



The characteristics and welfare status of blue swimming crab fishermen's household on the eastern coast of Lampung, Indonesia

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Abstract. Blue swimming crab, *Portunus pelagicus*, is one of the commercial fishery commodities in Indonesia, including in Lampung Province, which brings prosperity to local fishermen. The purposes of this research were to describe the characteristics of *P. pelagicus* business and to analyze the fishermen's exchange rate in the *P. pelagicus* business, on the east coast of Lampung Province. The data collected in this study consisted of primary data and secondary data. Primary data was obtained directly from interviews with respondents. Secondary data support primary data and are related to the trading system for *P. pelagicus* on the east coast, of Lampung Province. Respondents in this study were *P. pelagicus* fishermen communities who had crab fishing businesses. Data analysis was carried out descriptively with primary data using the Fishermen's Exchange Rate (FER) equation. Based on the results of this study, it can be interpreted that the total income of the fishing business can cover the subsistence needs (basic needs) of *P. pelagicus* fishermen families in the villages of Muara Gading Mas and Kuala Seputih, with a FER value of 1.07. Meanwhile, fishermen's main income can cover fishery business expenses with a FER value of 2.

Key Words: *Portunus pelagicus*, expenditure, income, FER, welfare.

Introduction. Blue swimming crab (*Portunus pelagicus*) becomes an important commercial fishery commodity in Indonesia (Hamid & Wardiatno 2015; Sara et al 2019; Hutajulu et al 2019; Ihsan et al 2020). The eastern coast of Lampung Province is in the top five crab producers of Indonesia (Hidayani 2018; Tirtadanu & Chodrijah 2019), so crab fishing activities are the main source of livelihood for fishermen there. Blue swimming crab fishing effort evokes quite large multiplier effects. The production and trading value of *P. pelagicus* have economic, social, and environmental significance for most fishermen's and communities' lives (Cendrakasih et al 2022). For this reason, the commitment of stakeholders is needed to support the preservation of blue swimming crab resources related to food security and fishermen's welfare. The source of income for the household on the eastern coast of Lampung Province, particularly in Muara Gading Mas Village and Kuala Seputih Village, comes from capture fisheries. Most people of these villages' population work as fishermen. Some of them catch *P. pelagicus* using box traps and bottom gillnet. The results of fishermen's income will certainly affect their prosperity.

Alpianni et al (2022) stated that many fishermen in Indonesia cannot fulfill their household needs and their income decreases annually. Fishermen in coastal communities are marginalized and often live below the poverty line. Fisherman family life has very limited access to education, health, housing, etc. (Febryano et al 2021). The prosperity

level can be measured using the Fishermen's Exchange Rate (FER) which is obtained by comparing all revenues with the entire value of expenditure or expenses. Exchange rates affect fishery output through product prices and input costs. The exchange rate is considered a mediator for transferring macroeconomic policies to the fisheries sector (Obekpa et al 2020). Fishermen's exchange rates are one of the tools or indicators used to observe the welfare of fishing communities. In addition, according to Anna et al (2019), FER can describe the ability and purchasing power of fishermen to meet their household economic needs. According to Odior (2014), the depreciation of the exchange rate is due to the export market prices' increase in foreign currency, thus increasing the domestic revenue for the same production level and increasing fishermen's welfare. Bene (2006) stated that the total yield of fisheries contributed to national self-sufficiency. Therefore, adopting policies that promote national self-sufficiency will require a total extracted fisheries' output enhancement, which might be detrimental to the food security of each fisherman.

FER can have variations that are caused by a variable consumption expenditure and an uncertain income from the capture fishery business, since it is influenced by catch, fish species, fishing season, and fish price (Ariwibowo 2020). According to Dien et al (2022), FER is divided into 3 categories: a FER>1 means FER in a certain period is better than FER in the base year, in other words, fishermen experience a surplus, where the price of production rose more than the drag on the price of consumption; the income of fishermen increases and becomes greater than their expenditure. If FER=1 means FER in a certain period is the same as FER in the base year and fishermen break even, where subject to a decrease in the price of production is the same as the percentage decrease in the price of consumer goods, with regards to the understanding that fishermen's income is the same as their expenditure. However, if FER<1 means FER in a certain period decrease compared to FER in the base year, in other words, fishermen experience a deficit where the price of production is relatively smaller than the price of consumer goods; fishermen's income is lower and less than their expenses. Dewi & Purwanta (2021) stated that a high FER value is frequently not followed by an increase in fishermen's prosperity, where most fishermen live below the poverty line. The fish capture decline is one of the factors of the fishermen's income reduction. In fishing operations, an absence of the recommended fishing lines and timing cause fuel and supplies to become more expensive than the profits. Empowering fishermen could increase their exchange rate. Therefore, the government needs to create rules which can increase the community's socioeconomic empowerment (Moento et al 2020). Based on this background, it is necessary to analyze the FER for the *P. pelagicus* business in the east coast region of Lampung Province.

Material and Method

The research method used in this study is a descriptive method, which is intended to investigate and report circumstances and conditions (Arikunto 2011). Problem-solving in descriptive research is carried out by describing the subject or object condition (a person, institution, community, etc.) during the research by referring to facts or phenomena that appear during the study (Nawawi 2012).

The data used in this study were the Subsistence Terms of Trade, which were collected through interviews with fishermen and included:

1. Fishermen's household income, which consisted of income from fishery products and non-fishery income. Fishery income was affected by the amount of output and the current price of the blue swimming crab.
2. Expenditure of fishing households consisted of fishing business expenses and family consumption expenses. Fishery business expenditure was affected by the amount of input and the price of the fishery business input (costs).

The FER was calculated based on Basuki et al (2001), by using the following equation:

$$FER = \frac{Y_t}{E_t}$$

$$Y_t = YFt + YNFt$$

$$E_t = EFt + EKt$$

Where:

FER - fisherman exchange rates;

Y_t - fishermen's total income (USD) over the period t;

E_t - fishermen's total expenditure (USD) over the period t;

YF_t - fishermen's total income from fishing business (USD) over the period t;

YNF_t - fishermen's total income from nonfishery (USD) over the period t;

EF_t - fishermen's total expenditure for fishing business (USD) over the period t;

EK_t - fishermen's total expenditure for family consumption (USD) over the period t.

The criteria for the FER results can be lower, equal, or higher than one. If FER<1, it means that fishing families have a too low purchasing power to fulfill their daily needs and have the potential to run into a household budget deficit. If FER=1, it means that fishing families are only able to meet their subsistence needs. On the other hand, if FER>1, it means that the fishermen's family has a good prosperity level to fulfill their subsistence needs and the potential to consume according to their secondary or tertiary needs and make savings or investments.

Results and Discussion

Conditions of blue swimming crab business. The *P. pelagicus* business on the east coast of Lampung involves many parties, from fishermen, agent traders, mini plants, crab processing unit companies, agents of the export market, and consumers. The crab marketing channel is a series of activities for the movement of crab commodities from the producer or fisherman level to the final consumer which forms a chain or relationship of buying and selling transactions, with a certain strategy that can provide added value and competitive advantage. Crab fishing efforts in the villages of Muara Gading Mas and Kuala Seputih generally used fishing gear such as nets, traps, and trawls. The crabs caught by fishermen are processed through several stages, such as cleaning, steaming, stripping, pasteurization, and packaging. There are at least more than 4,000 fishermen, more than 40 mini planners, and 5 crab processing companies involved, while in terms of marketing there are 5 marketing channels for fresh crab and 3 marketing channels for pasteurized crab (Cendrakasih et al 2022).

Characteristics of blue swimming crab fishermen

Age. The age of 31-40 years is the productive age of fishermen observed from Muara Gading Mas Village and Kuala Seputih Village. According to Rahim et al (2018), young fishermen in their 30^s and 40^s are more productive due to good physical abilities so they can perform activities optimally and are able to develop themselves by prioritizing their family's welfare, especially to fulfill children's needs. There were 32 fishermen aged 31-40 years with a percentage of 40.5%, while those in the age range >51 years are no longer so productive as fishermen, therefore only 8 respondents, with a percentage of 10.2%, participated to the study (Table 1).

Table 1

Characteristics of respondents by age

Interval	Number (person)	Percentage (%)
≤20	-	-
21-30	17	21.5
31-40	32	40.5
41-50	22	27.8
>51	8	10.2
Total	79	100.00

Highest education level. The highest distribution of the respondents for the last education criterium was recorded in the primary school class (78.67%), while the high school level has the lowest distribution (8.9%). There are still many fishermen unaware of the high education importance and lacking of interest in supporting their school-age children to attend formal schools, due to financial constraints, thus creating the mindset to prefer helping their parents to meet their daily needs rather than having to pay for school (Table 2).

Table 2

Characteristics of respondents, based on the highest education

<i>Last education</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
Primary school	52	65.8
Junior high school	20	25.3
Senior high school	7	8.9
University	-	-
Total	79	100.00

Amount of family members. Fishermen's households with several family members, ranging from 3-5 people, are the dominant respondent group (51.9%). A large number of children in a family is usually based on strong traditional socio-cultural values (Sudarmo et al 2015). Another factor that affects the number of children is the age of the women's first marriage age. It will lead to a large number of children because the reproductive period is much longer (Putri 2013). Based on information from several respondents, on average, women in the villages of Muara Gading Mas and Kuala Seputih entered into early marriages (Table 3).

Table 3

Characteristics of respondents, based on the number of family members

<i>Amount of family members (person)</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
3-5	41	51.9
6-8	36	45.6
9-11	2	2.5
Total	79	100.00

Main job. Living in a coastal area with abundant fishery resources has determined most of the people in Muara Gading Mas Village and Kuala Seputih Village to choose to be fishermen, as their main job. Most of the respondents have their main job as community fishermen in these 2 villages, as evidenced by the 79 respondents (Table 4).

Table 4

Characteristics of respondents, based on the main job

<i>Profession</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
Fishermen	79	100
Cultivator	-	
Fishery trader	-	
Fishery worker	-	
Motorcycle taxi	-	
Grocery shop seller	-	
Farmer, planter	-	
Total	79	100.00

Side job. Currently, fishermen cannot rely on fishing activities. They need additional income from side jobs to fulfill household needs (Zamroni & Yamao 2011). Related to the

category of side jobs, the number of respondents is 36 people, with a percentage of 45.5%; many fishermen in the villages of Muara Gading Mas and Kuala Seputih have no side jobs. Some of them attempt to rise the family income. The most frequent part-time second job category is the grocery shop seller, with a total of 24 people and a percentage of 30.4%. Several factors cause fishermen not to have a side business, such as not having access to capital to do business and not having enough time to do a side job (Table 5).

Table 5

Characteristics of respondents, based on the side job

<i>Profession</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
Cultivator	1	1.3
Fishery trader	9	11.4
Fishery worker (buildvessels, string nets)	6	7.6
Motorcycle taxi	-	-
Grocery shop seller	24	30.4
Transport driver	-	-
Farmer, planter	3	3.8
Online seller	-	-
Construction labor	-	-
No side job	36	45.5
Total	79	100.00

Work experience. Work experience is a determinant factor in fishing activities' success. The work experience periods of fishermen at Muara Gading Mas and Kuala Seputih vary: the longest experience category occurs the range of 31-40 years, with 28 (35.5%) respondents. Work experience can affect the income earned (Table 6).

Table 6

Characteristics of respondents, based on work experience

<i>Interval (year)</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
≤20	20	25.3
21-30	12	15.2
31-40	28	35.5
41-50	19	24
Total	79	100.00

Main income. According to Adili & Antonia (2017), the determinant that most influences income generated by coastal community households is a fishing activity where fishermen received higher income from fish catching compared to other activities. This is similar to the blue swimming crab fishermen's conditions at the study site. They are very dependent on the number of crabs they catch from the sea and the selling price determined by the trading agents. Sometimes the number of crabs caught is only a few and not as many as in the past so the fishermen's income is also small. Even if the crabs caught are abundant during the peak season, the selling price is often cheap. This is why many crab fishermen households are still experiencing poverty and less prosperous. The people at the research locations are classified as poor, based on the existing economic level, as many as 56 respondents (70.9%) have a main income of USD 96-224 month⁻¹. Fishermen are very dependent on the marine products that are sold to cover their daily needs. Unfortunately, the fish selling price is not always fixed and it is not balanced with the prices of other basic household needs, so fishermen's income is not always stable and puts fishermen in a weak economic position (Table 7).

Table 7

Main income of the respondents (details)

<i>Monthly main income (USD)</i>	<i>Category</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
<100	Low	8	10.1
100–233	Moderate	56	70.9
>233	High	15	19
Total		79	100.00

Side income. According to the results, there are 52 respondents, with a percentage of 65.8%, which have income from side jobs, worthing <USD 100 month⁻¹. The main income from fishing is not always able to fill the economic needs. Side jobs are used as fishermen's strategy to survive, such as working as cultivators, fishery product traders, fishing workers (building vessels, stringing nets). Their wives open grocery stalls. According to Luomba (2013), women in coastal communities play a major role in land-based socio-economic activities, while their husbands are at sea for fishing activities. Women not only act as housewives but also carry out productive activities to increase the family income (Batoa et al 2016). Women tend to work for several reasons, that are: difficulty to get a decent job due to a low-level education, the willingness to be financially independent and to meet their needs without burdening their husbands, and because of the availability of a workplace (Febri et al 2017). These various jobs are undertaken to fulfill family needs (Table 8).

Table 8

Side income of the respondents (details)

<i>Monthly side income (USD)</i>	<i>Category</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
<100	Low	52	65.8
100–233	Moderate	23	29.2
>233	High	4	5
Total		79	100.00

Total household income. The total household income of fishermen is the main income plus a monthly side income. The highest number of fishermen, 58 people or 73.5%, had an average total income per month ranging from USD 100 to 233. The total income earned by fishermen per month is not fixed, it can change at any time. The unstable basic income of fishermen is caused by weather conditions (that do not allow working all year round), a lack of production factors, and a non-transparent wage system (Table 9).

Table 9

Total household income of the respondents (details)

<i>Monthly total income (USD)</i>	<i>Category</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
<100	Low	4	5
100–233	Moderate	58	73.5
>233	High	17	21.5
Total		79	100.00

Total household expenditures. The total fishermen household expenditure per month is quite high, ranging from USD 100–233 month⁻¹, with a total of 62 people, or 78.4%. Total expenditure of fishermen consists of fishery and non-fishery types of commodities. Expenditure for the fishery business in the villages of Muara Gading Mas and Kuala Seputih includes fuel and oil, preservatives: ice and salt, rations, purchase of fishing nets, incidental costs (ship servicing), and others. The total expenditure of fishing households in those villages includes food expenditure for side dishes, rice, cigarettes,

cooking oil, sugar, and coffee. Non-food expenditure includes clothing, housing, education, and health needs (Table 10).

Table 10

Total respondent households expenses (details)

<i>Total expenses</i>	<i>Category</i>	<i>Number (person)</i>	<i>Percentage (%)</i>
<100	Low	6	7.6
100-233	Moderate	62	78.4
>233	High	11	14
Total		79	100.00

Fishermen's exchange rates. The concept of FER used in this study is an indicator measuring the relative level of fishing communities' welfare (Ustriyana 2005). This indicator is also a measure of the ability of fishers' families to fill their subsistence needs (Wenno 2011). The result of several indicators calculation aiming at determining fisherman exchange rates is shown in the following Table 11.

Table 11

Average income, expenses, and FER of fishermen families at Muara Gading Mas and Kuala Seputih

<i>Description</i>	<i>Amount (USD)</i>
Total income of fishermen families	
Main income (Yft)	198.07
Side income (YNft)	33.01
Total (Yt)	231.08
Total expenditure of fishermen families	
Fishing business expenditure (EFt)	99.04
Fishermen family consumption expenditure (EKt)	115.54
Total (Et)	214.58
Fishermen's exchange rate	
Total income (Yt/Et)	1.07
Main income from fisheries (Yft/EFt)	2.00

FER can be determined based on the characteristics of the respondents in terms of age, last education, number of family members, main job, side job, work experience, main income, and side income (Acquah & Abunyuwah 2011). Some of these characteristics describe the ability of fishermen to fulfill their basic needs, both from fishing activities and non-fishery businesses. Age structure is important to determine the productive age of fishermen and their experience, which enhances their performance in catching blue swimming crab and improves their revenues (Hutajulu 2019). The last formal educational level is required in assessing the knowledge available for succeeding in enhancing their revenues. It is also important to determine the number of fishermen's family members, which influences the needs and the corresponding expenses. For fishermen who have a large number of family members, the household needs incurred will also increase. The respondents' main job is fishermen, but some of them have side jobs to enhance their main income. The FER of 1.07 is a value calculated during the moderate season, not during the low season or peak season, so there is a possibility that during the low season the FER will be less than 1. This causes fishermen to have difficulty fulfilling household needs and expenses, in case of suppression of the operations. Usually, fishermen will borrow money from their families, friends, or middlemen as their patrons. The relationship between fishermen and their middlemen is of patron-client type and it is common in Indonesia, both in fisheries and agriculture. It has an essential social function in the lives of fishermen.

Fishermen's exchange rate based on the total income. The average income of fishermen families at Muara Gading Mas and Kuala Seputih, including the main income from fisheries business and non-fishery side income, of USD 198.07 and USD 33.01, respectively, totalizes USD 231.08. Whereas, their expenditure on fishery business and household consumption is of USD 99.04 and USD 115.54, respectively, for a total of USD 214.58. The FER calculation results based on the total income are 1.07. The FER value is bigger than 1, which indicates the income from the total fishery business can cover the subsistence needs (basic needs) of fishermen families at Muara Gading Mas and Kuala Seputih Village. The average fishery business expense is USD 99.04 month⁻¹, which can be covered by the main income from the fishery business, which is USD 198.07 month⁻¹. The ratio of income and expenditure of fishermen families illustrates that most of the income originates from the capture fisheries business, while income from non-fishery side businesses only makes a small contribution. According to Aripuspita (2018), based on the welfare criteria, respondents who have FER>1 are classified as having a better prosperity level, fulfilling their subsistence needs, and have more potential to meet their secondary or tertiary needs.

Fishermen's exchange rate based on the fishery income. The fisherman exchange rate based on fishery income is calculated based on a ratio between the total fishery business income and the fishery business outcome. Based on the results of the calculations for blue swimming crab fishermen, the FER is 2. It means that the income from the blue swimming crab fisheries can cover the costs incurred for the crab business in Muara Gading Mas and Kuala Seputih Village. Fishery business expenditure averages USD 99.04 month⁻¹ and it is covered by an income of USD 198.07 month⁻¹.

Conclusions. The existence of side jobs can help increasing the main income of fishermen's households. The total income of fishermen can cover the subsistence household's needs (basic needs) with a FER value of 1.07, while the main income from fishery products can cover the costs of fishery business with a FER of 2.

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