# Household Coping Mechanism For Fisheries Community Food Security Issue

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**Abstract** Food is a basic human need. Many communities, including the fishing and aquaculture communities, are still facing difficulty in fulfilling food sufficiency. Fishing and aquaculture households attempt coping mechanisms independently, but they are constrained by a variety of factors and thus the government should come with a help to overcome constraints. This research aims to identify problems of food security in fishing and aquaculture communities, analyze determining factors, identify attempts undertaken by fishermen and aquaculture operators, and identify relevant government roles. This research used a case study approach in Pangandaran District, with data collected through surveys. Respondents were selected purposively: 10 fishermen, 10 aquaculture operators, 10 fish processors, 10 fish traders, and two West Java Provincial Marine Fisheries Service officials. Research was conducted in April – October 2019. Household food security of fishermen/aquaculture operators was measured using a Multiple Linear Regression. Based on this research was detected that 60% of households were categorized as secured, 15% less secured, 15% vulnerable, and 10% unsecured. Households of fishermen/aquaculture operators responded to these conditions with a variety of coping mechanisms: allocating parts of fish production for household consumption, selling some others to buy various kinds of food, and processing some others to get added value. These coping mechanisms were constrained by a number of factors, among which and the most important ones were knowledge and skills, capital, facilities and infrastructure, and market access. Government policy, therefore, should be focused on handling these constraining factors.

*Keywords*: *household coping mechanism, food security, fishing and aquaculture communities, pangandaran*

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## 1. Introduction

Pangandaran district, West Java Province, Indonesia majority of the population lives as fishermen. The socio-economic conditions of fishing communities are different from those of other communities, especially from the aspect of food security in satisfy their daily needs. [1]

In BKP data (2015) show that there are still many Indonesian people who are not food secure. Provinces with the most population included in the category of food insecurity and very insecure are West Java Province, that is each reached 15,554,636 and 7,919,360 residents [2].

West Java is the 3rd province which has the largest number of households with per adult-equivalent calorie intake below the average adult reference, after East Java and Central Java. Per adult-equivalent calorie intake is one indicator of household food security. Amount of households that have a value per adult-equivalent calorie intake below the average adult reference in West Java, reaches 10% of the amount of households. Food is one of the primary human needs that must be available to maintain life [3].

According to Law No. 18 in 2012 concerning Food stated that: Food is everything that comes from biological sources of agricultural, plantation, forestry, fisheries, livestock, waters and water products, both processed and unprocessed which are intended as food or drink for human consumption, including food additives, Food raw materials.

Food is one of the basic human needs, so that availability becomes one of human rights. Food security is defined as the availability of physical, socio-economic and environmental access, where a person feels safe in fulfilling food needs [5,6,7].

Food security is a system consisting of a food supply and distribution subsystem and a consumption subsystem. Availability and distribution facilitates stable and equitable food supply throughout the region, while the consumption subsystem allows each household to obtain sufficient food, and use it responsibly to meet the nutritional needs of the entire community [8].

The definition of food security has continued to develop since the existence of the Conference of Food and Agriculture in 1943 which launched the concept of secure, adequate and suitable supply of food for everyone. First World Food Conference (1974), define food security as

the availability of world food sufficiently at all times to maintain the sustainability of food consumption and balance production fluctuations and prices [9].

FAO (Food and Agricultural Organization), 1992 define food security as a situation when everyone at all times has sufficient amounts of safe and nutritious food for a healthy and active life. Food security is explained in 4 pillars, namely food availability, physical and economic access to food, stability of supply and access, and food utilization. [10]. The division of pillars in food security based on the Indonesian Food Law is availability, accessibility, and stability. The International Conference in Nutrition (FAO / WHO, 1992) defines food security as access for every household or individual to obtain food at all times for the purpose of healthy living [11].

Community food security that requires considerable attention is coastal communities, especially those livelihood as fishermen and fish cultivators. According to the Law of the Republic of Indonesia Number 31 of 2004 concerning fishermen are people whose livelihoods are fishing, while small scale fishermen are people whose livelihoods are fishing to satisfy their daily needs using fishing boats of the largest size of 5 gross tons [12].

The condition of food security for fishing households is difficult to achieve if , the access of fishermen households to food is in a low condition, especially in terms of the economy such as income, employment opportunities and food prices. Not only access to weak food, fishermen households are also very likely to experience uncertainty in achieving food sufficiency, food security, and food sustainability in low conditions [13].

This research aims to identify problems of food security in fishing and aquaculture communities, analyze determining factors, identify attempts undertaken by fishermen, and identify relevant government roles

## 2. Material and Methods

This research used a case study approach in Pangandaran district, with data collected through survey. The selection of respondents was done by purposive sampling with a total respondents is 42, consisting of: 10 fishermen, 10 fish cultivators, 10 fish processors, 10 fish traders, and two employees of the Agency Fisheries and Marine West Java Province.

The reserch was conducted in April – October 2019. Identifying the problem of food security of fishermen and fish farmer households using the description method with range of adequate nutrition and protein. This measurement combines two indicators of food security namely the share of food expenditure and energy consumption [14]. The limit for energy sufficiency is 80% of the recommendation (per unit of adult equivalent), while limiting the share of food expenditure is 60% of total expenditure. The grouping of fishermen and fish farming households using these two indicators can be seen in Table 1.

Analyzing the factors that influence food security of fisherman households and fish farming by using model logit analysis, that is:

$$Pi = F(Zi) = F(\alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4) \quad (1)$$

$$P_i = F(Z_i) = F(\alpha + \beta_1 X_1 + \beta_2 + X_2 + \beta_3 + X_3 + \beta_n + X_n)$$

$$P_t = \frac{1}{1 + 0^{(zi)}} = \frac{1}{1 + 0^{-\alpha + \beta(\alpha + \beta_1 x1 + \beta_2 x2 + \beta_3 x3 + \beta_n xn)}}.$$

Information:

$P_i$ : Opportunities for fishermen households to have certain level of food security if $X_i$ known

$Z_i$: Opportunity for fishermen household $-i$, have a certain level of food security, where $Z = 1$ for households hold food and $Z = 0$ for vulnerable households food.

$\alpha$, $\beta$ : Regression coefficient

$e$ = Base numeric of natural logarithms (2,718)

In this research variables are used free which are the factors affect the level of food security fisherman household that is the level of education $(X_1)$, large household members $(X_2)$, household expenses $(X_3)$, and household nutrition knowledge $(X_4)$. The logit model is used to determine whether independent variables $(X)$ in the model has a real relationship with variables not free $(Z_i)$.

To find out the role of all the independent variables in the model together can be used the ratio test possibly the G-test, hypothesis:

$H_0$: $\beta1 = \beta2 = ... = \beta n = 0$

$H_1$: there is at least one $\beta1 \neq 0$ (j = 1,2, ..., n)

$H_0$ and $H_1$ are estimates submitted, namely the variables $(X)$ that are suspected affect the category variable $(Y)$. Rule testing is if G-count $< \chi2$ (p, $\alpha$) then accept $H_0$ whereas if G-count $\geq \chi2$ (p, $\alpha$), then accept $H_1$, at the level of $\alpha = 5\%$. Real test parameters can be partially used with Wald-test. Wald-test statistics follow the distribution normal by hypothesis (15).

$H_0$: $\beta i = 0$; $H_1$: $\beta i \neq 0$

The rule of testing is if Count $< Z\alpha / 2$, then accept $H_0$, whereas if W count $\geq Z\alpha / 2$, then accept $H_1$.

Analyzing the factors that influence food security of fisherman households and fish farming by using multiple linear regression analysis. Identifying efforts made by fishermen and fish farming to maintain household food security, using description analysis, through Focus Group Discussion (FGD). Identify the role of the relevant government to improve food security for fisherman households and fish farming, using descriptifve analysis, is one of the analysis tools that can be used for conditions of uncertainty and information imperfections and actions the criteria for a decision [15].

**Table 1. Level measurement of the degree of food security fishing households and fish farmers**

| No | Energy consumption Per Equivalent Adult | Food Expenditure Share | |
|----|-----------------------------------------|------------------------|---|
| | | Low ( $\leq$ 60 % Total Expenditures) | High ( > 60 % Total Expenditures ) |
| 1. | Enough (> 80% energy sufficiency) | Endurance | Susceptive |
| 2. | Less ($\leq$80% energy sufficiency) | Less | Vulnerable |

# 3. Result and Discussion

### Research Location

This research was conducted in Pangandaran District, West Java Province, Indonesia. This district is bordered by Ciamis district and Banjar City in the north, Cilacap district in the east, Indian Ocean in the south, and Tasikmalaya district in the west. Pangandaran District is in a coastal area. Most of the people earn a living as fishermen, fish cultivators, fishery product processors and farmers.

Pangandaran is one of the areas included in the zone of Fisheries Management Area IX Indian Ocean which covers the waters of the western of the island of Sumatra and the coast of South Java. Most community income sources in Pangandaran come from the fisheries sector. Most residents earn a living as fishermen. Potential coastal areas in Pangandaran district produce fisheries production products, namely: tuna, skipjack and aquaculture, namely grouper, pomfret, catfish.

Pangandaran area is an area that is categorized as food insecurity based on the condition of people who live as fishermen. The fishing community, especially fishermen, does not have a fixed income, but based on the catch season, where there are famine and harvest. This food insecurity conditions occur during the lean season, where the catch has decreased.

### Characteristict Responden

Fisheries is an activity of water resource management starting from pre-production, production, processing and marketing of fishery products so that it has economic value. The fisheries household food security conditions are influenced by climate and weather conditions for capture fisheries and aquaculture.

The characteristics of a fishing community are formed following the dynamic nature of fisheries resources, so to get the maximum catch, fishermen must move around. The characteristics of fishing communities are different from the characteristics of fish cultivation communities in management or in utilizing land to make a living. Fishermen face uncontrolled resources where when the yields are reduced, the fisherman must find new land. In addition, high business risks cause fishing communities to live in a harsh natural environment which is always overwhelmed by the uncertainty of doing business.

Food security for fishermen is different from that carried out by fish farmers and fishery product processors. Food security is carried out by fishermen when facing a declining catch season, which is diversifying work such as improving fishing equipment, repairing ships, repairing fishing gear. Based on the results of the study 80% of fishermen did not diversify their work. Fishermen have no view of having expertise other than fishing. In contrast to fish farmers and fisheries product processing, they are able to diversify work outside the fisheries sector. Based on the results of research in the field obtained information about the characteristics of respondents, which are as follows Figure 1.

Characteristik responden based on age, 33 % is age 36 – 45 years old, 42 % ia age 45-55 years old, 14 % is age 56-65 years old, 12 % is age 26-35 years old, 10 % is age > 65 years old and 7 % is age 15-25 years old.

Respondent characteristics based on age influence fisheries community decision making. The age of respondents between 36 - 45 years for fish farmers households is more varied in household decision making, to food security through diversification of jobs outside the fisheries sector.

Age of respondents between 45-46 years for fish farmers and fisheries products processing cropping mechanism is done by diversifying the work that is still in the aquaculture sector and fishery product processing, based on market needs.
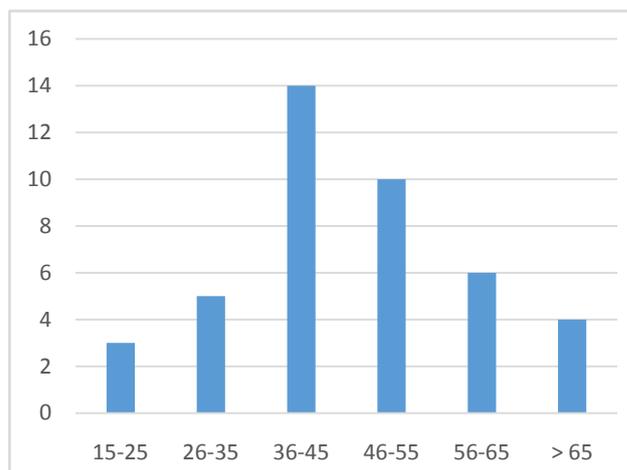


**Figure 1.** Characteristict Responden Based On Age

Characteristics of respondents based on level of education, is following Figure 2. The education level of fisheries household respondents consisting of fishermen, fish cultivators, fishery product processors and government employees of the fisheries and marine department, has different levels of education
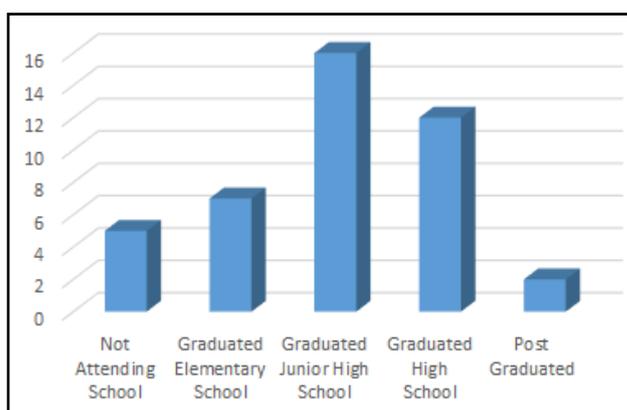


**Figure 2.** Characteristict Responden Based on Level of Education

Education is a process that includes the individual, community or national community of the individual, and all the contents of reality, both material and spiritual, that play a role in determining the nature, habits and decision making in daily life

Characteristict responden based on level education is 38 % pass graduated junior high school, 28 % pass garduated high school, 17 % pass graduated elementary school, 12 % not attending school and 5 % post graduated.

Respondent characteristics based on education level determine fisheries community decision making in

implementing family food security strategies. Respondents whose senior high school education background has dominant decision making in cropping mechanisms in the fisheries and marine sector, differn between junior, senior, and junior high school education levels

In Figure 3 can be seen characteristict responden based on types of head haousehold in the fisheries sector is fisherman, fish farming enterpreneur or aquaculture farming, fish processing enterpreneur each 24 % and works outside the fisheries sector 4 %. Characteristict responden based on types of head haousehold in the fisheries determine the level of strategy undertaken by fisheries households in family food security.
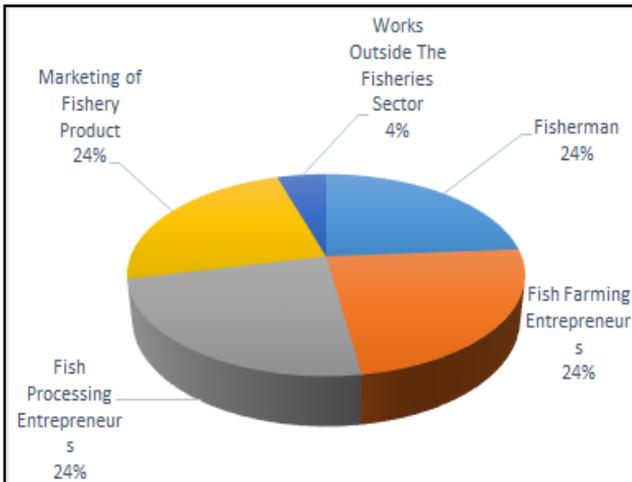


**Figure 3.** Types of Head Housework in the Fisheries Sector

Fish cultivators and fishery product processors are more dynamic in making decisions to meet family food security, in contrast to fishermen who are more static and prefer not to diversify work other than fishermen, this condition makes it vulnerable to family food security.

In Figure 4 can be seen characteristic responden based on number of family member determine the strategy carried out by fisheries households.
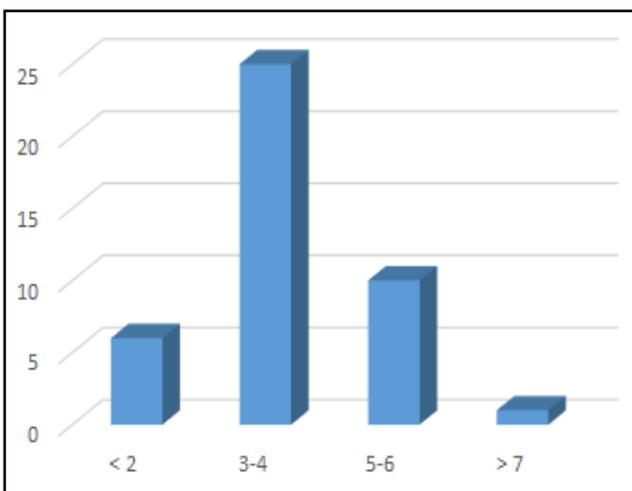


**Figure 4.** Number of Family Members

Respondent characteristics based on the number of family members, the more the number of family members the higher food needs and the more vulnerable to fisheries household food security.
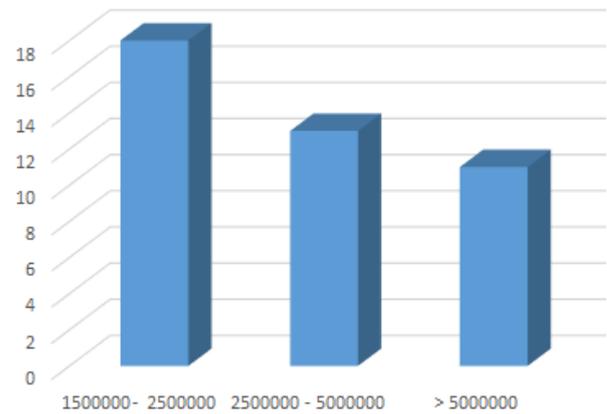


**Figure 5.** Household Expeniture

In Figure 5 can be seen respondent characteristics based on fisheries household expenditure of 43% in the range of Rp 15,000,000 – 25,000,000 per years. Fishery household expenditure is a basic need to family food needs. Respondent characteristics based on the level of expenditure of basic needs of fisheries households, of course adjusted to the level of household income of fishermen's families, fish farmers and fishery product processors. The level of education, income and expenditure of a fisherman's household will determine the fisheries household's knowledge of the nutritional intake needed by family members.

In Figure 6 can be seen characteristics of respondents based on the level of nutritional knowledge 48 % have a moderate understanding of the nutritional knowledge needed by the body.
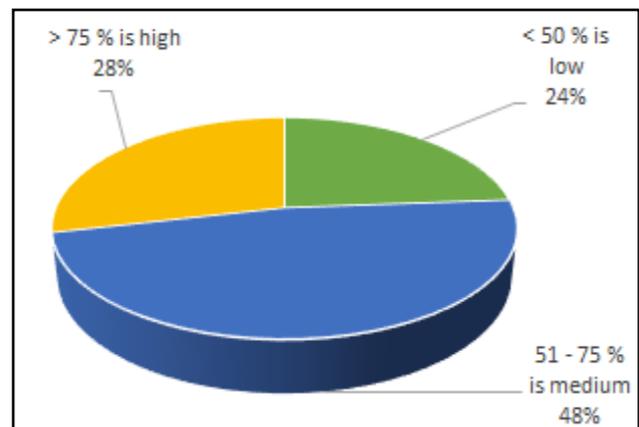


**Figure 6.** The Level of Family Nutritional Knowledge

They have a high understanding of nutritional knowledge needed by the body by 28% and 24 % is low for the level of family nutritional knowledge.

**Identify food security problems in households in fishing businesses**

Fisheries business actors consist of fishermen, fish cultivators, fish processors and fisheries marketers. Fishermen are people whose jobs carry out fishing activities. Fish farmers are people whose jobs carry out fish hatchery activities, fish enlargement of fish feeding and prevention of pests in fish. Fish processors are people who carry out hygienic fish processing activities, thus providing added value from fisheries and marine products (16).

The level of energy adequacy of households in fisheries businesses obtained by comparing the amount energy consumed with sufficient numbers household energy. The level of energy sufficiency of household fisheries business actors can be seen in Table 2, as follows:

**Table 2. The level of energy sufficiency of household fisheries business actors**

| No | Score | Criteria | Household | % |
|----|-------|----------|-----------|-----|
| 1. | > 80 % | Secured | 16 | 19.51 |
| 2. | 79 - 65 | Vulnerable | 25 | 30.49 |
| 3. | ≤ 65 % | Insecured | 41 | 50.00 |

Base on this reserch the household food security of fisheries business actors is influenced by internal and external factors in fisheries business activities. internal factors include; age, level of education, number of family members, scale of business actor. internal factors include; age, level of education, number of family members, scale of business actor. external factors include: total production, price of production, demand for production, supply of production, food prices.

**Analyze factors that influence levels household food security of fisheries business actors**

The hypothesis proposed in this reserach is thought to be influential factors towards household food security of fisheries business actors is the level of education, number of members household expenses, and knowledge about nutrition. In Table 3, it can be seen that has a significant effect on food security at the 100% confidence level seen from p-value of 0.000.

**Table 3. Logit model regression analysis results between factors that influence household food security of fisheries business actors**

| Independent variable | Coefficient | Probability | Ratio Odds |
|----------------------|-------------|-------------|------------|
| Intercept | -5.32124 | 0.007 | |
| The level of education | 0.0826204 | 0.612 | 1.32 |
| Number Of Family Members | -0.432218 | 0.089** | 0.489 |
| Household Expenditure | 0.0000035 | 0.001* | 1.00 |
| The Level of Family Nutritional Knowledge | 0.21617 | 0.017* | 1.35 |
| G = 45.276 DF = 5 p-value = 0.000 | | | |

Based on the results of regression analysis at above it can be seen that the variable expenditure of the house stairs ($X_3$) and nutrition knowledge ($X_4$) has a positive coefficient. This means that each increase in number household expenditure and nutritional knowledge causing an increase in household opportunities to reach food-resistant households.

**Identify efforts made by fisheries business actors in maintaining household food security**

Based on the results of research in the field, the efforts made by fisheries business actors in achieving food security are carried out in stages by involving local governments. Internal efforts carried out by fisheries business actors, that is: (1) conducting diversification of local food; (2) utilization of fishery products for family consumption; (3) have a family food barn or savings; (4) strengthening local institutions through cooperation and mutual cooperation in satisfy food sufficiency; (5) do networking to improve the understanding of family nutrition.

Fish either produced through fish farming/aquaculture5 activity or caught from wild stocks – marine, coastal, off-shore and freshwater is used in many developing countries as a primary source of protein.

Fish is a particularly nutritious food, rich in numerous micronutrients that are often missing in diets, particularly those of the poor. The presence of essential nutrients (such as iodine, vitamin B12 and D), the long-chain fatty acids (LC-PUFA), Eicosapentaenoic acid (EPA) and Docosahexaenoic acid (DHA) omega-3 fatty acids, protein of high quality and fish's very rich content in calcium, iron, zinc and vitamin A, is well documented in the literature

We also asked respondents about the food security of their household. Food security is defined as the physical, social and economic access of people to safe, sufficient and nutritious food and can be a notoriously elusive concept to measure [17].

Fisheries business actors in maintaining household food security conducted based on the condition of the season of fish catches, weather or climate conditions, conditions of demand and supply of fishery products, price fluctuations in fishery products.

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# References

[1] Nurhayati, A., Purnomo, A.H. (2017). Developing the Marine and Fisheries Industry in Pangandaran using a Bioecoregion-Based Technopark Framework. *Journal of STI Policy and Management,* 2(1), 43-52.

[2] Food Security Agency. 2016. Strategic Plan for the Food Security Agency 2015 - 2019. http://bkp.pertanian.go.id/statis-31-renstra 2015-2019. html Accessed on November 5, 2017

[3] Wiranthi PE, Suwarsinah HK, Adhi AK. 2014. Determinants of household food security: a comparative analysis of Eastern and Western Indonesia. J Agric Sci. 15(1): 17-28.

[4] Republic of Indonesia. 2012. Law of The Republic Indonesia No. 18 of 2012. Concerning Food. https://luk.staff.ugm.ac.id/atur/UU18-2012Pangan.pdf. Accessed on July 2, 2019.

[5] Barrett CB (2010) Measuring food insecurity. Science 327: 825-828.

[6] Maxwell DG (1996) Measuring food insecurity: the frequency and severity of coping strategies. Food Policy 21: 291–303

[7] Nurhayati., A. et.al. 2011. Cakrawala Pasang Surut Nelayan. "Cakrawala Tides for fishermen"Unpad Press.

[8] Suryana A. 2004. "Food Security in Indonesia". Proceedings of the National Food and Nutrition Widyakarya VIII. LIPI. Food and Nutrition Resilience in the Era of Regional Autonomy and Globalization. Jakarta.

[9] FAO (Food and Agricultural Organization). Policy Brief Food Security. June 2006 Issue 2. http://www.fao.org/fileadmin/templates/faoitaly/documents/pdf/pdf_Food_Security_Cocept_Note.pdf. Accessed on July 2, 2019.

[10] FAO (Food and Agricultural Organization) Final Report of The International Conference on Nutrition. Rome December, 1992. http://www.fao.org/3/u9265e/u9265e00.pdf. Accessed on July 2, 2019.

[11] Republic of Indonesia. Law of The Republic Indonesia No 31 of 2004. Concering Fisheries. http://www.dpr.go.id/dokjdih/document/uu/32.pdf. Accessed on July 2, 2019.

[12] Salim, FD dan Darmawaty 2016. Analysis of Household Food Security of The Fishers Labors in The Village of Bajo Sangkuang South Halmahera Regency. *J*ournal of socio-economic marine and fisheries. Vol 11 No 1. 2016. http://ejournal-balitbang.kkp.go.id/index.php/sosek/article/view/3177. Accessed on July 2, 2019

[13] Maxwell D McLevin, Klemeser MA. Rull M, Morris S. Aliadeke C. 2000. Urban livelihoods and Food Nutition Security in Greater Accra, Ghana. *IFPRI in collaborative with Noguchi Memorial for Medical Research and World Health Organization, Research Report No.112.* Washington, D.C.

[14] Nazir, Moh. (2013). Research methods. Bogor: Ghalia Indonesia.

[15] Saaty, T. L. (2008). Decision Making with the Analytic Hierarchy Process. Int. J. Services Sciences, Vol. 1 No. 1, pp. 83-98.

[16] Nurhayati.,A. et.al. (2018). Promoting innovative business in the fishery sector in West Java, Indonesia. IOP Conf. Series: Earth and Environmental Science 137 (2018) 012100.

[17] Maxwell DG (1996) Measuring food insecurity: the frequency and severity of coping strategies. Food Policy 21: 291-303.