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# Analysis of Factors Affecting Fish Purchasing Decisions of the Household: Antalya District Case

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**Abstract:** This research aims to determine the socio-economic factors that are effective on fish consumption. Through clarifying these factors, the study attempts to bring proposals towards increasing fish consumption which is vital for adequate nourishment. To this end, different factors which are believed to affect fish consumption of the households residing in Antalya are analyzed. In this study, a survey was conducted with 498 households in 2007 and the original data were utilized. Heckman sample selection correction procedure was applied to estimate the effects of individual and household in the analysis. Based on the results, it is seen that a certain segment of the household 36.55%, substitutes fish for chicken and red meat. It is seen that this group of households has lower and middle income with lower literacy level living in large families and is generally within the middle-age group. On the other hand, a smaller percent of the household 13.05%, substitutes fish only for chicken. Another important finding of the research is that a much larger group of the households, 78% with higher income, higher educational level in the older age group and covered under pension scheme has a higher propensity to buy or consume fish. According to the results of the analysis, the most effective factors on fish consumption can be stated as price and dietary attributes. Therefore, it is concluded that by setting the market price of fish in line with different household income levels, dietary habits might change as well.

**Key words:** Fish consumption, household preferences, sample selection, heckman, probit model, Antalya

## INTRODUCTION

It is known that animal and plant protein intakes should be at certain levels for adequate nourishment. In Turkey, the share of animal protein intake in per capita protein consumption is very low and protein intake is plant based. One of its reasons is the low level of animal production value, 42% within total agricultural production (FAO, 2008). Due to continuous population growth and the necessity to fill the gap of animal protein intake, it is required that the existing resources of animal protein be efficiently utilized.

Therefore, as an important protein source beside red meat and chicken, the increment of both production and consumption of fish appears as an important option. With the existing potential of water resources in mind and under appropriate subsidy schemes, the feasibility of quick rise in fish production seems feasible. In addition, most research shows that fish can easily be substituted for chicken and beef. As a matter of fact, owing to recently implemented fishery subvention policies, the levels of both production and annual per capita consumption of fish have significantly risen when compared with the previous years. Notwithstanding with a figure of 7.6 kg year$^{-1}$, Turkey is behind the world average of 16.4 kg year$^{-1}$ and the average of developed countries of 23.9 kg year$^{-1}$ in terms of annual per capita fish consumption. Highest rates for this figure in the world are in Iceland and Japan with a rate of 90.5, 63.2 kg year$^{-1}$, respectively. In the EU, Portugal and Spain is far above the average of the Union. As seen, annual per capita fish consumption in Turkey is almost one third-one fourth of the developed countries. (FAO, 2006).

These statistics point out the significance of proposals towards increasing household fish consumption through finding out the factors that are effective in purchasing fish. This pursuit undoubtedly shows the importance of research into household consumption preferences.

Research on household consumption preferences not only clarifies the factors effective on consumption but also enables to acquire the data required to develop marketing strategies and appropriate sales techniques. In this context, a relevant research can contribute to development of efficient marketing strategies and policies in fishing through finding out the determinants of supply and demand for fish which is known as a rich protein source. More explicitly, by pointing out the consumer's demographic features, cultural attitudes and socio-economic conditions, new inputs are designated

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towards making reliable decisions regarding the increment of fish consumption. There are some survey studies examining fish consumption in Turkey. Among these, Elbek *et al.* (1999) asserts that marketing and consumption features of aquaculture products has not reached a level that is comparable with red meat and poultry products.

A similar research puts forth fish consumption levels and preferences of households by emphasizing their socio-economic characteristics (Sayin *et al.*, 2006). Another research that aims to determine the fish consumption preferences of students, who demands for a higher level of animal protein intake for adequate nourishment concludes that students put chicken at first, fish at second and red meat at third place if they are to rank these products according to how they taste.

Another research, outside Turkey, scrutinizes the factors effective on locative consumption preferences for fish and the other aquaculture products (Nayga and Capps, 1995; Spinks and Bose, 2002). While Cheng and Capps (1988) analyses the substitution effect for red and white meat, Tambi (2001) investigates the effect of consumers' cultural and socio-economic features on their preferences for fish consumption. There are several other national and international researches with similar contents of consumption.

Considering the overall household survey studies on household fish consumption, their common findings about the determining factors can be stated as fish price, price of substitutes and complementariness and socio-economic features (especially education and income) of consumers. With regards to the Antalya district case; this research aims to set forth new proposals to increase fish consumption in Turkey in the light of the observed findings. In addition, finding out the socio-economic characteristics of potential fish consumers extends the aim of this study by firms and farm owners who produce fish and marketing with original and new data which will help them review their marketing strategies.

## MATERIALS AND METHODS

Main material of this research is the original data obtained through questionnaire survey. Regarding the research content, secondary data from different sources were utilized as well.

Surveys were conducted with the households inhabiting Antalya Province urban area. Firstly, households to be surveyed were determined. Due to the lack of information on the probability of household fish consumption, this figure came out of survey data from randomly selected 100 households. As the next step, probabilities of consuming (p) and not consuming (q) fish were used in the formula below and sampling size was determined as 350 households:

$$n=(N\times t^2\times p\times q)/(N\times d^2+t^2\times p\times q)$$

Where:

n = Sample size
N = Population (Antalya province population: 377857 person)
t = 95% (table value:1.96)
d = Error ratio (0.05)
p = Fish consumption probability (0.35)
q = Nonconsumption of fish (0.65) (Yamane, 2001)

The quarters in centre of Antalya province were grouped according to various socio-economic features and the indicators on their level of development. Through these groups, sample size were distributed in proportion to populations of these quarters. However, questionnaire survey was conducted with 498 households and households were randomly selected. As for the accuracy, questionnaires were tried to be made at least with one household in every street of the quarter.

To serve the aims of this study, questions within the questionnaires comprised household's socio-economic factors, propensity to consume fish, consumption level, frequency of consumption, preferences propensity to buy other white or red meat as substitutes, expenditure tendencies and price.

In order to emphasize the income effect on household preferences minimum wage and civil servant wage distributions were used. This way socio-economic features and consumption preferences are clarified according to four different income groups by taking income status of household representative into consideration.

**Data analysis:** In preference models of household consumption, it is found that different households display different preferences as a rule. Shaped within many years, consumption attitudes are not expected to be subject to a sudden change. Consumers who make a consumption decision at any point in time form a non-random subset of all potential consumers. Therefore the data obtained through survey questionnaires are subject to a vital sampling deviation (Cheng and Capps, 1988). Directly applying least squares method to a probit model including such data causes biased and incoherent estimations. Heckman (1979) developed a method to overcome this problem. This method comprises a two-step estimation

Table 1: Description of the variables specified in the model

| Variables | Measurement type | Definition of variable | Expected sign |
|---|---|---|---|
| **Dependent variable** | | | |
| FC | Dummy | If household prefer purchasing fish get value 1, otherwise 0 | |
| **Independent variable** | | | |
| RP | Continuous | Red meat price (Tl $kg^{-1}$) | + |
| CP | Continuous | Chicken meat price (Tl $kg^{-1}$) | + |
| FP | Continuous | Fish meat (Tl $kg^{-1}$) | - |
| HS | Continuous | Number of household person (number) | - |
| MR | Dummy | Married 1, others: 0 | + |
| CC | Dummy | If there is 0-10 age child 1, otherwise: 0 | + |
| ED1* | Dummy | If householder graduated from primary school 1, otherwise: 0 | - |
| ED2 | Dummy | If householder graduated from secondary school 1, otherwise:0 | - |
| ED3 | Dummy | If householder graduated from high school 1, otherwise:0 | + |
| ED4 | Dummy | If householder graduated from university 1, otherwise:0 | + |
| AG1* | Dummy | If householder age<25 get value 1, otherwise: 0 | - |
| AG2 | Dummy | If householder age 25-46 get value 1, otherwise: 0 | - |
| AG3 | Dummy | If householder age 46-+ get value 1, otherwise: 0 | + |
| OC1* | Dummy | If householder works as civil cervant 1, otherwise: 0 | + |
| OC2 | Dummy | If householder works as self-employed 1, yoksa 0 | - |
| OC3 | Dummy | If householder works as worker get value 1, otherwise: 0 | + |
| OC4 | Dummy | If householder retired get value 1, otherwise: 0 | + |
| IN1* | Dummy | If householder income <500 get value 1, otherwise: 0 | - |
| IN2 | Dummy | If householder income 500-750 get value 1, otherwise: 0 | + |
| IN3 | Dummy | If householder income 750-1250 get value 1, otherwise: 0 | + |
| IN4 | Dummy | If householder income >1250 get value 1, otherwise: 0 | + |

*Reference group

procedure. At first step, a probit model was applied where the dependent variable takes the value of 1 for households that decide to purchase fish and 0 for those that do not. Probit model was estimated by maximum likelihood method. It is estimated that the error terms for this model has a normal distribution. Maximum likelihood estimation of a parameter is done by maximisation of the value of its probability density function. Therefore, maximum likelihood estimations of the coefficients are coherent and asymptotically normally distributed which is known to give satisfactory results as the sampling size gets larger. Model β coefficients show the change in the probability of purchasing fish against one unit of change in the explanatory variable. Applied probit model is as follows:

$$\begin{aligned} C = {} & \beta_0 + \beta_1 \ln(RP) + \beta_2 \ln(CP) + \beta_3 \ln(FP) \\ & + \beta_4 \ln(HS) + \beta_5 (MR) + \beta_6 (CC) + \beta_7 (ED2) \\ & + \beta_8 (ED3) + \beta_9 (ED4) + \beta_{10} (AG2) + \beta_{11} (AG3) \\ & + \beta_{12} (OC2) + \beta_{13} (OC3) + \beta_{14} (OC4) + \beta_{15} (IN2) \\ & + \beta_{16} (IN3) + \beta_{17} (IN4) + \varepsilon \end{aligned}$$

The variables in the model are shown in Table 1. The dependent variable shows the household's decision whether or not to purchase fish. Among the explanatory variables are both continuous and dummy variables in the model. As an a priori assumption, RP, CP, MR, CC, ED3, ED4, AG3, OC1, OC3, OC4, IN2, IN3 and IN4 variables have a positive effect on household's decision to purchase fish. Among the other variables, FP, HS, ED1, ED2, AG1, AG2, OC2 and IN1 are expected to affect household's purchasing decision negatively. At first step, λ variable is generated by using Heckman procedure's The Inverse Mills Ratio (IMR) code in LIMDEP (Version 7) software program. At second step, λ variable is added into the original, least squares model as an explanatory variable and the model is written as follows:

$$FC = \alpha + \beta_j \sum_{i=1}^{n} X_{jn} + \beta_j \lambda + \varepsilon_j$$

Where:

FC = The dependent variable as defined previously
λ = An error correction variable that measures the degree of sample selecting bias in the sample
$X_{jn}$ = The other explanatory variables defined common equation

For continuous variables in estimating the model, Probit model coefficients are given in marginal effects due to the fact that one unit of change in explanatory variables do result in an expected change in dependent variable. Maginal effect or probability is calculated by multiplying the β coefficient with standard probability density function of the model which is evaluated by the mean values of the explanatory variables.

## RESULTS AND DISCUSSION

**Explanatory statistic findings:** Age average for household representative is 45 years and the number of average years for attending school is 12. Average

Table 2: Descriptive statistics for continuous variables influencing household purchases of fish

| Variables | No. of household* | Average | Variation (%) | Min. | Max. |
|---|---|---|---|---|---|
| **Household monthly average purchase (TL)** | | | | | |
| Red meat | 131 | 82.72 | 12.23 | 1.50 | 126.00 |
| Chicken meat | 72 | 15.09 | 33.21 | 2.14 | 28.21 |
| Fish meat | 295 | 29.62 | 35.12 | 7.35 | 32.08 |
| **Average price per kg (TL)** | | | | | |
| Red meat | 131 | 13.73 | 19.05 | 9.41 | 17.21 |
| Chicken meat | 72 | 3.35 | 45.28 | 1.28 | 6.68 |
| Fish meat | 295 | 8.26 | 32.95 | 4.50 | 12.3 |
| **Household income groups (TL)** | | | | | |
| <500 | 67 | 412.45 | 27.64 | 374.42 | 493.23 |
| 500-750 | 136 | 645.23 | 19.47 | 536.54 | 750.00 |
| 750-1250 | 201 | 812.87 | 23.21 | 786.75 | 1250.00 |
| >1250 | 94 | 1597.43 | 15.42 | 1385.65 | 2321.65 |
| **Householder age (year)** | | | | | |
| <25 | 90 | 22 | 8.43 | 20 | 25 |
| 25-46 | 259 | 38 | 12.94 | 26 | 43 |
| >46 | 149 | 56 | 23.21 | 47 | 67 |
| All age groups | 498 | 45 | 11.32 | | |
| Household size | 498 | 3.21 | 10.43 | 2 | 4 |

*Total household person = 498, (1$ = 1.25 TL. 05/07/2008, The Central Bank of Turkey)

household size is 3.21 people. Monthly household income varies between 374.42 (US$ 299.54) and 2321.65 TL (US$ 1857.32). Among the households surveyed, 13.42% is in the lower income group, 27.26% is in the second income group, 40.4% is in the third group and 18.93% is in the high income group. Monthly household expenditure on red meat is more than that of chicken and fish. The change in monthly household expenditure on meat is the biggest for fish and the smallest for red meat. The biggest change in average price paid per kg is for the chicken (Table 2). According to the survey findings, average household fish consumption is 6.51 kg year$^{-1}$, which below that of the value for Turkey 7.6 kg year$^{-1}$ (Tascioglu and Sayin, 2009).

**Probit model findings:** The least squares and maximum likelihood estimations for the factors affecting the fish purchasing decisions of the households is generated by using the two step procedure of the probit model. Maximum likelihood estimations and marginal probabilities of the probit model is given in Table 3.

Results show the estimation of the probability of purchasing fish by using the characteristics of the households. For different level of significance of the model, student t-test and maximum likelihood test showing $X^2$ distributions are utilized.

McFadden $R^2$ which measures the goodness of fit of the model shows how well the explanatory variables explain the change in fish purchasing decision. McFadden $R^2$ shows that explanatory variables explain 56.7% of the change in the probability of purchasing fish. Maximum

Table 3: Probit analysis of factors affecting household purchasing fish

| Variable name | Estimated coefficients | Asymptotic SE | Asymptotic z = b/SE | Marginal Possibility (%) |
|---|---|---|---|---|
| RP | 0.412* | 0.207 | 1.987(0.063) | 0.157 |
| CP | 0.034 | 0.056 | 0.607(0.552) | - |
| FP | -0.632** | 0.223 | -2.834(0.011) | 0.241 |
| HS | -0.013* | 0.006 | 2.166(0.045) | 0.005 |
| MR | 0.004 | 0.002 | 1.971(0.065) | - |
| CC | 0.875** | 0.188 | 4.654(0.000) | - |
| ED2 | -0.031* | 0.009 | -3.281(0.004) | - |
| ED3 | 0.241 | 0.801 | 0.301(0.767) | - |
| ED4 | 0.123 | 0.115 | 1.069(0.300) | - |
| AG2 | 0.312 | 0.263 | 1.185(0.252) | - |
| AG3 | 0.761* | 0.303 | 2.511(0.022) | - |
| OC2 | -0.512 | 0.401 | -1.277(0.219) | - |
| OC3 | 0.038 | 0.265 | 0.143(0.888) | - |
| OC4 | 0.438* | 0.164 | 2.671(0.016) | - |
| IN2 | 0.023* | 0.012 | 1.854(0.081) | - |
| IN3 | 0.547* | 0.282 | 1.940(0.069) | - |
| IN4 | 0.741** | 0.241 | 3.075(0.007) | - |
| Constant | 1.414 | | | |
| Probability ratio test | 142.468 | | | |
| McFadden $R^2$ | 0.567 | | | |

*Shows statistically significant at 10% level; **Shows statistically significant at 5% level

likelihood test shows that slope coefficients are different than zero at the significance level of 5%. At the second step of the Heckman procedure goodness of fit measured as adjusted $R^2$ is greater than the McFadden $R^2$ of the probit model. In addition, independent variables explain 75% of the change in the probability of purchasing fish. Sample selecting bias correction ($\lambda$) is significantly different than zero and increases the statistical significance level of the variables (Table 4). Research findings and the relevant evaluations regarding the factors effective on household fish consumption are explained as follows:

**Price:** Price variables are similar with the a priori assumptions of the estimated model. However, at first step estimation, it is found that chicken price is not effective on decisions on purchasing fish. Only the rise in red meat price positively affects the households' fish purchasing decision. The increase in fish price decreases the amount of fish bought by the households (Table 3).

There are differences in the significance level of the chicken and red meat price variables in the second step estimation. According to least squares estimation, the rise in chicken prices increases the amount of fish being sold (Table 4). This means that households give up consuming chicken and tend to eat fish that are cheaper in the market. Therefore, red meat and chicken is substituted for fish. As seen in the model, fish is a food that substitutes for red meat and chicken. Red meat which is subject to traditional consumption attitudes and chicken which is consumed

Table 4: Heckman's (second step) regression analysis

| Variables | Estimated coefficients | Asymptotic SE | z = b/SE |
|---|---|---|---|
| RP | 0.163** | 0.054 | 3.019 (0.005) |
| CP | 0.231* | 0.117 | 1.972 (0.064) |
| FP | -0.508** | 0.178 | -2.853 (0.011) |
| HS | -0.051* | 0.021 | -2.429 (0.026) |
| MR | 0.671* | 0.382 | 1.757 (0.097) |
| CC | 0.078** | 0.015 | 5.218 (0.000) |
| ED2 | -0.197* | 0.097 | -2.031(0.057) |
| ED3 | 0.213 | 0.134 | 1.590 (0.129) |
| ED4 | 0.021** | 0.010 | 2.100 (0.050) |
| AG2 | -0.714 | 0.528 | -1.352 (0.193) |
| AG3 | 0.981** | 0.305 | 3.216 (0.005) |
| OC2 | -0.321 | 0.476 | -0.674 (0.509) |
| OC3 | -0.732** | 0.258 | -2.837(0.011) |
| OC4 | 0.012** | 0.006 | 2.121(0.048) |
| IN2 | -0.162* | 0.083 | -1.952 (0.067) |
| IN3 | 0.359** | 0.137 | 2.621 (0.017) |
| IN4 | 0.235* | 0.055 | 4.273 (0.000) |
| λ (Inverse Mills Ratio) | 4.250* | 1.373 | 3.095 (0.006) |
| Constant | 2.05 | | |
| Likelihood ratio test | 141.345 | | |
| Corrected $R^2$ | 0.754 | | |

*Shows statistically significant at 10% level; **Shows statistically significant at 5% level

more in recent times are preferred more than fish in Turkey. While cultural attitudes are effective on red meat consumption preferences, low level of prices is a determining factor for consumption of chicken and fish as their consumption rise with the decline in their prices.

**House hold income level:** At both steps of the model estimation, households' income level is a vitally effective factor on fish purchasing decision for each income group. At second step, unlike in the first step, second income group (500-750TL) shows a negative coefficient effect. The lowest income group (<500 TL.) is chosen as a reference group as it is not significant. While the decision to purchase fish is negatively affected for the first (<500 TL.) and second (500-750 TL.) income groups, there is a positive effect for the third (750-1250 TL.) and fourth (>1250 TL.) income groups (Table 4). The increase in income for the mean (750-1250 TL) and high income level has such an effect that fish is preferred more in comparison to other food substitutes. Fish is seen as a normal and chicken as an inferior good by this group of households. Fish and red meat has an important place for high income (>1250 TL.) households' meat consumption. Low income (<500 TL.) households consume chicken more and can not afford other meat products because of the income gap (Table 3 and 4).

**Household size:** According to survey findings, household size as an important determinant of food consumption decision is significant at both steps of models estimation at 10% significance level and has a negative effect on fish purchasing decisions (Table 3 and 4). According to least squares estimation as the household size increases by one person the probability of purchasing fish decreases by 0.051% (Table 4).

**Age:** Age variable is another determinant of food consumption decision. According to research findings, household representative within the young and middle age group have a much smaller and insignificant level probability of purchasing fish. Taking the importance of healthy nourishment prospects for the younger generations into consideration such a finding deserves attention. This result is undoubtedly related with education and other variables in addition to age variable and also varies from country to country. However, as age increases due to health reasons, red meat is preferred less and the probability of consuming fish increases (Table 3 and 4).

**Marital status:** According to first step findings of the Heckman procedure, marital status of household representative has an insignificant effect on their decisions to purchase fish. However in the second step of the model this variable is significant at 10% significant level. In other words, married status of the household representative has a positive effect (Table 3 and 4).

**Child:** The presence of a small child (<10) within the households increases the probability of consuming fish. It is thought that the care of early development of children in a healthy way is effective on households' decision.

**Education level:** Education variable is found to be significant at 10% significance level for the secondary level education group in the first step probit model of the Heckman (1979) procedure while it is found to be significant at 5% significance level for higher education (university) level in the second step least squares method. In both of the estimations, the fact for the household representative to have a secondary level education has a negative fish consumption effect. Household representative with a secondary level of education has a higher probability to purchase other meat products than fish. In case the household representative has a higher level (university) of education, the household's probability of purchasing fish increases by 0.021%. For the fish purchasing decisions of the household representatives in other education level groups, it is seen that education level has no significant effect (Table 3 and 4).

Table 5: Test conduct for model specification of second step estimated

| Test | Breusch-Pagan Testi | Model specification test | Multiple linearity |
|---|---|---|---|
| Hypothesis | $H_0$: Var (u \|x ) = $\sigma^2$ (constant variance) | $H_0$:lambda ($\lambda$) = 0 (no model specification problem) | $H_0$: no multiple linearity |
| | $H_1$: Var (u \|x ) ≠ $\sigma^2$ (changing variance) | $H_1$: lambda ($\lambda$) ≠ 0 (there is model specification problem) | $H_1$: there is multiple linearity |
| t-statistics/ F-statistics | F-statistics = 4.21 | Lambda estimation = 4.250 | |
| $R^2$ | | | Probability ratio =0.18 |
| Probability ratio (p) | Probability ratio = 0.002 | Probability ratio =0.01 | |
| Results | $H_0$ is accepted | Lambda is important $H_0$ hypothesis is rejected | $H_0$ hypothesis is accepted |

**Profession and occupation:** The profession of the household representative is an either directly or indirectly effective factor on fish purchasing decision. The fist step findings of the Heckman (1979) procedure show that the case in which the household representative is covered under the pension scheme has a positive effect with a high significance level. On the other hand, other professional statuses have no effect on purchasing decisions. Second step findings show that pensioner status has a positive while worker status of the household representative has a negative effect on fish purchasing decisions. It is thought that worker status of household representative is effective on his decision to prefer other animal products than fish and therefore this group is considered to have a higher probability of purchasing red meat and chicken. On the contrary, pensioner household representative are thought to have a higher probability of purchasing fish as they are well educated and more conscious about their consumption (Table 3 and 4).

**Marginal effects:** Derived from probit model estimations, marginal effects might as well be utilized to explain households' fish purchasing decisions in Antalya province. All other variables being constant, a change effect on the explanatory variable regarding the household representative probability of purchasing fish might be determined through these estimation results. On Table 3 are calculated marginal effects for only continuous variables that are statistically important. Green (2000) shows that marginal probabilities calculated for binary variables are insignificant. An increase in household size negatively and in a small scale affects household's probability of purchasing fish. Similarly, while a rise of 1% in red meat price increases the probability of purchasing fish by 0.16%, a rise of 1% in fish price decreases the probability of purchasing fish by 0.24%.

**Model specification tests:** Model estimations are valid in case there is no linearity problem in Heckman model. Otherwise, Full Information Maximum Likelihood (FIML) which is suggested by Leung and Yu (1996) should be used. In finite samples the advantage of FIML method is not always proved in terms of efficiency. In practice Heckman procedure gives more efficient results in comparison to FIML. To check the linearity, inverse mills ratio which is estimated by using least squares X s is regressed. value of this regression is 0.18. This result shows that there is low correlation. Therefore Heckman (1979) model estimation is considered to be valid. Breusch-Pagan test is carried out to test the variable variance state of the sample. Test results show that F-statistic is statistically not significant at 5% significance level i.e., the hypothesis that there is variable variance is rejected. Estimated as an alternative solution to selecting problem, the lambda coefficient of estimated Heckman model is significant at 5% significance level. Therefore, the hypothesis that there is no sampling size problem is rejected (Table 5).

## CONCLUSION

In this study, a probit model is utilized to analyze the features affecting households' fish purchasing preferences in Antalya province center. To achieve better estimations than normal probit estimations two step Heckman (1979) procedure is used. Sample selection bias test is applied to attain confidence estimations from survey questionnaires in the second step of the Heckman model. Household consumption attitudes are tried to be defined and household fish consumption probability is estimated by using individual, socio-economic and demographic variables effective on household fish consumption.

As a result of the research, new findings come up which might be of good use to fishery farmers that set strategies according to consumer characteristics and firms that market fish and fish products. These findings are specified in findings section. Substituted with red meat and chicken, fish is demanded more by the households that have one of the features such as having high income being well educated, old aged, married with small children. Therefore, such socio-economic features

causing households to display low demand levels should be taken into account and suggestions towards increasing demand should be emphasized.

## RECOMMENDATIONS

It is thought that policies aimed to increase fish production and consumption are vital for public health as it contributes to adequate nourishment. Following items can be suggested in terms of policies and applications to contribute to the increase in fish production and consumption. To increase per capita fish consumption in Turkey which is below world and developed countries' average, price formation at levels that different income group of households can afford is crucial. According to research findings, there is a negative correlation between fish price and demand for fish consumption. One of the factors causing fish price to rise is the increase in fish production costs. With the policies preventing fish worm prices to rise, price formation of fish will be at affordable levels. This will indirectly and positively affect demand for fish consumption.

Another way to increase fish consumption in Turkey is to support fish farms investments at suitable locations and increase fish production. As a matter of fact such subsidies as investment incentives, fry supplying and discounted energy prices to support production have been realized at different times in the country. With the increase in fish production the market price formation of fish at levels affordable to low income households is targeted.

Thanks to social activities promoted by local administrations such as special fishing area, fishing days fish meal contest, individual fish consumption attitudes might be revived.

As part of the culture, dietary habits include red meat consumption which has been adopted by the majority of the households in the country. On the other hand, fish is demanded by the households with certain socio-economic features. These features show several differences with those preferring other meat substitutes. Through analyzing this case well, household fish consumption propensity might be increased with an efficient and organized fish promotion programme throughout the country. In the context of the programme, informative training might be presented via media. Initial target group might be those who care more about their health (pensioner, old aged, families with small children etc.). The promotion programme might be extended to cover all other groups.

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