

Factors affecting packed and unpacked fluid milk consumption

Faktory ovlivňující spotřebu baleného a nebaleného mléka

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Abstract: This article identifies consumer characteristics associated with preferences toward fluid milk alternatives. Using consumer survey data from Samsun province of Turkey and Multinomial Logit model, unpacked and packed fluid milk preferences were analyzed. Based on the results, 14.1% of respondents consumed only unpacked fluid milk, 58.2% consumed only packed fluid milk and 27.7% of respondents consumed both unpacked and packed fluid milk at least once a week. Multinomial Logit model results indicated that better educated household head, higher income households, younger and female household head and people who agree with “unpacked milk is not healthy” consume more packed fluid milk than do others. Moreover, consumers who agree with statement “price of packed milk is expensive compare to unpacked milk” were less likely to consume packed fluid milk than do others.

Key words: milk consumption, packed and unpacked fluid milk, household characteristics, consumer behavior, preferences

Abstrakt: Článek identifikuje charakteristiky spotřebitelů spojené s preferencemi alternativní spotřeby konzumního mléka. S využitím výzkumu spotřebitelských dat v turecké provincii Samsun a Multinomiálního Logit modelu byly analyzovány preference spotřebitelů týkající se spotřeby baleného a nebaleného konzumního mléka. Na základě výsledků výzkumu lze konstatovat, že 14,1 % respondentů spotřebovává pouze nebalené konzumní mléko, 58,2 % konzumuje pouze balené konzumní mléko a 27,7 % respondentů spotřebovává jak nebalené, tak nejméně jednou týdně i balené konzumní mléko. Výsledky Multinomiálního Logit modelu naznačují, že domácnosti s vyšší úrovní vzdělání hlavy domácnosti, domácnosti s vyšším příjmem, mladší domácnosti a domácnosti žen a lidé souhlasící s názorem, že nebalené konzumní mléko je nezdравé, konzumují vyšší podíl baleného mléka než ostatní. U spotřebitelů, kteří souhlasí s názorem, že “balené mléko je drahé v porovnání s nebaleným”, se projevuje nižší pravděpodobnost konzumace baleného konzumního mléka než u ostatních.

Klíčová slova: spotřeba mléka, balené a nebalené konzumní mléko, charakteristika domácností, chování spotřebitelů, spotřebitelské preference

In the recent years, significant changes have taken place in the fluid milk consumption patterns of Turkish consumers. Annual per capita consumption of packed fluid milk increased from 2.2 l in 1994 to 6.9 l in 2003, whereas the consumption of unpacked fluid milk decreased from 22.9 l to 20.1 l (TURKSTAT 1994, 2003). The substantial growth of packed fluid milk and the continued low per capita consumption of fluid milk (27 l) indicate that marketing activities might increase the consumption of long-life fluid milk in Turkey, which remains very low compared with other European countries. For instance, the annual per capita consumption of packed fluid milk in 2000

was 139 l in Finland, 65 l in Greece, 108 l in Spain, and 33 l in Poland (SETBIR 2000).

Consumption patterns for fluid milk products in Turkey were different among socio-economic and demographic characteristics of households such as the household income, education, age, gender and employment status of consumers may influence the fluid milk consumption patterns. Each consumer is different and for that reason he/she makes different decisions within the process of purchasing. So, in addition to the impact of socio-economic and demographic characteristics of households on fluid milk consumption, the characteristics of consumers who

prefer consuming packed and unpacked fluid milk, their attitudes towards price and health and the effects of child preference are also important factors of the fluid milk consumption choices. Consumer's behavior and decision-making process of households on food consumption were discussed by several researchers (Stávková, Turčínková 2005; Melicharová 2006; Nagyová et al. 2006; Foret, Procházka 2006, 2007; Stávková et al. 2007, 2008).

Both in the organizational and consumer markets, customers respond to the effects of marketing tools in a different manner when buying products and/or services. For the time being, both commercial and academic research of the behavior of individuals and organizations is based on the theoretical base, which uses methods of psychology, sociology, social psychology, cultural anthropology and economics. All these tools help to describe, explain and understand the consumer behavior of people (Stávková et al. 2007, 2008). When analyzing the behavior and decision-making of customers, it is necessary to take into account all the width and diversity of factors, which influence it and it should be said that the attention must be paid to them (Foret, Procházka 2006).

In this study, we analyze the fluid milk consumption choices and whether or not consuming fluid milk is independent of households' knowledge and beliefs. Moreover, the present study investigates socio-economic and demographic characteristics and attributes of consumer that may influence the consumers' fluid milk consumption behavior. Since many households do not consume all milk types, the choice of the fluid milk types is addressed using a multinomial logit model. Two types of fluid milk were included in this study: unpacked milk and packed milk. Since households' packed fluid milk consumption is increasing very rapidly in Turkey, the results of this study provide some relatively new information about consumers' fluid milk consumption preferences and attributes.

The remainder of the paper is organized into four sections. In the next section, the consumer survey is described. This is followed by the discussion of the multinomial logit model. Empirical results and discussion are given in section four. The last section contains concluding remarks, and discusses implications of this study.

MATERIAL AND METHODS

This study is conducted in the urban area of the Samsun province of Turkey. This region, while it obviously does not represent all Turkey, is perceived

to be comprehensive enough to shed insight for the Turkish consumers' fluid milk consumption for various socio-economic groups. The sample size was determined by the ungrouped one stage random likelihood sampling method (Collins 1986):

$$n = (t^2 \times pq) / E^2 \quad (1)$$

where:

n = the sample size

t = the significance level (assumed to be 95%)

p = the probability of the situation being searched (for this study, probability of household consuming packed fluid milk is assumed to be 50%)

q = the probability of the household not consuming packed fluid milk ($1 - p$)

E = the accepted error (assumed to be 5%)

$$n = \frac{1.96^2 \times (0.5 \times 0.5)}{0.05^2} = 384 \quad (2)$$

The survey data were compiled from a random sample of 384 consumers in the summer 2007. The total of 325 questionnaires were analyzed since 59 households dropped from the sample because of the missing observations. An interviewer collected the data in home visits in order to encourage a high level of cooperation and complete reporting. The households were randomly visited and asked to participate in a study about fluid milk consumption survey.

The interviewers asked each individual respondent if she or he had been consuming packed or unpacked fluid milk during the last one month period. In addition to these responses, interviewers also collected data on the respondents' socio-economic and demographic characteristics (age, gender, education, household size, household income, employment status of the household wife). Fluid milk consumption is also related to consumers' attitudes and perception about price and health effects of milk. Table 1 presents the description of the variables used in the model.

To find out how sensitive consumers were about price and health, they were asked to rank importance of the following attributes for their fluid milk consumption decision: "Milk is the most important part of human diet", "Milk is fattening", "Milk advertising influences people so they buy more milk", "Sterilized milk does not contain any preservatives", "Unpacked milk is not healthy", "Price of packed milk is expensive compared to unpacked milk". Consumers were asked to record their responses as a scale as follows: strongly disagree (1), somewhat disagree (2), neutral (3), somewhat agree (4), and strongly agree (5).

In accordance with the goals of this paper, the data were collected and analyzed to investigate consumers' characteristics and attitudes towards to packed and

unpacked fluid milk consumption. It is hypothesized that the household's socio-economic characteristics, beliefs, knowledge and the attitudes about price and health affected consumers' fluid milk consumption decisions.

The multinomial logit model is a simple extension of the binary logit model. The multinomial logit model is the most frequently used model for nominal outcomes which are often used when the dependent variable is ordinal. In the survey, the questionnaires asked the respondents to indicate their choice of fluid milk types. According to the responses, dependent variables were created from the data, which indicated the consumption of unpacked fluid milk (1), packed fluid milk (2), and both unpacked and packed fluid milk (3). Since the dependent variable has more than two choices, the multinomial logit regression model is the most suitable to estimate the relationship between dependent and independent variables. The general form of the multinomial logit model is (Long 1997; McFadden 1973):

$$P_{k,i} = \frac{\exp(x_i \beta_k)}{\sum_{k=1}^J \exp(x_i \beta_j)} \text{ for } I = 1, 2, \dots, N; J = 1, 2, \dots, k(3)$$

where P is the probability that the household i chooses to consume one of the alternatives, x is explanatory variable vector that contains the set of factors about consumers' attributes and socio-economic and demographic characteristics such as household size,

household income, age, gender, occupation and education of respondents and β_j is a vector of parameters relating the explanatory variable to the valuation of alternative j ($j = 1, 2, 3$). The dependent and independent variables, their definitions, arithmetic means and standard deviations are shown in Table 1.

The marginal effects and the predicted probabilities are obtained from the logit regression results by the following equation:

$$\frac{\partial P_{ji}}{\partial x_{ji}} = P_{ji} (\beta_j - \sum P_{ki} \beta_k)$$

where β and P represent the parameter and probability, respectively, of one of the three choices. Marginal 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. The model is estimated under the Newton's maximum likelihood procedures using the LIMDEP Econometric Software (Greene 2007).

RESULTS AND DISCUSSION

According to the survey results, the average age of respondents was 39.2; 33% of respondents had university diplomas; 44% of households had a working wife; 24% of households had children aged less than 6 years and the average household size was 3.5 (Table 1).

Table 1. Definitions of variables and their descriptive statistics

Variable definitions	Variable name	Mean	Standard deviation
Number of members in the household	HSIZE	3.52	1.21
Age of the respondents (years)	AGE	39.19	11.46
Gender of the respondents (Male = 1; Female = 0)	GENDER	0.18	0.38
Number of members aged less than 6 years old	CHILD	0.24	0.43
Education level of the respondents (University graduate = 1; otherwise = 0)	EDUCATION	0.33	0.47
Household with working wife (Yes = 1; No = 0)	EMPLOYMENT	0.44	0.50
Household income (\$1000)	INCOME	1.86	1.26
Price of packed milk is expensive compare to unpacked milk (Agree = 1; Not agree = 0)	PRICE	0.58	0.50
Milk is the most important part of human diet (Agree = 1; Not agree = 0)	IMPORTANCE	0.90	0.31
Milk is fattening (Agree = 1; Not agree = 0)	FAT	0.09	0.29
Advertising influences people so they buy more milk (Agree = 1; Not agree = 0)	ADVERTISEMENT	0.45	0.50
Sterilized milk does not contain any preservatives (Agree = 1; Not agree = 0)	PRESERVATIVES	0.22	0.42
Unpacked milk is not healthy (Agree = 1; Not agree = 0)	HEALTH	0.46	0.50

The perceived importance of the attributes, beliefs, knowledge and importance ratings are presented in Table 1. The perception of lower price was important to most of the responding consumers. In the total sample, only 58% of respondents agreed that price of

Table 2. Consumers fluid milk consumption choices

Milk consumption	Number of households	Percentages
Only unpacked milk	46	14.15
Only packed milk	189	58.16
Both unpacked and packed milk	90	27.69
Total number of consumers	325	100.00

packed fluid milk is expensive compared to unpacked fluid milk. This was an important attribute influencing the consumers' purchase. The survey results revealed that ninety percent of respondents agreed that milk is the most important part of human diet. Interestingly, 46% of respondents believed that unpacked milk is not healthy, but 54% of respondents disagreed with this statement. 9% of respondents believed that milk is fattening. 45% of the respondents agreed that advertising influences people so they buy more milk. 22% of the respondents agreed that sterilized milk does not contain any preservatives.

The results indicate that the largest fluid milk alternative chosen by sample households was only packed fluid milk with 58.2% (Table 2). While 14.1%

Table 3. Multinomial Logit Model's results for fluid milk consumption choices⁺

Variables	Estimated coefficients		
	unpacked milk vs. both unpacked and packed milk	packed milk vs. both unpacked and packed milk	packed vs. unpacked milk
INTERCEPT	-2.671** (0.053)	2.095 (0.116)	4.765** (0.000)
HSIZE	0.494** (0.010)	-0.137 (0.482)	-0.631** (0.000)
AGE	0.001 (0.950)	-0.044** (0.029)	-0.045** (0.006)
GENDER	-0.285 (0.564)	-1.010* (0.059)	-0.725* (0.096)
EMPLOYMENT	1.258** (0.019)	0.544 (0.321)	0.714** (0.058)
EDUCATION	1.112* (0.106)	1.552** (0.024)	0.440 (0.261)
CHILD	-0.081 (0.872)	-0.813 (0.120)	-0.732** (0.050)
INCOME	0.389 (0.356)	0.881** (0.035)	0.493** (0.042)
IMPORTANCE	0.300 (0.679)	0.091 (0.892)	-0.209 (0.729)
FAT	0.043 (0.952)	0.019 (0.978)	-0.024 (0.966)
ADVERTISEMENT	0.498 (0.238)	0.935** (0.027)	0.437 (0.176)
PRESERVATIVES	0.991** (0.055)	0.793 (0.124)	-0.198 (0.562)
HEALTHY	0.432 (0.384)	1.823** (0.000)	1.391** (0.000)
PRICE	-0.494 (0.330)	-1.746** (0.000)	-1.252** (0.000)
Model Chi-Square	184.298 (0.000)		
Pseudo R square			
Cox and Snell	0.433		
McFadden	0.299		
Percentage of correctly predicted results	73.231		

+ *P*-values are in parentheses

* and ** imply statistically significant at the 10- and 5-percent levels of probability, respectively

of consumers bought only unpacked fluid milk, 27.7% bought both unpacked and packed fluid milk.

The results of the multinomial logit model are presented in Table 3. The model has been estimated by the maximum likelihood method. The overall model is significant at the 0.01 level as indicated by the Chi-square value of 184.30. Moreover, based on the McFadden pseudo R^2 of 0.30, the model appears to have a good fit, especially for the multinomial logit model and when the underlying data are cross-sectional (McFadden 1973). The marginal effects and predicted probabilities give better indications of how changes in the regressors affect the probability of a particular event. The marginal effects in Table 4 represent the change in the dependent variable for the given change in a particular regressor while holding the other regressors at their sample means.

Table 3 shows the results from the Multinomial logit models for respondents' preference for the fluid milk consumption choices. Four variables, HSIZE, EDUCATION, EMPLOYMENT, and PRESERVATIVES, have statistically significant coefficients for the unpacked fluid milk category. Based on these results, younger respondents, those in smaller households, with employed household wife, higher income households, households with more educated household head and with female household head are more likely to consume packed fluid milk than those of their corresponding counterparts.

Since the marginal effects give better indications and represent changes in the dependent variable for given changes in the particular regressor whereas

holding the other regressors at their sample means, we mostly discussed marginal effects given in Table 4. The results indicate that the household size is positively related to the unpacked fluid milk consumption decision. Increasing household size decreases the probability of consuming packed fluid milk compared to unpacked fluid milk. As a hypothesis, compared to packed fluid milk category, the households which have a child aged less than 6 years old are more likely to consume unpacked fluid milk than households without a child aged less than 6 years old.

Education of the household head, on the other hand, affects the household's packed fluid milk consumption positively. The positive and statistically significant coefficients imply that the individuals with a higher than high school education were the most likely to consume packed fluid milk than those of less educated individuals.

Similar to the education effects, the income positively impacts the consumers' fluid milk consumption preferences. Households with higher-incomes are more likely to consume both unpacked and packed fluid milk than those of lower-income. This is consistent with the findings of Bus and Worsley (2003), Watanabe et al. (1998) and Dong and Kaiser (2001) who reported that income positively influences the probability that household consume fluid milk. Higher-income households are about 4.3% more likely to show the preference for packed fluid milk compare to lower-income households (Table 4).

As expected, the results indicate that fluid milk consumption decisions were statistically influenced

Table 4. Marginal effects of milk consumption choices according to the Multinomial Logit Model

Variables	Marginal effects		
	unpacked milk vs. both unpacked and packed milk	packed milk vs. both unpacked and packed milk	packed vs. unpacked milk
HSIZE	0.122	-0.119	0.002
AGE	0.008	-0.010	-0.002
GENDER	0.126	-0.172	-0.046
EMPLOYMENT	0.149	-0.106	0.043
EDUCATION	-0.061	0.143	0.082
CHILD	0.130	-0.165	-0.035
INCOME	-0.082	0.125	0.043
IMPORTANCE	0.043	-0.034	0.009
FAT	0.005	-0.003	0.001
ADVERTISEMENT	-0.070	0.117	0.047
PRESERVATIVES	0.052	-0.003	0.049
HEALTHY	-0.243	0.325	0.082
PRICE	0.217	-0.297	-0.080

by the employment status of the household wife. Households with an employed housewife are more likely to consume packed fluid milk than the households with an unemployed wife.

These results suggest that the socio-economic and demographic characteristics of the household and household head play an important role in fluid milk consumption among the Turkish households. Similar results are reported on other study areas (see for example, Capps, Schmitz 1991; Sun, Blaylock 1993; Gould 1996; Watanable et al. 1998; Oğuz, Kucukcongar 2002; Bus, Worsley 2003; Wham, Worsley 2003; Foret, Procházka 2006; Stávková, Turčínková 2005; Stávková et al. 2007, 2008).

The attitude factors chosen for investigation were quite distinct (Mitsostergios, Skladas 1994; Saba et al. 1998; Watanable et al. 1998; Bus, Worsley 2003). In general most people had positive views about fluid milk.

Not surprisingly, the estimation of the model about the stated importance of milk in human diet is an important consideration in consumers' milk consumption decisions. The respondents who believe that milk is the most important part of diet are about by 1% more likely to prefer packed fluid milk (Table 4).

Price was the primary reason mentioned in the survey for not purchasing packed fluid milk, as it was perceived as being quite expensive compared to unpacked fluid milk. In average, Turkish consumers have been sensitive to price of foods which they consume. Our study suggests that this is also the case among packed fluid milk buyers. Interestingly, it was noted that PRICE had a negative sign, indicating that consumers who usually sensitive to price were less likely to consume packed fluid milk (Table 4). The statistically significant and negative coefficients of PRICE variable for packed fluid milk equation indicated that respondents agreed with statement 'price of packed milk are expensive compared to unpacked milk' were less likely to consume packed milk than the respondents who did not agree with the statement. Although the packed fluid milk consumers understand better why packed fluid milk is more expensive, many believe that they would buy more of it if the price was lowered.

Advertisement was an insignificant predictor of the consumers' fluid milk consumption choices. The insignificant relationship between fluid milk preference and ADVERTISEMENT gives further evidence that fluid milk consumers are not affected from advertisement about milk.

This study also found that consumers with a higher level of concern about unpacked fluid milk have less likely to consume unpacked fluid milk than the others. The significant and positive relationship be-

tween packed fluid milk preference and respondent's agreement with 'unpacked milk is not healthy' gives further evidence that consumers care about their health and preference towards to packed fluid milk compare to unpacked fluid milk. Respondents who believe in that unpacked fluid milk is not healthy are about 24.3% less likely to consume unpacked fluid milk and are about 8.2% more likely to consume packed fluid milk (Table 4). These results are of some importance because of their positive and statistically significant coefficients.

CONCLUSION

In this study, the factors which affect the household unpacked and packed fluid milk consumption behavior in Turkey were analyzed by using the multinomial logit model. Although several past studies focused on the consumers' fluid milk consumption choices, no known study was found to examine the effect of socio-economic and demographic factors with consumers' food consumption attributes on the consumers' unpacked and packed fluid milk consumption.

The findings of this study revealed that better educated household head, higher income households, and households without children aged less than 6 years old consume more packed fluid milk than do others. Thus, the likelihood of consuming packed fluid milk is affected by these variables, and the null hypothesis that these variables have no effect on the probability of consuming fluid milk is rejected.

It was recognized that the unpacked and packed fluid milk consumer cannot only just be segmented by age, income and education but also by their behavior: there were some participants who stated that they buy packed fluid milk due to internal reasons such as taste, health and quality. Like the previous studies, we found distinctive differences in the fluid milk consumption habits, knowledge, beliefs and attribute importance ratings. According to our findings, fluid milk consumption decisions are influenced not only by the socio-economic and demographic factors but also by variables of habit formations, beliefs and attribute knowledge.

Our empirical study indicates specific consumer characteristics which affect the consumers unpacked and packed fluid milk consumption preferences. The findings have important implications and strategies for milk producers and companies. Because milk production and manufacturing firms are increasing very rapidly in Turkey, results of this study provide some relatively new information about the consumers' fluid milk consumption decision. Moreover, this

research provides a profile of consumers that consume and probably spend more on packed fluid milk.

The obtained results are quite consistent with the expected behavior of Turkish consumers and provide a clear picture of the fluid milk consumption behavior. It is hoped that the findings of this study help to both domestic and foreign companies in Turkey to design pricing and promotion strategies and other marketing strategies for fluid milk consumption.

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