weather while fishers search for fish on the open seas significantly enhance their risk of workplace mishaps. It means that when an occupational accident occurs, a fisher will be unable to work as usual, which reduces the fisher's income. As a result, the cost of fishing will rise concurrently, as will the cost of treating fishers for injuries sustained in workplace accidents. Furthermore, it may be inferred that the degree of fisher's welfare will be disrupted because, during this time, their income declined, and their household expenses rose. For this reason, it is critical for fishers to have occupational accident insurance. On the other hand, having occupational accident insurance can entice fishers to take the chance of searching for fish in a new area or farther from the shore where the availability of fish may be more significant to boost fisher's revenue. This fact is consistent with the claim made by Morduch (1999) that owning insurance will encourage someone to be more willing to take risks in order to acquire higher profit chances.

When comparing the advantages of having occupational accident insurance for fishers who living in different regions of Indonesia, it can be seen that the advantages enjoyed by fishers in the Western Indonesia region are greater than those enjoyed by fishers in the Eastern Indonesia region. Strong winds

and high waves, which are more common in western Indonesia, particularly in the waters south of the islands of Sumatra and Java, are one of the factors that could be the source of this phenomenon. It is because these waters are joined to the Indian Ocean, where the average wind and wave height are always higher than in other water locations. Furthermore, the abundance of fish resources is another factor that can explain why Western Indonesia has higher occupational accident insurance payouts than Eastern Indonesia. According to the Republic of Indonesia's Decree of the Minister of Maritime Affairs and Fisheries about the level of usage of fish resources in the Republic of Indonesia's Fisheries Management Area (WPPNRI) in the West Indonesian waters, which comprises WPPNRI 571, WPPNRI 572, WPPNRI 573, WPPNRI 711, and the majority of WPPNRI 712, have reached an over-exploited condition. In their publications, BPS (2020) claimed that these circumstances forced fishers to hunt for fish in places distant from the coast so that when drastic weather changes happened, these fishers could not find shelter on the closest island. As a result, two things might happen. The first is an increase in the possibility of occupational accidents for fishers. The other one, there is a general increase in the amounts of fish caught, which has led to an increase in the fisher's income.

Ownership of health insurance will statistically raise fisher's household expenses with a coefficient value of 29,2% to 32,1%, according to the estimated findings of the Propensity Score Matching (PSM) model in Table 7. This result is consistent with the findings reached by Liao et al. (2020) in their research in China, which showed that insurance ownership would ensure that fisher's households can meet their essential demands. Degenerative diseases, such as skin cancer and musculoskeletal problems, which affect the bone, joint, and nerve system and make it difficult for fishers to move normally and, in turn, lower their output, are common among those who engage in the fishing industry for extended periods (Eckert et al., 2018). Moreover, when fishers are ill and unable to work, as usual, they incur additional medical costs in addition to losing their revenue. In this situation, health insurance will be crucial for fisher since it will ensure that they may receive treatment in the hopes of quickly recovering and returning to work without worrying about the costs of their necessary medical care.

Based on the place of residence, a fisher in Western Indonesia still enjoys more enormous health

insurance benefits than those in Eastern Indonesia. This finding has to do with the fact that access to health facilities in the Western Indonesia region is generally better than that of facilities in the Eastern Indonesia region. Data on the unmet need for health services from BPS show that in the Western Indonesia region, the average percentage of unmet needs in 2019–2021 is between 4.10% and 4.93% lower than the value of unmet needs in Eastern Indonesia, which was between 5.27% and 5.78%. These indicators are a proxy to see the coverage of the population who do not seek treatment when they are ill related to several factors, including lack of financial means, lack of transportation costs, lack of access to transportation or healthcare facilities, and lengthy wait times for health services that make a person hesitant to seek treatment. Compared to the health insurance benefits obtained by rural communities in China (Chen et al., 2022), which are only 14%, the value of health insurance benefits earned by fishers is still higher.

Despite the fact that the Indonesian government enacted physical and social distancing measures to prevent the transmission of disease due to the Covid-19 epidemic, many fishers were forced to continue working as usual during the pandemic. This was the case even though the policies were intended to reduce the transmission of disease. This is due to the fact that for most fishers, the catch of fish is their sole source of income. The only choice left for fishers is to carry on with their regular activity. Consequently, the likelihood of a fisher getting infected the Covid-19 virus is quite high, as is the likelihood that he or she will incur additional treatment costs. Despite the fact that the Indonesian government has adopted a policy covering all costs for Covid-19 patients, the Covid-19 virus causes side effects in the form of other diseases in some circumstances. Another illness that is not covered by Indonesian government policy is that fishers must continue to pay for their own medical care. Having health insurance will ensure that medical bills are covered, minimizing the impact on the household's standard of living. In Table 7, it can be observed that the value of health insurance benefits in 2021 is slightly higher than the value of health insurance benefits in 2020, despite the fact that the 2020 dataset utilized was unable to reflect the effects of the Covid-19 outbreak.

Several initiatives have been implemented by the Indonesian government to improve the standard

of living for the fishers. Since 2017, the Indonesian Ministry of Maritime Affairs and Fisheries has required business owners in the fishing industry to provide their employees (ship crew members) with occupational accident insurance. Aside from insurance ownership, several other Indonesian government programs include easy access to low-interest debt loans for fishers and aid with boats and fishing equipment. The purpose of both policies is to enhance fish production. However, neither of these strategies has resulted in a considerable improvement in the well-being of fisher. For instance, the policy of providing low-interest loans is still underutilized by Indonesian fishermen due to a lack of financial literacy and a dearth of collateral.

However, it is expected that fisher's insurance ownership may have a negative impact, particularly on marine fisheries resources and maximum sustainability yields (MSY). When climate change causes inclement weather to occur frequently, the role of insurance becomes even more crucial, particularly insurance for work-related accidents and ship/boat assets. Having insurance will protect fishers in terms of both their own safety and the viability of their fishing vessels/boats. This may motivate fisher to venture out to sea more frequently, increasing fish captures and depleting the ocean's fish stock. If this is not anticipated, the MSY will be surpassed, making it difficult for fishers to find fish in the water in the long run because fish stocks are already scarce. According to Sumaila et al. (2013), providing productive subsidies and steadily increasing catch fisheries productivity will eventually hurt the fisher themselves. As a result, a policy encouraging fishers to own insurance cannot be implemented in a silo; it must be combined with other programs like the establishment of fishing quotas or raising fishing production taxes. So that the Indonesian government's goal of improving the welfare of fishers can be realized and the marine ecology in Indonesia is not harmed, so that the welfare of fishers is not threatened in the short- and long-term.

There are caveats to this study, such as the fact that fishers with boats or motorboats were used as subjects. Therefore, the authors cannot account for crew members and fishers who do not own vessels or motorized boats, and they cannot provide a complete picture of the impact of insurance ownership in the fishing industry. Nevertheless, this was done with the awareness that this research could distinguish between capture fisheries and aquaculture. The

dataset utilized for this study also lacks information on fisher's preference for risk. A fisher's preference for risk is an important factor in deciding whether or not to purchase insurance. Consequently, the fisher's preference for risk in this study can only be determined by using the same age and experience approach as in previous research.

## CONCLUSION AND POLICY RECOMMENDATION

### Conclusions

Ownership of occupational accident insurance and ownership of health insurance has a positive and significant relationship with the total expenditure of fisher's households, or, to put it another way, ownership of occupational accident insurance and ownership of health insurance can maintain and impact the welfare of fisher's households. Therefore, it can be claimed that fishers who have insurance—either in the form of health insurance or occupational accident insurance—have a higher degree of economic welfare since they spend more (in this situation, household spending among the fishers serves as a surrogate for the fishers income). Owning occupational accident insurance entice fishers to take the chance of searching for fish in a new area or farther from the shore. In addition, having insurance, including health and occupational accident insurance, works as social protection when fishers are unable to work to prevent disruptions to their welfare.

The number of fishers covered by occupational accident insurance is still quite low. Due to the brief duration of BPAN policies, they are ineffective at increasing fisher's ownership of work-related accident insurance. Compared to the Indonesian government's Contribution Assistance Recipients policy, this program has increased fisher's health insurance ownership. In spite of the fact that the percentage of fishermen with independent health insurance (insurance purchased with personal funds) remains low, the percentage of fishermen with health insurance is quite high overall.

### Policy Recommendation

Due to the benefits of occupational accident insurance and health insurance, both of which have quite large values, the Indonesian government should encourage fishers to obtain insurance. To maximize the insurance advantages gained by fisher, BPAN policies need to be improved, for example, by extending the time frame for offering BPAN policies to include

longer periods of time and adding insurance for boat assets so that the number of insured fishers can rise. The Indonesian government can also combine this policy with other policies, such as making insurance ownership a prerequisite for assistance with vessels and fishing equipment and for obtaining low-interest loans.

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## AUTHORS CONTRIBUTION STATEMENT

We hereby state that the contribution of each author to the creation of this article are Pramu Maisandi as the main contributor and Alin Halimatussadiyah as a member. The author declares that he has attached a statement of the author's contribution.

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