

Socioeconomic Analysis of Octopus Handline Fishers in Aceh Besar

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Abstract— The decrease in octopus catches among handline fishers in Gampong Lamteungoh may impact the social and economic well-being of fishing households. This study aims to describe the social conditions and analyze the economic conditions of octopus handline fishers based on income levels. The research was carried out in April 2025 using a quantitative descriptive approach, applying a census method that involved 30 fishers. Data were collected through direct observation, questionnaire-based interviews, and supporting documentation. Social analysis was conducted descriptively using welfare indicators from the Central Statistics Agency (BPS), while economic analysis employed an income-based approach. The results suggest that, overall, the fishers' social conditions are quite good, with 97% classified as having high welfare and 3% falling into the moderate category. However, their economic situation remains relatively low and unstable. On average, their annual net income is IDR 6,274,567, or about IDR 522,881 per month, which is still below Aceh's Provincial Minimum Wage (UMP). These findings reveal a discrepancy between relatively good social conditions and weak economic conditions among octopus handline fishers.

Keywords— *Economy, Fishers, Octopus, Social, Welfare*

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I. INTRODUCTION

Aceh Province is located at the westernmost tip of Indonesia and is shaped by its proximity to major bodies of water, including the Malacca Strait and the Indian Ocean. This position provides Aceh with substantial fisheries resource potential while simultaneously exposing it to high exploitation pressure. In general, fishing activities in Indonesia are largely dominated by small-scale fisheries, involving millions of coastal households and playing an important role in sustaining the economic resilience of coastal communities [1]. At the district level, Aceh Besar is a coastal area with vast marine resources, featuring a coastline of around 344 km and a sea area of approximately 2,796 km² [2]. These conditions make capture fisheries one of the main sources of livelihood for coastal communities [3]. Aceh Besar includes many coastal villages (gampong) that rely

on fisheries, one of which is Gampong Lamteungoh in Peukan Bada Subdistrict. Most people in this village work as fishers, using a variety of fishing gear, including octopus handlines.

Octopus fisheries are an important part of small-scale fisheries in Indonesia and are usually carried out in coral reef areas, mainly by traditional fishers [4]. Octopus handline gear is relatively selective and is typically used in specific benthic habitats. Previous research [5] shows that the way fishing gear is operated, including handlines, can significantly affect both the catch yield and the composition of species caught. Furthermore, fishing success is closely influenced by benthic habitat conditions, especially coral reef ecosystems that serve as shelter for target species. However, recent trends show a decline in both octopus catches and market prices over the past few years. Based on a preliminary survey in Gampong Lamteungoh, catch production, which reached around 70 kg per trip in 2019, dropped to about 15 kg per trip in 2024. This decline was accompanied by a decrease in price from IDR 70,000/kg to IDR 45,000/kg. Meanwhile, operational costs have not decreased, which may lead to reduced income for the fishers

One of the factors believed to contribute to the decline in catches is habitat degradation caused by destructive fishing practices. Activities such as blast fishing can severely damage coral reefs and reduce overall fisheries productivity. While it may offer short-term gains, blast fishing leads to much greater economic losses in the long run due to the damage it causes to marine ecosystems [6]. In addition, coral reef damage caused by destructive activities can lower fishery yields, since productivity in degraded reefs is much lower than in healthy ones [7, 8]. This condition also has social consequences for coastal communities, especially in the form of reduced income and weaker household economic resilience among fishers [9]. On the other hand, socio-economic factors also influence fishers' conditions.

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Octopus fisheries have high economic value and are an important source of income for small-scale fishers. However, they are vulnerable to price fluctuations, limited market access, and inequalities along the marketing chain [10, 11]. This shows that the sustainability of fisheries depends not only on the condition of the resources but also on socio-economic factors.

Based on the description above, the main issue addressed in this study is the limited understanding of how declining catches, ecosystem degradation, and socio-economic conditions are interconnected and influence the income of octopus handline fishers at the local (gampong) level. Previous studies remain limited and tend to examine ecological and economic aspects separately, thus failing to comprehensively explain the interrelationships among these aspects within small-scale octopus fisheries. The novelty of this research lies in its integrated approach, which brings together changes in catch, habitat conditions, and socio-economic factors to better understand fishers' income at the village level. This study aims to describe the social conditions of octopus handline fishers and to examine their economic situation based on income levels in Gampong

Lamteungoh, Peukan Bada Subdistrict, Aceh Besar Regency.

II. METHOD

Research Design

This study used a quantitative descriptive approach to examine the social and economic conditions of fishers.

Study Area and Period

The study was conducted in April 2025 in Gampong Lamteungoh, Peukan Bada Subdistrict, Aceh Besar Regency.

Data Collection

Data were collected through observation, structured interviews using questionnaires, and documentation. A census method was applied, involving all 30 octopus handline fishers.

Data Analysis

Social Analysis

The social conditions of octopus handline fishers were analyzed using descriptive methods. The assessment was based on welfare indicators established by Statistics Indonesia [12, 13], as outlined below:

TABLE 1.
WELFARE INDICATORS, SCORING SYSTEM, AND INTERPRETATION CRITERIA BASED ON BPS

No	Indicator	Criteria	Score	Interpretation
1	Floor Area per Capita (m ²)	≤ 8	3	Low welfare
		8–15	2	Moderate welfare
		> 15	1	High welfare
2	Dominant Floor Type	Ceramic tiles	3	High welfare
		Cement/concrete	2	Moderate welfare
		Soil/earth	1	Low welfare
3	Dominant Roof Type	Concrete/roof tiles	3	High welfare
		Zinc sheets	2	Moderate welfare
		Thatch	1	Low welfare
4	Dominant Wall Type	Brick/masonry	3	High welfare
		Wood	2	Moderate welfare
		Bamboo	1	Low welfare
5	Lighting Source	Electricity	3	High welfare
		Pressure lamp	2	Moderate welfare
		Oil lamp	1	Low welfare
6	Drinking Water	Bottled water	3	High welfare
		Piped water	2	Moderate welfare
		Well water	1	Low welfare
7	Toilet Facility	Private	3	High welfare
		Shared	2	Moderate welfare
		Public	1	Low welfare
8	Housing Ownership	Owned	3	High welfare
		Parents' house	2	Moderate welfare
		Rented	1	Low welfare
9	Education Level	≥ Senior high school	3	High welfare
		Junior high school	2	Moderate welfare
		≤ Primary school	1	Low welfare
10	Cooking Fuel	LPG gas	3	High welfare
		Kerosene	2	Moderate welfare
		Firewood	1	Low welfare
11	Medical Treatment	Hospital	3	High welfare
		Health center	2	Moderate welfare
		Traditional healer	1	Low welfare
12	Household Dependents	< 2 persons	3	High welfare
		2–3 persons	2	Moderate welfare
		> 3 persons	1	Low welfare

Source: [12, 13].

Note: The total score is obtained by adding up all the indicator scores. A higher total score reflects a higher level of household welfare

TABLE 2.
WELFARE CLASSIFICATION BASED ON TOTAL SCORE

No.	Welfare Level	Score Range
1.	High Welfare Level	27-37
2.	Moderate Welfare Level	19-26
3.	Low Welfare Level	11-18

Source: [12, 13].

Note: Classification is based on the total score obtained from all welfare indicators.

The level of welfare is grouped into three categories: high, moderate, and low. The criteria for each category, based on Statistics Indonesia [12], are as follows.

Economic Analysis

The economic condition of octopus handline fishers was assessed based on their income levels. The types of analysis used in this study are described below.

Total Cost

Total cost was calculated using the formula proposed by [14] as follows:

$$TC = FC + VC \dots\dots\dots (1)$$

Where:

TC = Total cost
FC = Fixed cost
VC = Variable Cost

Total Revenue

Total revenue is calculated as the product of production quantity and selling price. In this study, total revenue was determined using the formula proposed by [14], as shown below:

$$TR = P \times Q \dots\dots\dots (2)$$

Where:

TR = Total Revenue
P = Price
Q = Quantity

Income

Profit, or income, was calculated using the formula proposed by [14], as shown below:

$$\Pi = TR - TC \dots\dots\dots (3)$$

Where:

Π = Income
TR = Total Revenue
TC = Total Cost

III. RESULTS AND DISCUSSION

Social Conditions

Octopus handline fishers in Gampong Lamteungoh, Peukan Bada Subdistrict, Aceh Besar Regency are generally classified as small-scale or traditional fishers, relying mainly on octopus fishing with handline gear as their primary source of livelihood. Based on interviews with 30 respondents, the social conditions of the fishing community in this area show a generally positive trend. This is reflected in strong social cohesion, a sense of solidarity, and adherence to local customary rules, such as restrictions on fishing activities on Fridays and during religious holidays. The assessment of fishers' social conditions was carried out using 12 welfare indicators developed by Statistics Indonesia (BPS). The results of this assessment are presented in Table 3 below.

TABLE 3.
DESCRIPTION OF THE SOCIAL CONDITIONS OF OCTOPUS HANDLINE FISHERS

No	Indicator	Criteria	Score	Number of Respondents	
				Individuals	%
1	Floor Area per Capita (m ²)	≤ 8	3	0	0
		8–15	2	29	97
		> 15	1	1	3
2	Dominant Floor Type	Ceramic tiles	3	13	43
		Cement/concrete	2	17	57
		Soil/earth	1	0	0
3	Dominant Roof Type	Concrete/roof tiles	3	0	0
		Zinc sheets	2	30	100
		Thatch	1	0	0
4	Dominant Wall Type	Brick/masonry	3	30	100
		Wood	2	0	0
		Bamboo	1	0	0
5	Lighting Source	Electricity	3	30	100
		Pressure lamp	2	0	0
		Oil lamp	1	0	0
6	Drinking Water	Bottled water	3	30	100
		Piped water	2	0	0
		Well water	1	0	0
7	Toilet Facility	Private	3	30	100
		Shared	2	0	0

CONTINUED TABLE 3.
DESCRIPTION OF THE SOCIAL CONDITIONS OF OCTOPUS HANDLINE FISHERS

		Public	1	0	0
		Owned	3	27	90
8	Housing Ownership	Parents' house	2	1	3
		Rented	1	2	7
		≥ Senior high school	3	15	50
9	Education Level	Junior high school	2	10	33
		≤ Primary school	1	5	17
		LPG gas	3	29	97
10	Cooking Fuel	Kerosene	2	1	3
		Firewood	1	0	0
		Hospital	3	4	13
11	Medical Treatment	Health center	2	26	87
		Traditional healer	1	0	0
		< 2 persons	3	3	12
12	Household Dependents	2–3 persons	2	20	80
		> 3 persons	1	2	8

Source: Processed Data (2025)

Based on the analysis in Table 4, most fishers (97%) have a per capita housing floor area of 8–15 m², while the remaining 3% have a floor area of more than 15 m². All respondents have access to electricity as their primary source of lighting, private sanitation facilities, and adequate sources of drinking water. In terms of housing ownership, 90% of fishers own their homes, while the rest live in their parents' houses or in rented accommodation.

In terms of the education level of household heads, most have completed senior high school (50%), followed by junior high school (33%) and primary school (17%). Most fishers (97%) use LPG gas as their

main cooking fuel and rely on community health centers (puskesmas) for their primary healthcare needs. In terms of household size, 80% of fishers have 2–3 dependents.

Based on the cumulative score of welfare indicators developed by Statistics Indonesia, 97% of fishers are classified as having a high level of welfare, while the remaining 3% fall into the moderate category. Furthermore, based on the cumulative score of social welfare indicators from Statistics Indonesia (BPS), 97% of octopus handline fishers are classified as having a high level of welfare, while 3% fall into the moderate category, and none are categorized as having low welfare. The detailed criteria for assessing these indicators are presented in Table 4.

TABLE 4.
DISTRIBUTION OF FISHERS BASED ON WELFARE LEVEL

No.	Welfare Level	Score Range	Percentage
1.	High Welfare Level	27-37	97%
2.	Moderate Welfare Level	19-26	3%
3.	Low Welfare Level	11-18	0%
	Total		100%

Source: Processed Data (2025)

Note: The classification is based on the cumulative welfare score

The results of this study show that octopus handline fishers in Gampong Lamteungoh generally have good social conditions, especially in terms of access to basic facilities such as electricity, clean water, sanitation, and home ownership. This condition suggests that fishers' social welfare is not solely determined by income, but also by access to basic infrastructure and household asset ownership. These findings are in line with [15], who note that the welfare of small-scale fishers is shaped by multiple factors, including not only income but also social conditions and access to resources. Even when fishers have diverse sources of livelihood, their level of welfare is still influenced by economic, environmental, and social factors.

In addition, social capital and local institutions play an important role in supporting and sustaining the livelihoods of small-scale fishers. [16] demonstrate that small-scale fisheries contribute significantly to local economies, yet continue to face various constraints, including limited access to capital, policy frameworks,

derived from indicators developed by the Central Statistics Agency and participation in decision-making processes. The high level of home ownership among fishers in this study reflects a certain degree of long-term social stability. Owning household assets also plays an important role in strengthening economic resilience, especially in helping fishers cope with uncertainties in catch and fluctuations in income. However, this study also highlights a gap between the social and economic conditions of fishers. Although they show high levels of social welfare based on indicators from Statistics Indonesia (BPS), their economic situation remains unstable. This suggests that fishers' welfare cannot be fully captured by a single measure, especially income alone. This is supported by [17], who highlight that small-scale fishers are highly vulnerable to external pressures, such as environmental changes, technological limitations, and fluctuations in prices and catch yields. Moreover, the sustainability of fisheries is shaped by the close interaction between ecological, economic, and social factors, where pressure on one aspect can directly affect the overall welfare of fishers. The novelty of this study lies in the identification of a discrepancy between the social and economic

conditions of octopus handline fishers at the local scale. The findings show that fishers can have relatively good social conditions seen in their access to basic facilities and asset ownership while still facing unstable economic situations. This study highlights the need for a multidimensional approach to assessing fishers' welfare by considering social, economic, and ecological aspects together.

Economic Conditions

The economic conditions of octopus handline fishers in Gampong Lamteungoh reflect those of small-scale capture fisheries, which depend heavily on fishing operations at sea as well as changing environmental conditions. Based on the findings, fishers conduct fishing

activities with an average of 26 trips per month, with their primary income derived from octopus catches. These activities are shaped by seasonal patterns, weather conditions, and the availability of resources, all of which directly influence fluctuations in production and income. The economic structure of the fishing business consists of production costs, revenue, and net income. Production costs are divided into fixed and variable components. Fixed costs include the maintenance of boats, fishing gear, and engines, while variable costs cover expenses such as fuel, oil, artificial bait, and food during fishing activities. Based on the findings of this study, a detailed breakdown of costs, revenue, and fishers' income is presented in Table 5.

TABLE 5.

DETAILED EXPENDITURE, REVENUE, AND INCOME OF OCTOPUS HANDLINE FISHERS	
Expenditure Details	Total Expenditure (IDR)
A. Costs	
A. Fixed Costs	
- Vessel maintenance (IDR/year)	2,793,600
- Fishing gear maintenance (IDR/year)	2,402,000
- Engine maintenance (IDR/year)	984,000
Subtotal Fixed Costs (IDR)	6,179,600
B. Variable Costs	
- Fuel (liters)	6,636,000
- Oil (liters)	674,000
- Artificial bait (units)	1,620,000
- Consumption (IDR/trip)	7,832,000
Subtotal Variable Costs (IDR)	16,762,000
Total Costs (IDR)	22,941,600
B. Revenue (Total Catch × Selling Price)	
Total catch:	
- Peak season (278.8 kg × IDR 60,000)	16,730,000
- Moderate season (151.5 kg × IDR 53,000)	8,029,500
- Low season (63.7 kg × IDR 70,000)	4,456,667
Total Revenue (IDR)	29,216,167
C. Income	
Net income per year (IDR)	6,274,567
- Net income per month (IDR)	522,881

Source: Processed Data (2025)

Based on Table 5, the total annual production cost incurred by fishers is IDR 22,941,600, with variable costs making up the largest share. This suggests that fishing operations rely heavily on operational inputs, especially fuel consumption. The total annual revenue of IDR 29,216,167 suggests that the fishing enterprise remains economically viable; however, the resulting net income is relatively low, averaging only IDR 522,881 per month. When compared to the Aceh Provincial Minimum Wage (UMP) for 2025, which is IDR 3,685,616 per month, fishers' income remains far below this standard. This situation reflects a low level of economic welfare and a high vulnerability to economic pressures, especially those caused by fluctuations in catch yields.

Seasonal changes in revenue also point to a strong dependence on environmental conditions. This aligns with [18], who note that small-scale fisheries are naturally influenced by environmental variability and resource dynamics, leading to unstable income patterns.

In addition, [19] report that small scale fishers commonly experience limited income due to high operational costs and restricted access to productive assets. Furthermore, [20, 21] highlight that the small-scale fisheries sector is especially vulnerable economically due to its strong dependence on natural resources and limited access to technology, capital, and markets. These conditions contribute to the low economic resilience of fishers when facing fluctuations in catch productivity. Although octopus fishing is still financially viable, the consistently low and unstable income levels point to a clear economic vulnerability [22, 23]. Therefore, strategic efforts are needed, such as improving cost efficiency, adopting better fishing technologies, and strengthening market access, to sustainably improve the welfare of fishers.

IV. CONCLUSION

Based on the findings of this study, it can be concluded that the social conditions of octopus handline

fishers in Gampong Lamteungoh are generally favorable. This is reflected in their good access to basic facilities and the fact that most are classified in the high welfare category based on indicators from Statistics Indonesia. However, the economic conditions of fishers remain relatively low and unstable, with income levels still below the Aceh Provincial Minimum Wage and strongly affected by seasonal fluctuations and high operational costs. This highlights a gap between the relatively good social conditions and the more uncertain economic situation of octopus handline fishers.

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