



Consumer characteristics influencing organic milk consumption preference in Tokat, Turkey

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Abstract

Turkish consumers have increasingly shown interest in organically produced foods in recent years. Concerns about environmental degradation, pesticide and hormone residues in food products and animal welfare issues all are contributing factors in this consumer interest. This article identifies consumer characteristics associated with preferences toward organic milk in Tokat, Turkey. The data were obtained by a survey method from 224 families living in the urban areas of Tokat Province in June 2010. In this study, a binomial logit model was used to investigate the selected socioeconomic and demographic characteristics of consumers that determine households' organic milk consumption choices and non-consumption choices. Housewife education, permanent income, household size, having a working wife, knowledge of organic product has statistically significant impacts on household organic milk choices. Binary logit results for organic milk consumption choices of the households are related positively household with working wife, knowledge of organic product and negatively number of members in the household, education level of the housewife and permanent income. According to the survey, knowledge of organic product is effective on the organic milk consumption. Therefore, policy makers should be efforts to increase consumer awareness about organic products. Consumption of organic milk is influenced by such factors as milk prices and income. Organic products are expensive, so organic dairy farming should be encouraged and the manufacturers should be supported. This situation is very important both for the export of organic products and for the domestic demand. Turkey has an important agricultural potential for organic agriculture. The rising trend of natural products, food safety and changes in consumer habits may be an advantage for Turkey.

Key words: Organic product, organic milk, consumer preferences, consumer choices, Turkey, consumption.

Introduction

Milk and milk products are an important source of many nutrients as protein, calcium, phosphorus, vitamin B2 and vitamin B12. Those products should be consumed especially adults female, children and young people and all ages each day¹.

People are advised to consume two glasses of milk a day. It is reported that a child who drinks a glass of milk every day meets 35% of protein requirements, 52% of the calcium requirement and 98% the requirement of vitamin B12².

Consumption of dairy products in Turkey is quite low compared to those of European countries. Economic reasons often limit fluid milk consumption in Turkey. Annual per capita consumption of fluid milk in Turkey is about 24 L, whereas it is above 100 L in European countries. In developed countries, consumption of this important food source is given a special importance. Annual per person consumption of fluid milk is 139 L in Finland, 100 L in England and 63 L in Italy². Annual per capita consumption of dairy products, with fluid milk consumption is 255 kg in the US and 262 kg in the EU. Annual per capita fluid milk consumption is 26 kg and dairy products consumption is 140 to 166 kg of the dairy milk consumed in Turkey. Consumption of dairy product (as equivalent milk) is 85 kg cheese, 31 kg yogurt, 21 kg butter, 1.36 kg ice cream and 1.54 kg milk powder³.

In Turkey, milk and milk products consumption is low compared to with better countries in this sector. In Turkey, dairy sector has

developed, but there are various problems in the sector from production to last link of the consumption. The number of animals per farm and per animal milk yield obtained is lower. Most farmer do not product to market. Milk is collected from business for a very small scale and scattered, this situation increases the cost of the industrialists. This is reflected consumer prices. Under these conditions, prices force to low-income groups, narrow milk demand⁴.

According to statistics, approximately 20% of raw milk produced in Turkey is consumed the source. The milk supply to the market is processed by modern enterprises (27%) and by medium-sized enterprises or dairies (33%). Of milk 20% is sold as open by hand seller. However, in developed countries, more than 90% of raw milk is sold in modern factories³.

In Turkey, while lack of milk consumption, unpackaged milk consumption and hygiene issues are discussed, today in the world the concept of organic products is on the agenda. Today, the concept of hygiene was insufficient for the consumption of foods with confidence. Intensive production with environmental and health problems have necessitated the search for a different food products. Consumers have begun to look for natural and safe products for their health, this revealed the organic products. Consumers are now looking for organic products that protect the environment and human health.

Consumption of milk composed influenced by such factors as,

milk prices, consumer habits, product safety, naturalness, and consumer awareness, income, education and so on. Increasing consumer awareness, trends in consumption of organic milk is increasing. Investment and production cost of organic milk is high, this situation prevents the increase of the number of firms providing services in this area. Because organic product is expensive, consumers meet in other milks the needs. To increase the consumption of organic milk, costs should be reduced first. Companies should be encouraged to produce organic milk. In the same way dairy farmers should be encouraged. The promotion of organic products is necessary to increase consumer awareness.

There is a considerable literature on the effects of socioeconomic and demographic characteristics on milk consumption patterns and preferences in different regions provinces of Turkey and other country. Several studies⁵⁻⁹ have investigated consumers' attitudes toward fluid milk purchases and consumption.

Most of these studies have focused on aggregate consumption of individual milk such as whole milk, low-fat milk, and skimmed milk, but also on the characteristics of consumers who exhibit preference specifically toward unpacked milk and packed milk, sterilized milk and pasteurized milk.

Although a few studies focused on milk consumption decisions of consumers for a specific region, no study has examined the effect of socioeconomic and demographic factors on organic milk consumption decisions in Turkey. In Turkey, Atasever and Erdem¹⁰ and Karslıoğlu and Koyuncu¹¹ examined issue of organic dairy farming. However, a study on consumer preferences and consumption of organic milk has not been found.

One of the fastest-growing categories of organic production in the world is in the organic dairy category. In the last few years, there are studies related to the consumption of organic milk in various countries. Several studies have attempted to identify the characteristics of organic consumers. A study by Bernard and Bernard¹² supports the idea that WTP for organic dairy attributes increases with income, and additionally finds that consumers are willing to pay a premium for the hormone- and antibiotic-free attributes found in organic milk. One finding that most studies of organic products agree upon is that families with young children are more likely to purchase organic products than those without children.

Study of Liu *et al.*¹³ makes use of experimental data and utilizes a relatively novel non-parametric modeling approach, the CART analysis, in identifying how willingness to pay for organic milk varies with the demographic profile of experiment participants. Glaser and Thompson¹⁴ examined the demand for organic and conventional beverage milk in the US, retail sales of organic and conventional beverage milk, excluding buttermilk and flavored milk, using national-level supermarket scanner data. McBride and Greene¹⁵ compared conventional and organic milk production of systems in the US, and Midmore *et al.*¹⁶ prepared a report on consumer attitudes to quality and safety of organic and low input foods.

Hill and Lynchehaun¹⁷ considered consumer attitudes and motivation towards organic food, and milk specifically, and Rosa Dias *et al.*¹⁸ examined the future of organic milk in Portugal. Their study explores and forecasts the factors influencing the supply chain of organic milk products in Portugal using the Delphi methodology.

With the increasing role organic products, and specifically

organic milk, play in the retail arena, it is important to gain a better insight into the characteristics of organic milk consumers. Dairy producers and retailers stand to gain with a better understanding of their consumers.

This study was designed to examine fluid of consumers and organic fluid milk consumption preference in Tokat province, and households' organic milk consumption preferences were analyzed by using binomial logit model. Tokat is not very large a city located in the middle northern part of Turkey and has got high agricultural potential but organic farming is very limited. Consumers do not know very well the concept of organic products, but in terms of health there is demand for a reliable product. In the Tokat province, consumers prefer for various reasons unpacked milk, packaged milk and organic milk.

The main objective of this article was to provide a better understanding of consumers' purchasing behavior toward organic milk and to investigate socioeconomic and demographic characteristics that may influence consumers' organic milk consumption behavior.

Materials and Methods

The source of the study data is a consumer survey conducted on a sample of 224 households in June 2010. The surveys were collected from consumers using face to face questionnaire. Tokat province was divided into four geographical locations for survey study. These four districts, which geographical represent household that have different income groups in Tokat were chosen. Households (224) surveyed were selected with random sample method. Sample number was determined using Probability Sampling Method based on the formula given below¹⁹:

$$n = \frac{Nt^2 pq}{d^2 N + t^2 pq}$$

N = number of households in Tokat (23,251),

t = t value for confidence interval (for 95% confidence interval, $t = 1.96$),

p = existed probability (0.5),

q = non-existed probability (0.5),

d = error rate (0.065).

Cross sectional data obtained from the questionnaire conducted on 224 households in Tokat were analyzed.

Objective of this study was to determine whether consumption of organic milk is independent of socioeconomic and demographic characteristics of the households. According to the objectives of the study, binomial logit model was used to analyze households' organic milk consumption decisions as a function of socioeconomic and demographic factors. The model assumes that a household is faced with making choices between two alternatives; consuming or not consuming organic milk.

Regression analysis involves the studying of the dependability of a variable (dependent variable) on other variable(s) (independent variables)²⁰. Logit regression is a non-linear regression model specifically designed for two-dependent variable systems. It is a non-linear model that can be linearized using appropriate transformations. Logit regression is also called "logistic regression model"²¹. It is called "binary logistic regression model" when the dependent variable is expressed in two categories and called "multiple logistic regression model" when in more than two categories²².

Logistic regression model is an alternative to discriminant analysis and cross tables when certain assumptions (such as the presence of normality and a common co-variance) cannot be obtained. When the dependent variable is a discrete one consisting of two, 0 and 1, or more levels, logistic regression model can be properly used. In addition, mathematical elasticity and simplicity of interpretation increase the popularity of the method²³. The logistic regression model employed in the present study is a binary logistic regression model, where dependent variable is Y and independent one is X. In order to explain the model, the following logistic distribution function is used²⁴⁻²⁷:

$$P_i = E(Y = 1 | X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_i)}} \quad (1)$$

In the logistic distribution formulae, P_i is the independent variable, X_i is the data, i is the possibility of a preference by an individual (possibility of having 1 and 0 values by i^{th} individual). It is seen that the abovementioned model (Equation 1) is not linear. However, it can be linearized using proper transformations. When $\beta_1 + \beta_2 X_i$ in Equation 1 is replaced by Z_i , Equation 2 is obtained:

$$P_i = \frac{1}{1 + e^{-Z_i}} \quad (2)$$

Z_i is between $-\infty$ and $+\infty$, and P_i is between 1 and 0. When P_i shows the possibility of an event's occurrence, the possibility of this event's non-occurrence is $1 - P_i$ ²⁸. Then, the possibility of this event's non-occurrence can be explained as in Equation 3 as follows:

$$1 - P_i = \frac{1}{1 + e^{Z_i}} \quad (3)$$

Equation 4 is obtained by dividing the occurrence by non-occurrence:

$$\frac{P_i}{1 - P_i} = \frac{1 + e^{Z_i}}{1 + e^{-Z_i}} = e^{Z_i} \quad (4)$$

When the natural logarithm of both sides of the equation is written, Equation 5 is obtained:

$$L_i = \ln\left(\frac{P_i}{1 - P_i}\right) = Z_i = \beta_1 + \beta_2 X_i \quad (5)$$

Thus, non-linear logistic regression model is linearized based on both its parameters and variables. "L" is called "logit" and models such as this called "logit models"²⁰⁻²⁶. When there are more than one independent variable, (X_1, X_2, \dots, X_k), binary and multiple logit regression models apply. In these situations, Equation 6 is used for proper transformations:

$$P_i = E(Y = 1 | X_i) = \frac{1}{1 + e^{-(\beta_1 + \beta_2 X_1 + \beta_3 X_2 + \dots + \beta_k X_k)}} \quad (6)$$

In logistic regression models involving a binary mode, categorical dependent variable has the following assumptions^{29, 30}:

- i) Conditional mean of logistic regression model has a value between 0 and 1.
- ii) Error terms in logistic regression model have a binomial distribution.
- iii) If the data is X, the possibility of Y's being 1 is P_i . That is, $E(Y = 1 | X_1, \dots, X_k) = P_i$

iv) n number of observations about dependent variable are statistically independent.

v) Defining variables are independent of each other.

Odds and odds ratio are significant terms in Logit model. Odds, is a ratio of possibility. Odds are defined as the ratio of the number of events that occurred to number of events that did not occur³¹. "Odds ratio", on the other hand, is the ratio of two odds, in other words, the ratio of likelihood to another. In Equation 4, two probabilities, occurrence and non-occurrence probability of an event, are proportioned and this is the odds of proportion.

It is important to understand that possibility, odds and logit concepts are three different ways of explaining the same thing³². There is a clear interpretation of odds ratio³¹. An odds ratio of greater than 1 means that likelihood of an event's occurrence has increased while that of lower than 1 indicates that likelihood of that event's occurrence has decreased.

In the logit regression analysis, Pearson's Chi-square and deviation statistics is used to test the general meaningfulness of the model²². Finally, R^2 values of Cox and Snell, and Nagelkerke, which are statistics that roughly estimate the variance (variation) resulted by the variables in the model, are statistics similar to R^2 in standard procedures.

The marginal effects and predicted probabilities give better indications and represent changes in the dependent variable for given changes in a particular regressor whereas holding the other regressors at their sample means. These are obtained from the logit regression results by the following equation³³:

$$\frac{\partial P_{ji}}{\partial X_{ji}} = P_{ji} \left(\beta_j - \sum_{k=1}^j P_{ki} \beta_k \right) \text{ for } j=0, 1, 2, \dots, j, \quad (7)$$

where β and P represent the parameter and probability, respectively, of one of the four normalized outcomes. Each model is estimated under Newton's maximum likelihood procedures using Limdep computer software³³⁻³⁵.

Turkish household survey data include a large number of socioeconomic and demographic variables including income, characteristics of the household's size, age, education, gender, and marital status of household head, regional variation, and many others⁹. We include several demographic variables, namely, dummy variables for permanent income, household with working wife and knowledge of organic product, three dummy variables for age of the household head, education level of the housewife, number of members in the household. These variables are common variables that have been used in previous papers^{5-7, 9, 36, 37}. The independent variables, their definitions, arithmetic means, and standard deviations are presented in Table 1. The variables defined in Table 1 are age of the household head (AGE), education level of the housewife (HWEDU), permanent income (PINC), number of members in the household (HSIZE), household with working wife (WEMP) and knowledge of organic product (KNOWOP).

It is assumed that age and gender, education, income and household size are significant factors on choice of households for purchasing food. Generally, higher education and economic status may be positively correlated with the healthy dietary patterns³⁸. Household education and income levels are important variables that influence household purchasing behavior. It is hypothesized that households who have high-education level and high-income level are more likely to choose quality of food. Household size variable influences consumers' purchase behavior.

Table 1. Definitions and descriptive statistics of explanatory variables.

Variable definitions	Variable name	Mean	Std. dev.
<i>Age of the household head</i>	AGE		
30 years old or less=1; otherwise=0	AGE1*	0.37	0.48
Between 31 and 45 years old=1; otherwise=0	AGE2	0.33	0.47
46 years old or older=1; otherwise=0	AGE3	0.30	0.46
<i>Education level of the housewife</i>	HWEDU		
Elementary school* or less=1; otherwise=0	HWEDU1*	0.44	0.50
High school=1; otherwise=0	HWEDU2	0.39	0.49
University degree=1; otherwise=0	HWEDU3	0.17	0.38
<i>Permanent income</i>			
Permanent income=1; otherwise=0	PINC	0.69	0.46
<i>Number of members in the household</i>	HSIZE	\bar{x} =4.05	
Less than 4=1; otherwise=0	HSIZE1*	0.33	0.47
Between 4 and 5=1; otherwise=0	HSIZE2	0.54	0.50
More than 5=1; otherwise=0	HSIZE3	0.13	0.34
<i>Household with working wife</i>			
Household with working wife=1; otherwise=0	WEMP	0.28	0.45
<i>Knowledge of organic product</i>			
Knowledge of organic product	KNOWOP	0.57	0.50

* Reference category omitted from models to avoid multicollinearity. **Elementary school is eight years (elementary+secondary) in Turkey.

It is assumed that rising household size are less likely to quality of food as primary preference because wide households more interested in price of foods.

Results and Discussion

According to the survey results, the average household size was found to be 4.05 people that are lower than the average household size (3.80 people) of Turkey³⁹. The survey results illustrate that 20.5% of households were illiterate and primary school graduates, 19.6% were secondary school graduates, 29.0% were high school graduates, 30.8% were university and post graduates.

The main hypothesis is that the preference for organic milk consumption is influenced by socioeconomic and demographic characteristics of the households, age of the household head, education level of the housewife, permanent income, number of members in the household, household with working wife and knowledge of organic product. It is hypothesized that better educated housewives have higher preferences for organic milk than less educated housewives. We expect that households with permanent income are more likely to consume organic milk. Similarly, it is hypothesized that households who have knowledge of organic products more likely choose organic milk, because of the households having knowledge of organic products are conscious. It is assumed that rising household size is less likely to organic milk as primary preference because wide households are more interested in price of foods.

Binomial logit model estimates the probability of whether or not the household consumes organic milk during the survey period. The results of maximum likelihood estimation of this model are presented in Table 2. A likelihood ratio test that tests whether all the coefficients in the binomial logit model equal zero is highly significant at the 0.000 level as indicated by the chi-square value of 41.423.

Five of 9 coefficients are statistically significant at the 0.10 level in the binomial model. Housewife education, permanent income, household size, having a working wife, knowledge of organic product has statistically significant impacts on household organic milk choices.

The binomial logit results indicate that household size is

Table 2. Binary logit results for organic milk consumption choices of the households.

Variables	Coefficients	Standard error	Odds ratio	Marginal effects
AGE2	0.023	0.470	1.024	0.0029
AGE3	-0.184	0.490	0.832	-0.0229
HWEDU2	-0.285	0.493	0.752	-0.0353
HWEDU3	-1.361*	0.713	0.256	-0.1683
PINC	-0.922**	0.429	0.398	-0.1139
HSIZE2	-0.691*	0.431	0.501	-0.0854
HSIZE3	-0.491	0.556	1.634	0.0607
WEMP	0.785	0.493	2.191	0.0970
KNOWOP	2.203***	0.524	9.053	0.2723
Constant	-1.908***	0.613	0.148	-0.2359
2 Log likelihood		183.311		
Cox & Snell R ²		0.169		
Nagelkerke R ²		0.267		
Chi-square		41.423***		

***, ** and * indicate statistical significance at the 0.01, 0.05 and 0.10 levels, respectively.

negatively related to the organic milk consumption decision. Being large household decreases the probability of consuming organic milk by 8.54%. This means that as household size grows, the household will tend to consume non-organic milk instead of consuming organic milk. HSIZE3 do not have a significant influence on the choice between these alternatives. Age of the household head was included in model. The dummy variable representing the household head aged less than 30 years old was omitted. The binomial logit results indicate that the impacts of the two age groups (AGE2 and AGE3) on the choices between consumption and non-consumption have positive and negative signs. However, AGE1 and AGE2 do not have a significant influence on the choice between these alternatives. WEMP was used as a dummy variable equal to 1 if a household has a working wife and zero otherwise. Households with a working wife were significantly more likely to consume organic milk than other households. As shown in Table 2, the probability of consuming organic milk is 9.7% higher for households with working wives.

The results indicate that HWEDU3 was related negatively to the probability of organic milk consumption, ceteris paribus. The negative and statistically significant coefficients imply that housewives with more than elementary school education are less likely to consume organic milk than households with less-educated housewives. Marginal effect of the education variable indicates that a household with a university-graduated housewife is about 16.83% less likely to consume organic milk.

It is expected a positive relationship between consumption of organic milk and permanent income. However, the relationship between two variables is negative. The negative and statistically significant coefficients imply that households with permanent income are less likely to consume organic milk than the others. The probability of consuming organic milk is 11.39% lower for households with permanent income.

As expected, the results show that knowledge of organic product has a positive impact on organic milk consumption. KNOWOP was used as a dummy variable equal to 1 if a household has a knowledge of organic product and zero otherwise. Households with knowledge of organic product were significantly more likely to consume organic milk than other households. As shown in Table 2, the probability of consuming organic milk is 27.23% higher for households with knowledge of organic product.

Conclusions

Consumers have begun to look for natural and safe products for their health. This revealed the organic products. Consumers are now looking for organic products that protect the environment and human health. One of the fastest-growing categories of organic production in the world is in the organic dairy category.

Until recent years, organic food production was more export oriented in Turkey. However, in the last few years, demand of these products has increased along with increased consumer awareness. Turkish consumers have begun to show more interest and demand for organic products.

For new products, it is important to determine the factors affecting the potential demand for that product. The aims of this study were to determine the effects of socio-economic and demographic factors on the demand of organic milk in Tokat.

In the logistic regression model estimated using cross sectional data obtained from a survey conducted on 224 households in Tokat, preference for organic milk consumption is influenced by socioeconomic and demographic characteristics of the households, age of the household head, education level of the housewife, permanent income, number of members in the household, household with working wife and knowledge of organic product. Of these factors, household with working wife and knowledge of organic product had positive effect on the demand of organic milk while the others had negative effects.

According to the survey, knowledge of organic product is effective on the organic milk consumption. Therefore, policy makers should have efforts to increase consumer awareness about organic products. Consumption of organic milk is influenced by such factors as milk price and income. Organic products are expensive, so organic dairy farming should be encouraged and the manufacturers should be supported. This situation is very important both for the export of organic products and for the domestic demand. Turkey has an important agricultural potential for organic agriculture. The rising trend of natural products, food safety and changes in consumer habits may be an advantage for Turkey.

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