

## Analysis of Household Income of Capture Fisheries Business in Indonesia

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### ABSTRACT

This study aims to analyze the household income of capture fisheries business actors in Indonesia. The data used is the latest data from the Indonesian Agricultural Sector Household Income Survey collected in 2014 by the Central Bureau of Statistics. Specifically, this study uses datasets from 28,727 fisher households spread across 33 provinces. By using the OLS regression, this study found that apart from the age of the head of the household, education level of the head of the household, and household size, it can be concluded that capture fisheries households that are members of Kelompok Usaha Bersama/KUB, members of cooperative, access formal credit, easily market fish, and receive grants from the government, these households tend to have higher incomes.

Keywords: Households, Fishers, Capture Fisheries, Income

### INTRODUCTION

Indonesia is the largest archipelagic country in the world which is geographically located between two continents, Asia and Australia, as well as the Indian and Pacific oceans. A dynamic region on the world stage, both economically and politically. The area of Indonesian waters is 6.32 million km<sup>2</sup>, 2/3 of the total area of Indonesia, with a coastline of 90.093 km and a total of 17,504 islands, which shows the large potential of fisheries resources, especially capture fisheries (Badan Pusat Statistik, 2015). From an economic standpoint, the Center for Statistical Data and Information of the Ministry of Maritime Affairs and Fisheries, (2020) explained that the growth in the fisheries sector in 2019 was 5.81%

which was supported by the consumption of domestic and export fishery products. In addition, Indonesia is an important player in world fishery production with 6.5 million tons per year (7% of global production), and the third largest capture fisheries producer after China and Peru (Jaya et al., 2022).

FAO explained that 960,000 households were involved in fishing in 2016 and more than 1.5 million aquaculture households contributed to the Indonesian economy (Stacey et al., 2021). These households are generally small-scale economic activities, covering various types of capture fisheries, aquaculture, and marine aquaculture, using labor-intensive harvesting, processing, and distribution technologies. In general, all household

members are involved in small-scale fishing activities, where the male household members are involved in fishing, while the female household members take care of preparing fishing trips, setting nets, processing, and marketing the catch (Jaya et al., 2022). However, small-scale fishing activities carried out by these households are characterized by high levels of poverty and vulnerability (Stacey et al., 2021).

Fishery sector household businesses involve around 90% of the total number of fishers and generate significant employment for coastal communities (Sari, Ichsan, White, Raup, & Wisudo, 2021). Small-scale fisheries are defined based on government regulations (PP No. 32, 2019) as fishers who catch fish for their daily needs and use fishing vessels no larger than 10 GT. Based on statistical data for 2016, the number of fishing fleets measuring less than 10 GT operated by small-scale fishers was 508,551 units or 94% of the total operating fleet (Kusdiantoro, Fahrudin, Wisudo, & Juanda, 2019). This shows that the capture fisheries business in Indonesia is still dominated by small fishers with traditional equipment.

The life of fishers in general depends on weather conditions which directly affect the amount of income. Fishing activities are considered a job with a high risk of uncertainty and unsafe because the sea can be very inhospitable and dangerous at any time. The risk factor for big waves will certainly have an impact on decreasing catches, during the big wave season fishers cannot go to sea because the facilities used are still relatively traditional (Liony Wijayanti & Ihsannudin, 2013). Furthermore, Béné & Friend, (2011) concluded that fisher's income generally depends on catches that are highly variable, uneven, and unpredictable, so fishing communities are referred to as 'the poorest of the poor'. In many places, traditional fishers tend to be poorer and unhappy than those who have other jobs, besides that fishing is considered a job with a lower social status in society (Anna,

Yusuf, Alisjahbana, Ghina, & Rahma, 2019).

Fishers need certain equipment or technology to carry out activities in the sea because they live in an uncertain and completely inhomogeneous environment. Uncertainty in fisher's livelihoods originates from the physical and social environmental conditions where fishing activities take place (Wahyono, Imron, & Nadzir, 2014). The sea is a physical environment for fishing, and humans are only equipped with limited abilities to live in it (Wahyono, Imron, & Nadzir, 2013). However, the livelihoods of poor fishers depend entirely on the sea, thus requiring modern fishing facilities and other supporting facilities to survive long in the waters (Stanford, Wiryawan, Bengen, Febriamansyah, & Haluan, 2013). Fishers who use boats with larger engine capacity earn a large income. This reflects an unequal distribution of profits, as only those who invest in fishing facilities and those who invest more in fishing operations can earn maximum profits (Nurul Islam, Yew, & Viswanathan, 2014).

In addition to the problem of environmental uncertainty where fishing is carried out, the debate regarding fisher's livelihoods is also discussed by Béné et al., (2015) which emphasizes economic aspects (income) and biological aspects (overfishing). Fishing communities are characterized by low levels of financial resources, formal education, and business experience, as well as high levels of conflict (Sowman, Sunde, Raemaekers, & Schultz, 2014). The low income of small-scale fishing communities is an economic, political, and institutional marginalization of fishing communities in general which results in the majority of fishers not having access to economic institutions such as efficient credit markets or decent labor markets, or access to these institutions is too expensive for them. Without this access, fishers still cannot reach the minimum level of investment that will enable them to generate greater financial returns and escape the low-income productivity and poverty levels that ensnare them (Béné & Friend, 2011).

Formal institutions are very important for fishers to facilitate various necessities of life and support the sustainability of the fishing business. Satria & Li, (2017); Emdad Haque, Julián Idrobo, Berkes, & Giesbrecht, (2015) explained that fishers face the problem of uncertainty related to climate change, so they usually need loans to fill the gap in consumption needs due to uncertainty in their income, as well as to invest in their fishing equipment. In this case, formal and informal credit institutions are important for fishers.

In addition to developing fisher's cooperatives, as part of the government's efforts to empower fishing actors, fisher's groups have been formed within the fisher's communities themselves. The fishers group is known as the "Kelompok Usaha Bersama/KUB" which carries out fishing business activities based on the results of an agreement or deliberation of all members based on common interests. This is stated in the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia No.14 of 2012.

Fisher's participation in institutions such as cooperatives or fishing communities can help increase their income (Parappurathu, Ramachandran, Baiju, & Xavier, 2019); (Kolade & Harpham, 2014); (Twumasi et al., 2021); (Khan, Alam, & Islam, 2012); (Nurul Islam et al., 2014). Association membership influences the possibility of diversifying income into agricultural work and can provide information about production inputs, access to extension services, and information about crop prices and sales (Olale & Henson, 2012). Cooperatives can provide loans/financial assistance to their members, so that it is expected to be able to overcome various fisher's problems, and can also encourage the growth of investment in the fisheries sector (Subari, 2012).

Fishers often do not have market access, especially those who live on small islands, which is a problem due to the perishable condition of the fish. Imron, (2003) explained that in such situations, the role of loan sharks becomes very large in the livelihood of fishers. On small

islands, the existence of capital owners (money lenders) not only functions as a buyer of marine products but also sells various fisher's needs such as fishing gear, and daily necessities, such as sugar, coffee, tea, and cigarettes. Dependence on moneylenders makes the fisher's position weak, so moneylenders take advantage of this condition to buy fish at low prices.

There have been many studies discussing fisher's income and the factors that influence it, but this research contributes by adding empirical evidence from capture fisheries households using the latest dataset from the Indonesian Agriculture Sector Household Income Survey, which was collected in 2014 by Central Bureau of Statistics. The variables of the age of the head of the household, the educational attainment of the head of the household, household size, membership of a fishing group/KUB, utilization of cooperative facilities, access to credit, market access, and government grants are used to predict household income.

## **METHODS**

This study uses the latest data from the Indonesian Agricultural Sector Household Income Survey collected in 2014 by the Central Bureau of Statistics (BPS). The survey is part of the Indonesian Agricultural Census which is conducted every ten years, providing national data on fishing households, providing demographic data, fishing and fishing gear, catch, fishing costs and income, and other general information about each fishing household. Specifically, this study uses datasets from 28,727 fishing households spread across 33 provinces, including Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, Riau Islands, DKI Jakarta, West Java, Central Java, DI Yogyakarta, East Java, Banten, Bali, West Nusa Tenggara, East Nusa Tenggara, West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan, North Sulawesi, Central Sulawesi, South Sulawesi, Southeast Sulawesi, Gorontalo, West Sulawesi, Maluku, North Maluku, West Papua, and Papua.

Furthermore, the OLS regression is used to analyze the determinants of income in capture fisheries households. The capture fisheries household determinant specification model is defined as follows:

$$Y = \beta_0 + \beta_1 X_1 + X_2 + \dots + \beta_n X_n + \varepsilon$$

Where  $Y$ : Household income (Rupiah);  $\beta_0$ : intercept;  $\beta_1$  sd  $\beta_{10}$  : Regression parameters (coefficients);  $X_1$  : Age of head of household (Years);  $X_2$  : Educational attainment of head of household (Year);  $X_3$  : Size of household members (Years);  $X_4$  : Kelompok Usaha Bersama/KUB Membership, 1 if the household is a Kelompok Usaha Bersama/KUB member, 0 otherwise;  $X_5$  : Cooperative Membership, 1 if the household is a cooperative member, 0 otherwise;  $X_6$  : Credit access, 1 if the household has ever used credit, 0 otherwise;  $X_7$  : Market access, 1 if the household can easily sell their fish to the market, 0 otherwise;  $X_8$  : government grants, 1 if the household gets a government grant, 0 otherwise;  $\varepsilon$  : error.

**RESULT AND DISCUSSION**

The capture fisheries business is the main source of income for most people who live in coastal areas of Indonesia. This business is carried out at sea as well as in rivers, lakes, reservoirs, and swamps using motorized boats, outboard motor boats, and boats without motors. Most fishing

households run fishing businesses individually or in groups. This type of fishing gear is still classified as traditional where most fishing households catch fish using nets (Badan Pusat Statistik, 2015).

The types of fish caught by fishers from the sea in Indonesia are Tuna, Cakalang, Bawal, Shrimp, and others. In general, fish caught by fisher's households are sold in the local market, and only a small proportion can market their catch outside the area. Most of the fish are taken to fish auctions, fish markets, fish traders, restaurants, or directly to the end consumers. In addition, more than 80% of capture fisheries households sell their catch in fresh form, and only a small proportion sell processed fish (Badan Pusat Statistik, 2015).

The results of an agricultural survey by BPS in 2014 also showed that 60-93% of fishing households at sea carried out fishing operations for only 1 day (one-day fishing). This indicates that the fishing operation area is generally relatively close and the capability of the vessel/boat is limited. The proximity of the fishing operation area affects the catch. This is because in general these places are already saturated or experiencing conditions of overfishing due to a large number of ships/boats operating in the same area.

**Table 1**  
**Summary of Regression Variable Statistics**

Variable	Mean	Std.Dev	Min	Max
Income	4973350	2252956	29000	15000000
Log Income	17.0209	0.74665	11.8845	23.40514
Age of Head of Household	45.0963	11.8783	14	98
Education Attainment of Head of Houshold	4.77972	3.95816	0	18
Size of Household	4.54969	1.81361	1	20
Kelompok Usaha Bersama/KUB Membership	0.25902	0.43811	0	1
Cooperative Membership	0.03279	0.17809	0	1
Credit Access	0.05284	0.22372	0	1
Market Access	0.82731	0.37799	0	1
Government Grants/Assistance	0.07202	0.25853	0	1

Source: Agricultural Household Income Survey BPS, Data Processed, 2022.

Table 1 explains that the average income of fishers in the capture fisheries business per month is IDR 4,973,350. In

addition, it can be seen that there is a fairly large income gap, where the minimum income is IDR 29,000 and the maximum is

IDR 15,000,000. The table also explains that being the head of the household and working as fisher requires a strong physique, life experience, and education to support the operation of fishing as a source of household income. In general, the head of the capture fisheries household is 45 years old and has not completed elementary school education. In addition, the average number of household members is 4 people. To support the

operations of their fishing business, 25% of households are members of KUB, and only 3% of households are members of cooperatives. In addition, only 5% of households receive credit from formal institutions, 82% of households have the convenience of marketing their fish, and 7% of households receive grants from the government in the form of boats, fishing gear, and business financing.

**Table 2**  
**Regression Estimation Results**

Variable	Coefficient	Robust std. err	t	P> t
Age of Head of Household	0.0027187	0.0003758	7.23	0.000
Education Attainment of Head of Houshold	0.0181313	0.0011359	15.96	0.000
Size of Household	0.0848087	0.0024171	35.09	0.000
KUB Membership	0.0689682	0.0099251	6.95	0.000
Cooperative Membership	0.0968784	0.0248234	3.90	0.000
Credit Access	0.0822031	0.0209336	3.93	0.000
Market Access	0.0741404	0.0110661	6.70	0.000
Government Grants/Assistance	0.1363846	0.0172933	7.89	0.000
Constant	16.32922	0.0235215	694.23	0.000

Source: Agricultural Household Income Survey BPS, Data Processed 2022

Before interpreting the results of the regression estimation, heteroscedasticity and multicollinearity tests were performed for the regression model. We apply a robust standard error to avoid heteroscedasticity problems. The results of examining heteroscedasticity with the Breusch-Pagan test showed that the Prob>chi2 value was 0.0001. This leads to the conclusion to reject H0 or there is no

heteroscedasticity problem in the model being analyzed. Furthermore, the Variance Inflation Factor (VIF) is implemented to check whether multicollinearity occurs. The existence of multicollinearity can be indicated by a value of 1/VIF = 4 or more. The multicollinearity results (in Table 3) confirm that there is no strong evidence of high multicollinearity between the explanatory variables in the model.

**Table 3**  
**Multicollinearity Estimation Results**

Variable	VIF	1/VIF
Age of Head of Household	1.08	0.9282
Education Attainment of Head of Houshold	1.07	0.93028
Size of Household	1.01	0.99361
Kelompok Usaha Bersama/KUB Membership	1.06	0.94307
Cooperative Membership	1.04	0.9661
Credit Access	1.01	0.98725
Market Access	1.00	0.99715
Government Grants/Assistance	1.04	0.96419

Source: Agricultural Household Income Survey BPS, Data Processed 2022

Table 2 explains that all variables are positively correlated with household income. It can be explained that capture fisheries households tend to have higher incomes if they are headed by men of

productive age who have completed basic education, have household members who are members of KUB, utilize cooperative facilities, get credit from formal institutions, easily market their fish, and received

grants from the government in the form of ships, fishing gear, and business financing.

The age of the head of the household has a positive coefficient value in the model which explains that an increase in the age of the head of the household will increase household income. This finding is similar to that of Olale & Henson, (2012) who explained that working as a fishers requires a strong physique and a lot of life experience in operating their fishing business, increasing age means increasing experience. In addition, Yamazaki, Resosudarmo, Girsang, & Hoshino, (2018) conducted research on the productivity of small fishing communities in the Kei Islands, Maluku, explaining that fishers have an average of 14 to 16 years of experience with a range from less than 1 to 65 years.

The education of the head of the household has a positive coefficient value in the model which explains that the higher the education, the higher the household income. However, in general, fishers still think that education is not a primary need. Fishing is a hereditary occupation that does not require a higher educational status because all it takes is a skill and hard work, how to get abundant catches and sell them at high prices. The famine season which always comes every year and cannot be guaranteed continuously makes the economic conditions of the households worse off so that they are reluctant to set aside expenses for their children's education. In addition, the low education level of fisher's households is caused by the distance between secondary schools (SLTP and SLTA) which are far from fisher's settlements, which generally live in coastal villages (Badan Pusat Statistik, 2015).

Household size has a positive coefficient value in the model, this explains that more household members will increase their income. In capture fisheries households in Indonesia, the father or head of the household and sons usually catch fish in the sea. Wives and daughters usually collect fish or shellfish, process it, clean boats, repair nets, and become fish traders. Almost all household members

can be used as labor to increase household income. These results confirm the research of Olale & Henson, (2012) which explains that fishery workers can carry out other income-generating activities (non-fishery), which include agriculture and non-agriculture. The capture fisheries business is not only capital-intensive but also labor-intensive, so it requires a lot of manpower to operate it.

Membership of fishers groups (Kelompok Usaha Bersama/KUB) has a positive coefficient value in this model, which explains that fishers households that are members of KUB tend to have high incomes. This finding is similar to Nurul Islam et al., (2014); Kolade & Harpham, (2014). The fishing community forms small groups of fishers to carry out fishing activities. This is through the results of the agreement of all members based on common interests. The benefits of KUB are as a forum for raising joint capital, as an institution that will partner with fishing companies, and especially with the existence of KUB it can facilitate access to grants from the government. Data from the agricultural census by the Central Bureau of Statistics in 2013 explains that the existence of joint venture groups (KUB) is still minimal, where capture fisheries households are only 5-16% of KUB members. The reason for not becoming a member of KUB is due to the absence of KUB in the village and the lack of information about the benefits of joining KUB.

Cooperative membership has a positive coefficient value on the model. This explains that fishing households that are members of cooperatives tend to have high incomes. This finding is similar to Parappurathu, Ramachandran, Baiju, & Xavier, (2019); Twumasi et al., (2021); Khan, Nature, & Islam, (2012); Olale & Henson, (2012). Generally, cooperatives are designed to provide stable fish markets, access to credit, fishing gear, and market information. In Indonesia, cooperatives are based on the principle of mutual cooperation and togetherness to improve the welfare of its members.

Cooperatives partner with investors and banks to facilitate access to credit, as well as partner with the government in managing Fish Auction Places (TPI) facilities located at fishing ports to facilitate market access and service needs for ice factories, cold storage, and fuel for fishers. However, attempts to develop cooperatives among fishers in Indonesia often end up being less than satisfactory. Data from the agricultural census by the Central Bureau of Statistics in 2013 explained that less than 10% of fishing households are members of cooperatives. The reason for not being a member of the Cooperative is that there is no Cooperative in the area where he lives.

Access to credit has a positive coefficient value in the model. This explains that fishing households that get credit from formal institutions tend to have high incomes. This finding is similar to Emdad Haque et al., (2015), and Olale & Henson, (2012). Formal and informal credit institutions are very important for small fishers, where these credits are needed by fishers for fishing business operations, including repairing boats and fishing gear. In addition to filling the gap in their consumption needs, due to the impact of significant variations in income due to weather uncertainties. As an effort to increase the fishing business, the Indonesian government created a program related to capital; Kredit Ketahanan Pangan dan Energy /KPPE, and Program Usaha Mina Pedesaan/PUMP. This program was started in 2011 and aims to alleviate poverty by increasing the productivity of small-scale fishing businesses. KPPE is a low-interest loan of around 6 (six) percent in several banks such as BRI, BNI, and Mandiri. However, fishers feel reluctant to take part in the KPPE program because the credit process is considered quite complicated. Generally, the credit process requires collateral with a certain total loan, so fishers prefer to use their own capital rather than borrow from banks or non-banks. In addition, agricultural census data by the Central Bureau of Statistics in 2013 explained that more than 70% of fishing

households used their own capital as the main source of business financing. This is because the credit administration process, both at banks and non-banks, is still too convoluted, so fishers are not interested in taking credit.

Market access has a positive coefficient value in the model which explains that fishing households that have no difficulty selling their fish tend to have high incomes. The fish market or auction is very important for fishers. Fish will only have added value if it is not only used for consumption, but also for sale. Satria & Li, (2017) explained that fishes have a higher level of transaction risk compared to other agricultural sectors, thereby hampering economic development in coastal areas. Transactions in the fishery sector may occur in certain circumstances through intermediaries who facilitate buying and selling. Various services provided by intermediaries have been identified as important bridges in the fisheries value chain. Fishers often do not have access to markets, and the perishable condition of fish is a big problem faced by fishers, especially those living on small islands. In such conditions, the role of loan sharks becomes very large in the lives of fishers. On small islands, loan sharks not only function as buyers of marine products but also sell fisher's various needs, both fishing gear and daily necessities, such as sugar, coffee, tea, and cigarettes. Dependence on loan sharks makes the fisher's position weak. The weak position of fishers is often used by moneylenders to buy fish at low prices, and they sell them at high prices. On the other hand, loan sharks sell daily necessities to fishers at high prices.

Government grants/assistance has a positive coefficient value in the model. This explains that households that receive government grants/assistance in the form of boats, fishing gear, and business financing tend to have high incomes. The Government of Indonesia through the Ministry of Maritime Affairs and Fisheries conducted a program to increase the institutional capacity of coastal communities in the form of ship grants, fishing gear grants, and business financing

grants. This grant is channeled through cooperatives, Kelompok Usaha Bersama/KUB, and individual fishers. This program started in 2010 by distributing 1,000 ships with a capacity of 30 GT throughout Indonesia. This program continues every year, where there are various sizes and types of boats as well as various types of fishing gear that have been distributed to fishers. This government grant includes machinery, equipment, and licensing documents.

## CONCLUSION

This study found that apart from the age of the head of the household, the educational attainment of the head of the household, and the size of the household, it can be concluded that capture fisheries households where the head of the household is a member of a fishing group (KUB), member of cooperative, access formal credit, do not experience difficulty marketing the fish they catch, and receiving grants from the government, these households tend to have higher incomes.

The main key to increasing the economic benefits that fishers receive from their fishing business is to optimize the supply chain. For this reason, government efforts are needed to ensure a smooth supply chain system for fisheries from upstream to downstream, both before fishers carry out fishing activities, while at sea, and after returning to land. Starting with increasing the capacity of fishing facilities and fisher's household access to formal credit institutions, including providing low-cost credit services with easy administration, facilitating the marketing of their catch, and ensuring the availability of fuel oil (BBM) and easy access, as well as price and availability guarantees in the market, as well as providing an insurance program to protect fisher's livelihoods.

In addition, the existence of fisheries cooperatives and joint business groups/KUB is very important in maximizing income from fishing activities carried out by fishers. However, there is still a need to increase the capacity of this institution through outreach to fisher

households, especially those located outside Java. In addition, seeing the low level of fisher's education, it is necessary to have a mentoring program from extension agents for cooperative members.

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