Factors that influence the level of fish consumption in Tabanan Regency, Bali Province

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Abstract. Fish is an important source of animal protein and unsaturated fatty acids needed for the development of children and to prevent several other diseases. The promotion of fish nutrition benefits (fish eating) has been carried out for more than 10 years by the local government and by the Ministry of Maritime Affairs and Fisheries through some activities. Specifically in Tabanan Regency, a fish-eating program targeting students and women of reproductive age has been developed in the area. Apart from these activities, no significant changes in fish consumption in the target group were observed and in 2017. Tabanan was ranked the second lowest in the Province of Bali for fish consumption, with a value of 15.25 kg/cap/year. In 2016, fish consumption by 17.46 kg/capita/year. Thus, fish consumption in 2017 has decreased by 2.21 kg/capita/year compared to 2016. However, considering that in 2019 macro data processing has not been carried out, this study will conduct micro data processing to determine the development of fish consumption in 2019 using representative respondents in Tabanan Regency. The purpose of this study was to determine the factors that influence the level of fish consumption in Tabanan Regency. The independent variable consisted of age, education, occupation, status, and income, and the dependent variable was fish consumption, analyzed using multiple linear regression. This study involved 31 respondents to fill out questionnaires and interviews, as well as interviews with key informants in the district. Primary data were obtained through a closed questionnaire that was used to distribute data collection in addition to secondary data obtained from marine and fisheries services, as well as from district food security services. The analysis shows that age is an independent variable that affects the level of fish consumption in Tabanan. The age factor that affects the level of fish consumption has the highest percentage of samples at the age of 45-49 years which is 58.1% and a significance value (P<0.05). To realize programs to increase fish consumption that are more supported by the community, it is recommended to involve family heads aged 45-49 in the process of educating the community. Besides having a productive age, they also have insights that can be used as a way to facilitate education to the community and family. Thus, the realization of stunting prevention and handling program can be more resolved.

1. Introduction
Indonesia has territorial waters that are wider than the mainland. The fisheries sector is a big opportunity to be developed optimally. Indonesian fisheries production in 2018 reached 6,242,846 tons, an increase of 1.93% from 2017 amounting to 6,124,522.8 tons. However, the overflow of fish resources has not been used optimally [1]. This Indonesian fishery production must be a guarantor of sufficient fish consumption needs for the people of Indonesia. However, the phenomenon that occurs in fish consumption of Indonesian society is still relatively low. This condition encourages the
government to focus on the impact of low fish consumption. One of the government efforts related to low fish consumption is by stunting prevention and handling. Protein from fish is an important nutrient component for countries that have high population numbers where the adequacy of protein is at a low or low level [2]. In previous studies, it stated that fish especially marine fish have a high content of Ca, Zn, and Fe [3]. Stunting is associated with an increased risk of morbidity and death and stunted growth in motor and mental abilities [4-6]. Stunting is an important issue for several countries, including Indonesia. Stunting is not just a health problem, but also a national economic problem. Potential losses can reach 2-3% of gross domestic product (GDP) per year. Stunting has negative functional consequences for children. The consequences include poor cognition and educational performance. When children become adults, it will have an impact on productivity and low adult wages. Nutritional status played an important role in preparing the next generation [7]. The government hopes that early childhood data will be an indicator of healthy growth and have an impact on optimal learning capacity and high work productivity. Thus, the problem of stunting becomes an important priority for the government. In 2012, World Health Organization (WHO) in the World Health Assembly launched a Global Nutrition Targets, one of them was a stunting reduction by 40% in 2025 [8]. WHO provides a maximum tolerance limit of 20% or one-fifth of the total toddler. However, according to WHO data that in 2013, Indonesia reached a stunting rate of 27%, and in 2017 it reached 36%.

Figure 1. The situation of stunting in Indonesia and global [2]

In the global stunting situation, Indonesia ranks 4th out of the top 10 stunting levels. It showed the need for great attention from the government. One of the concerns given by the government, especially in areas with low fish consumption is a program that supports increasing fish consumption. Fish consumption is one of animal protein which has a high nutrient content that can improve brain development and health for toddlers, children, and pregnant women. According to Susenas [6], Tabanan is one of the locations with low fish consumption. The low level of fish consumption in the community of Tabanan Regency is a concern for local government, especially Regional Development Planning Board (Bappeda), the Health Office, and the Marine and Fisheries Service which have the responsibility in preventing stunting to the community.
Tabanan is one of the regencies in Bali Province with a population of around 404,582 people with 20% toddlers, 30% children, and 10% pregnant women [9]. From the total amount spent in Tabanan reaching 15.25 kg/capita/year. This value is down from 2015 (19.15%) and 2016 (17.46%). Compared with the national fish consumption level with an average of 46.49 kg/capita/year, this value means that fish consumption in Tabanan regency has a low status because it is less than 20 kg/capita/year [10]. However, bearing in mind that in 2019 macro data has not been processed, this study will conduct micro data research to determine the development of fish consumption in 2019 by using respondents in all districts in Tabanan regency. This study aimed to observe the factors that influence the level of fish consumption in Tabanan Regency, Bali Province.

2. Materials and methods

2.1. Time and location

The study was conducted in July 2019 in Tabanan Regency, Bali Province. This location was determined because this district is calculated to have a level of fish consumption which is one of our research objectives targets.

2.2. Method of sampling

Sampling was done purposively on 31 respondents in Tabanan. Respondent population is the households in Tabanan regency. Age criteria for samples ranging from 16 to 65 years. Samples were characterized by age, are education, occupation, income, and work experience. Sampling was not only characterized from the respondents but also family members. In this case, their wife and children also influence the fish consumption level of households.

2.3. Sample grouping for analysis

Classification of respondents adjusted to the location of the respondent's residence by regency. The age were grouped into <18 years, 18-24 years, 25-34 years, 35-44 years, 45-49 years, 45-59 years, and > 60 years. Education were grouped into uneducated, elementary, junior high, high school, and undergraduate. Earnings are grouped in 1,000K-5,000K, 6,000K-10,000K, and > 10,000K. Meanwhile, jobs are grouped into fishermen, processors, private employees, farmers, cultivators, laborers, schools, breeders, government employees, and housewives. Moreover, motivation is divided into ten groups namely awareness of high protein content, hereditary habits, taste, easy to process, affordable prices, loved by family members, influenced by others, easily obtained, has a livestock business, and prestige.
2.4. Types and data collection methods
Secondary data collection was obtained from the Marine Affairs and Fisheries Services and the Food Security Services in Tabanan Regency. Primary data was obtained by distributing questionnaires to 31 respondents and in-depth interviews with key informants namely respondents who have an educational background in bachelor, workers, and housewives. The distribution of closed questionnaires was intended to collect data related to respondent characteristics, social culture, and fish consumption of respondents in a week. To find out about habits and knowledge about nutrition, in-depth interviews were also conducted with key informants.

2.5. Processing and data analysis
Primary data processing was carried out with a cleaning process to ensure the data were used under the specified variable. The results of interview were prepared with the basic assumptions and rules of thinking used in this study. Based on the analysis of respondents, characteristics have done descriptively, whereas analysis of the factors was carried out using multiple linear regression.

3. Results and discussion

3.1. Characteristic of social economy in household
The number of respondent households in Tabanan Regency is 31 households. The average age of household heads is 18-24 years with a percentage of 6.5%, ages 25-34 years with a percentage of 9.7%, age 35-44 years with a percentage of 16.1%, age 45-49 years with a percentage of 58.1%, and ages > 60 years with a percentage of 9.7%. In terms of education, the average education is senior high school with a percentage of 54.8%, undergraduate with a percentage of 12.9%, followed by uneducated, elementary school, and secondary school. Those occupational backgrounds were varied from farmers, government employees, teachers, private employees, traders, processors, fishermen, mechanics, and housewives (Table 1).

Table 1. Distribution of respondent in Tabanan Regency

| Characteristic (Age) | Amount of n | n | %  |
|---------------------|-------------|---|-----|
| 18-24               | 2           | 6.5|    |
| 25-34               | 3           | 9.7|    |
| 35-44               | 5           | 16.1|   |
| 45-49               | 18          | 58.1|   |
| > 60                | 3           | 9.7|    |
| Total               | 30          | 100|    |

| Characteristic (Education) | Amount of n | n | %  |
|-----------------------------|-------------|---|-----|
| Uneducated                  | 1           | 3.2|    |
| Elementary School           | 4           | 12.9|   |
| Junior High School          | 5           | 16.1|    |
| Senior High School          | 17          | 54.8|   |
| Bachelor                    | 4           | 12.9|    |
| Total                       | 30          | 100|    |

| Characteristic (Occupation) | Amount of n | n | %  |
|-----------------------------|-------------|---|-----|
| Fisherman                   | 1           | 3.2|    |
| Cultivator                  | 5           | 16.1|   |
| Processor                   | 1           | 3.2|    |
| Government Employee         | 3           | 9.7|    |
| Private Company Employee    | 3           | 9.7|    |
| Housewife                   | 2           | 6.5|    |
| Farmer                      | 9           | 29.0|   |
| Seller                      | 2           | 6.5|    |
| Retailer                    | 2           | 6.5|    |
| Mechanic                    | 1           | 3.2|    |
3.2. Consumption of the animal protein of households

The household protein consumption of Tabanan Regency is 77.69% sourced from vegetable protein or as much as 49.50 Cal/capita/day. While the consumption of animal protein is only 22.31% or 15.5 Cal/capita/day. Higher consumption of vegetable protein compared to animals caused by income levels, purchasing power, culture, preferences, and health. In terms of animal protein, Tabanan Regency households consumed higher level on kilograms of meat consumption per capita per year compared to fish, eggs, and milk. Based on observations of meat consumption, most of it was pork and chicken. Meanwhile, the portion of beef consumption in Tabanan was small due to religious reason. The level of household participation was higher in eggs and milk or as much as 96.13% of household respondents in Tabanan Regency consume eggs and milk (Table 2).

Table 2. Consumption of the animal protein of households in Tabanan (2017)

| Type of Animal Protein | Consumption Level (kg/capita/year) | Participation Level (%) | Contribution Level of Protein (%) |
|------------------------|------------------------------------|-------------------------|----------------------------------|
| Fish                   | 10.97                              | 82.90                   | 9.32                             |
| Meat                   | 15.78                              | 86.61                   | 10.65                            |
| Egg & Milk             | 11.14                              | 96.13                   | 5.56                             |

Source: Central Bureau of Statistics [10]

Based on data from 2017, it can be seen that the highest percentage level of animal protein came from meat (10.65%), then followed by fish (9.32%), and eggs and milk (5.56%). This condition is not supported by the results of research in 2019. Household respondents from ten sub-districts described fish consumption as the highest at 67.9 kg, then followed by pork 30.15kg, eggs 24.65 kg, broiler chicken 20.15 kg, milk 5.5 kg, lamb 2.2 kg, and beef 2.2 kg. Although consumption of the animal protein is lower in Tabanan, respondents had the higher consumption of fish on that regency. In this research, the highest consumption of animal protein by respondents is fish about 67.9 kg/week or 271.6 kg/month (Table 3). The majority of them consumed freshwater fish, such as catfish, common carp, and tilapia.

Table 3. Consumption of animal protein by respondent

| Type of Animal Protein | Tabanan District, 2017 |
|------------------------|------------------------|
|                        | Consumption Level (kg/week) | Participation Level (%) |
| Fish                   | 67.9                    | 44.48                   |
| Pork                   | 30.15                   | 19.75                   |
Although pork remains a large consumption in Tabanan Regency, fish consumption in households has experienced a change in the level of fish consumption in 2019. This can be seen from the level of fish consumption that is higher than pork.

3.3. Factors that influence fish consumption
To find out the factors that influence fish consumption in Tabanan Regency, we used fish consumption as the dependent variable. Meanwhile, we used independent variables such as age, education, occupation, status, occupation, and income.

The respondents in this research consisted of two respondents with the age of 18-24 years (6.5%), three respondents with the age of 25-34 years (9.7%), five respondents with the age of 35-44 years (16.1%), 18 respondents with the age of 45-49 years (58.1%), and three respondents with the age of 60 years (9.7%) (Table 4).

| Table 4. Variable of age |
|-------------------------|
| Frequency | Percent | Valid Percent | Cumulative Percent |
|------------|---------|---------------|-------------------|
| Valid      |         |               |                   |
| 18-24      | 2       | 6.5           | 6.5               |
| 25-34      | 3       | 9.7           | 16.1              |
| 35-44      | 5       | 16.1          | 32.3              |
| 45-49      | 18      | 58.1          | 90.3              |
| >60        | 3       | 9.7           | 100.0             |
| Total      | 31      | 100.0         | 100.0             |

Based on education, the respondents in this research consisted of one uneducated respondent (3.2%), four respondents graduated from elementary school (12.9%), five respondents graduated from junior high school (16.1%), 17 samples graduated from senior high schools (54.8%), and four samples graduated from bachelor degree (12.9%) (Table 5).

| Table 5. Variable of education |
|-------------------------------|
| Frequency | Percent | Valid Percent | Cumulative Percent |
|-----------|---------|---------------|-------------------|
| Valid     |         |               |                   |
| Uneducated| 1       | 3.2           | 3.2               |
| Elementary school | 4   | 12.9         | 12.9              |
| Junior high school | 5  | 16.1         | 16.1              |
| Senior high school | 17 | 54.8         | 87.1              |
| Bachelor degree     | 4   | 12.9         | 100.0             |
| Total               | 31  | 100.0        | 100.0             |

From the variable of occupation, it is known that the most dominant occupation is as a farmer (29%) and cultivator (16.1%) (Table 5).
Table 6. Variable of occupation

|                | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Jobless  | 1         | 3.2     | 3.2           | 3.2                |
| Fisherman      | 1         | 3.2     | 3.2           | 6.5                |
| Cultivator     | 5         | 16.1    | 16.1          | 22.6               |
| Processor      | 1         | 3.2     | 3.2           | 25.8               |
| Government Employee | 3   | 9.7     | 9.7           | 35.5               |
| Private Company Employee | 3 | 9.7 | 9.7 | 45.2 |
| Housewife      | 2         | 6.5     | 6.5           | 51.6               |
| Farmer         | 9         | 29.0    | 29.0          | 80.6               |
| Seller         | 2         | 6.5     | 6.5           | 87.1               |
| Retailer       | 2         | 6.5     | 6.5           | 93.5               |
| Mechanic       | 1         | 3.2     | 3.2           | 96.8               |
| Teacher        | 1         | 3.2     | 3.2           | 100.0              |
| Total          | 31        | 100.0   | 100.0         |                    |

Based on the status, the most dominant respondents were head of family (67.7%), followed by wife (22.6%), and child (9.7%) (Table 7).

Table 7. Variable of status

|                | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid Head of Family | 21   | 67.7    | 67.7          | 67.7               |
| Child           | 3         | 9.7     | 9.7           | 77.4               |
| Wife            | 7         | 22.6    | 22.6          | 100.0              |
| Total           | 31        | 100.0   | 100.0         |                    |

In terms of income, most of the respondents have income of 1-5 million IDR (80.6%), followed by 6-10 million IDR (16.1%), and above 10 million IDR (3.2%) (Table 8).

Table 8. Variable of income

|                | Frequency | Percent | Valid Percent | Cumulative Percent |
|----------------|-----------|---------|---------------|--------------------|
| Valid 1.000.000 – 5.000.000 | 25   | 80.6    | 80.6          | 80.6               |
| 6.000.000 – 10.000.000 | 5      | 16.1    | 16.1          | 96.8               |
| > 10.000.000    | 1        | 3.2     | 3.2           | 100.0              |
| Total           | 31        | 100.0   | 100.0         |                    |

Based on those variables, regression analysis had been conducted to evaluate the relationship between each other. It was shown in Table 9.
Table 9. Coefficients

| Model | Unstandardized Coefficients | Standardized Coefficients | t  | Sig. |
|-------|-----------------------------|---------------------------|----|-----|
|       | B                          | Std. Error                |    |     |
| 1     | (Constant)                  | 8.156                     | 21.760 | .375 | .711 |
| Age   | -2.543                      | .825                      | -.519 | -3.081 | .005 |
| Education | .082                        | .906                      | .016  | .091  | .928 |
| Occupation | -.066                       | .193                      | -.061 | -.343 | .734 |
| Status | 1.421                       | 1.035                     | .240  | 1.373 | .182 |
| Income | .256                        | 1.391                     | .031  | .184  | .855 |

Description: Dependent Variable = Consumption

\[ Y_t = \beta_0 + \beta_1 X_1 + \log\beta_2 X_2 + \log \beta_3 X_3 + \beta_4 X_4 + \beta_5 \log X_5 + U_t \]

Remarks:
\( \alpha \) = Constant
\( \beta_1, \beta_2, \beta_3, \beta_4 \) = Coefficient of Regression Variable \( X_1, X_2, X_3, X_4 \) and \( X_5 \)
\( U_t \) = Error Term
\( X_1 \) = Age
\( X_2 \) = Education
\( X_3 \) = Occupation
\( X_4 \) = Status
\( X_5 \) = Income

Based on the results of regression analysis, it is known that only the age variable influences consumption, which is known from its significance value (P<0.05). In this regression analysis, it is known that the variable which has the most positive relationship is the status variable. The highest status of the respondent is the head of the family, which is 67.7% who has the biggest decision in deciding the best protein consumption for the family. Although the wife has greater rights, following the deepening of the primary data through in-depth interviews, it showed that the wife will ask for input from her husband to determine the right protein for family consumption. The head of family (58.1% from total respondents) have a productive age between 45-49 years. At this productive age, decisions in determining fish consumption tend to be driven by motivational considerations. The highest motivation is 54.8% of awareness about the content of fish animal protein, good taste due to the presence of fresh and processed products from fish, and affordable prices. Whereas the income variable has a second positive relationship with fish consumption. This is contrary to the results of previous studies in Semarang which stated there was no relationship between income levels with stunting in infants [11].

4. Conclusion
Based on development of data in 2017 with households’ conditions in Tabanan Regency, it can be seen that knowledge of the importance of fish consumption from households in Tabanan Regency has increased. It was indicated from the increase in fish consumption by 67.9% and the increase in motivation from the head of family in determining fish animal protein as the highest consumption in the household. In addition, the factor that influences fish consumption in Tabanan Regency is the age factor.

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