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An Empirical Examination of Consumer Consumption for Honey in Turkey

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ABSTRACT: The aims of this study were to investigate the factors affecting honey consumption of consumers and to reveal consumer preferences in honey consumptions in Turkey. The results obtained in this study are useful for the companies in honey market to improve their policies. Face to face questionnaires were carried out in 2019 with 3587 honey consumers living in 12 central districts of Turkey. Average annual honey consumption per capita was only 1.05 kg. The factors which consumers pay attention while purchasing honey are quality (83.44%), brand (68.30%), price (61.75%), package (58.82%) and advertisement (36.47). The factors affecting honey consumption of consumers were determined by binary logit analysis. The results revealed that age, level of education, marital status, number of individuals in a household, income, advertisement and health status have statistically significant effect on honey consumption. The results showed that value-based pricing strategy, promotional approaches, advertising campaigns, quality and standardization are important factors for honey producers to increase their market share.

Key words- *Honey, Consumer, Preferences, Binary Logit Analysis, Turkey*

1. Introduction

Honey is defined in TS 3036 Honey Standard as a sweet product which is collected honeybees (Apismellifera) from nectar secreted from the nectar glands in the flowers or other living parts of plants and the secondary substances secreted by some insects living on plants. The composition of nectar collected is changed in the bodies of honeybees, and finally stored in the honeycomb cells and matured (Mutlu *et al*., 2017). Honey is not only a valuable nutrient consumed as a food, but also a preferred medical product for health life (Soylu and Silici, 2018). Honey is consumed in childhood to support growth and in youth and old age for the purpose of health also benefits in the conservation from disseases and treatment of many diseases (Soylu and Silici, 2018). Honey is a natural food produced by bees, and its availability and consumption are higher compared to the other bee products such as propolis, royal jelly, bee venom, beeswax and pollen.

The diversity in bee races, different ecological conditions and rich flora which provides nectar and pollen throughout a year are the advantages of Turkey in beekeeping and honey production (Semerci, 2017). Therefore, various honeys with different aroma and other characteristics are produced and each region of Turkey has their own local honey. In addition to honeys with citrus, thyme, chestnut, tragacanth and linden floral origins, different honey types such as strained honey, comb honey and natural comb honey (local name is karakovan) can be found in the Turkish honey market. The number of registered honeys have significantly increased in Turkey after geographical indication law came into action in 2016 (Kan and Kan, 2020). Thirteen honeys have geographically registered in

Turkey as of March 2021 under the name of product origin (PDO) (Turkish Patent and Trademark Office, 2021).

The number of beekeepers in Turkey registered to farmer registration system in 2018 was 81.830 with 8108.424 hives and an average of 99 hives per beekeeper (TURKSTAT, 2019). The beekeeping was one of the four most supported agricultural branches under Young Farmer Support Project between 2016 and 2018. Beekeeping activity is an alternative source of income especially in rural areas and is also important to increase the entrepreneurial skills of young farmers (Doğan *et al*., 2018; Kan *et al*., 2018; Kan *et al*., 2019).

Turkey, connecting Europe and Asia, has diverse climatic condition, topography and vegetation, and different varieties of honey are produced in different parts of the country. Therefore, Turkey is an important honey producer country in the world. The average honey production per hive around the World is about 20 kg, while it ranges between 13 and 17 kg in Turkey (TURKSTAT, 2019). Approximately, 98% of the honey produced in Turkey is consumed domestically, and only 2% is exported which was 398 tons in 2007 and reached 3623 tons in 2016. Turkey earned $ 14 million 926 thousand revenues from 3623 tons of honey exported in 2016 (FAO, 2019).

Honey production in the World is recently increasing and the main honey producer countries in 2018 were: China (27.47%), Turkey (5.91%), Iran (4.51%), United States of America (4.11%), Russian Federation (3.90%), India (3.43%), Ukraine (3.32%), Mexico (3.10), Argentina (2.87%), Ethiopia 2.67%) and other countries (38.71%) (FAO 2019). Total of 4.484 tons of honey was produced in 131 countries of the World. China ranks the first with 1.232 tons and Turkey is the second with 264 tons of honey production. Honey consumption behavior and some socio-demographic characteristics of honey consumers have been investigated in this study. The results of this study are of great importance for honey market in Turkey which ranks in the first places in honey production in the world and has many local honey products and the number of patents. Honey consumption and preferences of honey consumers have been studied in other countries (Murphy *et al*., 2000; Gámbaro *et al*., 2007; Saner *et* al., 2007; Ványi et al., 2011; Crittenden, 2011; Pocol, 2011; Batt and Liu 2012; Pocol, 2012; Pocol and Ványi, 2012; Mohamadi-Nejad et al., 2013; Pocol and Bolboacă, 2013; Yeow et al., 2013; Ismaiel et al., 2014; Ćirić et al., 2015; Guziy et al., 2017). In Turkey, consumer-oriented studies on many agricultural products have been published, while honey consumption has not been investigated in Turkey.

The honey preference of consumers were assessed using factor analysis (Arvanitoyannis and Krystallis, 2006; Krystallis et al., 2007) and various logit (ordered, binary, multi) analyses (Jensen and Mørkbak, 2013; Gyau et al., 2014; Schifani et al., 2016; Testa et al., 2019). Some studies used auction experiments to analyze the willingness of consumers to pay for honey, (Wu et al., 2014; Cosmina et al., 2015).The results of previous studies stated that the origin of a honey is the most important factor considered prior to purchase honey (Batt and Liu, 2012; Parvanov and Dinkov, 2012; Pocol and Teselios, 2012; Pocol and Bolboac, 2013; Roman et al., 2013; Brščić et al., 2017; Šánová et al. 2017; Šedík et al., 2018; Thoma et al., 2018).

2. Material and Methods

2.1. Material

The data used in this study obtained through face-to-face questionnaires with consumers living in urban areas of Turkey. The face-to-face questionnaires were carried out between January and June 2019 in 81 provinces at 12 regions. The names and populations of the regions are given in Table 1. The percentage (%) was calculated as the ratio of a population (N) in the region to the population of Turkey. The number of questionnaires to be applied in a region was determined using this ratio. Thus, the total sample size (n: 3587) was distributed in proportion to the population density of the regions.

Table 1. Population of country and region and sample volumes

Regions	N	%	n
Mediterranean -TR6	10129087	13.39	480
Western Anatolia -TR5	7896258	10.44	374
Western Black Sea-TR8	3485328	4.61	165
Western Marmara-TR2	3139476	4.15	149
Eastern Black Sea -TR9	2246785	2.97	107
Eastern Marmara-TR4	7625825	10.08	362
Aegean-TR3	9946284	13.14	472
Southeastern Anatolia -TRC	8179409	10.81	388
Istanbul-TR1	15067724	19.91	714
North-Eastern Anatolia -TRA	1578093	2.09	75
Central Anatolia-TR7	3245136	4.29	154
Middle East Anatolia-TRB	3127092	4.13	148
Turkey-TR (Total)	75666497	100.00	3.587

***TUIK, 2019. (https://biruni.tuik.gov.tr/medas/?kn=95&locale=tr date accessed: 26.12.2019)**

2.1. Methods

The descriptions of dependent and explanatory variables are presented in Table 2. The factors which are important on honey consumption of consumers were determined as honey price, price of substitutes and complementariness and socio-economic features (especially education and income) of consumers (Gyau et al. 2014). In addition, income, the number of people and children among the consumers, educational background, age, not consuming honey due to health concerns and ethnicity were considered as independent variables in the previous studies. (Herrmann *et al*., 1994; Nayga and Capps, 1995; Manrique and Jensen, 1998; Ho-Shui Li *et al*., 2000; Tambi, 2001; Puduri *et al*., 2011; Gyau *et al*., 2014; Schifani *et al*., 2016; Lanfranchi *et al*., 2019).

The questionnaire consisted of two parts; the first part included the questions determining the socio-economic structures of consumers, and the second part included the questions determining the criteria for honey consumption, preference, and purchase.

The information on marital status, age of the household head, educational background, and monthly income of the consumers were used as the socio-economic factors affecting honey consumption. NLOGIT software was used to estimate the results of empirical model.

The factors affecting the honey consumption were determined using binary logit analysis. In the logit model, the dependent variable dummy and estimated probability values range from 0 to 1. The individuals who consume less than 0.25 g per year were are included in

the category of not consuming. Some variables in the logistic model were converted into categorical variable to obtain differences between categories as probability ratio. The honey consumers were defined as 1 and those who do not consume honey were defined as 0. For the convenience of interpretation, some of the independent variables were included in the model as dummy variables.

The age, monthly income of consumers are continuous variables and number of individuals in a household are used as continuous variables. The explanatory variables in the model were; gender (coded 0 for female, 1 for male), marital status (coded 0 for single, 1 for married), educational status (coded 0 for literate, 1 for primary school, 2 for middle school, 3 for high school, 4 for associate degree, 5 for university, 6 for graduate), the state of having children (coded 0 for none, 1 for one child). The factors affecting purchasing honey which are price, quality, brand, packing and advertising were also explanatory variables (coded 1 if effective, 0 if not) and health problems such as diabetes (coded 1 for health problem, 0 for healthy consumer).

The model developed to predict factors affecting the probability of honey consumption was as follow.

$$HONYCONS = \alpha + \beta_0 + \beta_1 AGE + \beta_2 GENDER + \beta_3 EDU + \beta_4 MS + \beta_5 MEMBER + \beta_6 CHILD + \beta_7 INCOME + \beta_8 PRICE + \beta_9 QUALITY + \beta_{10} BRAND + \beta_{11} PACKING + \beta_{12} ADVER + \beta_{13} HEALTH + \varepsilon_i$$

Table 2. Description of the variables specified in the model

Kodu	Variable	Mean	Standard Deviation	Minimum	Maximum
Dependent variable (Y)	People consuming honey:1 Not consuming honey:0	0.557	0.497	0.0	1.0
AGE	Age of Consumers (Constantly Variable)	39.922	13.550	18.0	98.0
GENDER	Gender of Consumers Female:0 Male:1	0.561	0.496	0.0	1.0
EDUCATION	Education Status of Consumers No Training: 0 Primary School: 1 Secondary School: 2 High school: 3 Associate degree: 4 University: 5 Graduate: 6	2.927	1.378	0.0	6.0
MARITAL STATUS	Marital Status of Consumers Single:0 Married:1	0.852	0.355	0.0	1.0
MEMBER	Household members (Constantly Variable)	3.901	1.696	1.0	14.0
CHILD	Child Status of Consumers Have:1 Don't Have:0	0.693	0.461	0.0	1.0
INCOME	Annual Income (Constantly Variable)	3.593	1.522	0.5	16.5

Table 2 (Continued)

PRICE	The Effect of Price on Purchasing Honey Effective:1 Noneffective:0	0.618	0.486	0.0	1.0
QUALITY	The Effect of Quality on Purchasing Honey Effective:1 Not effective:0	0.834	0.372	0.0	1.0
BRAND	The Effect of Brand on Purchasing Honey Effective:1 Non effective:0	0.683	0.465	0.0	1.0
PACKAGE	The Effect of Packing on Purchasing Honey Effective:1 Non effective:0	0.588	0.492	0.0	1.0
ADVERTISEMENT	The Effect of Adds on Purchasing Honey Effective:1 Non effective:0	0.365	0.481	0.0	1.0
HEALTH	Having health problems (diabetes, cholesterol, etc.) Have a health problem:1 Do not have a problem: 0	0.234	0.424	0.0	1.0

$1 equals to 5.87 TL and 1 Euro equals to 6.59 TL in June, 2019 (CBRT, 2019)

3. Results and Discussion

General characteristics of the honey consumers

Some demographic characteristics of honey consumers in Turkey are given in Table 3. The average age of consumers is 40, which coincides with the results obtained by Testa *et al*. (2019) who reported that the average age for 49.0% of consumer ranges between 25 and 44 in Italy. Similarly, Schifani *et al*. (2016) found that the age for 79.6% of consumers in Southern Italy were between 25 and 64. The results indicated that 56.12% of honey consumers are male, and 43.88% are female. The average age distribution of honey consumers in Turkey is parallel to the overall age distribution of Turkey as reported in TSI (2019) which shows that 50.16% of individuals living in Turkey are men, and 49.84% are women. The age distribution of honey consumers reported in other countries are also similar to Turkey. For example, the average age of honey consumers in Democratic Republic of Congo was 42 and 75.2% of them was male (Gyau *et al*., 2014).

Most of the honey consumers (32.12%) were high school graduates and followed by primary school graduates (19.12%) and associate degree (18.20%). The education level is a reliable indicator of consumption preferences; therefore, the education level of consumers has been examined and similar results have been reported in the literature. The results of studies carried out in Italy showed that 55.74% of honey consumers are primary and secondary school graduates (Cosmina *et al*., 2016) and 41.9% are high school graduates (Testa *et al*., 2019), which indicate that the level of education among honey consumers in Turkey is similar to that in different countries. The income of a consumer was also assessed as an indicator of purchasing power. Monthly average income of honey consumers is higher

(3,593.50 TL $ 611.97 or €545.49) than that of the monthly minimum wage in Turkey (2,558.40 TL, $ 435.70 or € 388.37) (TURKSTAT, 2019).

Most of the honey consumers (85.17%) were married and 69.31% of them had children. The average number of people in a household was 4. Similar results have been reported by Schifani *et al*. (2016) who determined that 36% of consumers were married and an average number of individuals in a household for honey consumers in Southern Italy was 4. The marital status of honey consumers in Romania (Arvanitoyannis and Krystallis, 2006) and in Eastern Europe (Krystallis *et al*., 2007) were also married. The ratio of honey consumers with children in Vojvodina was reported as 37% (Ćirić *et al*., 2015).

In addition to socio-economic factors, health also is an important factor affecting the consumption of honey. Therefore, the chronic diseases such as diabetes and cholesterol status of honey consumers were determined. Most of the consumers (76.55%) do not have the chronic diseases such as diabetes or cholesterol.

Table 3. Some socio-economic characteristics of consumers

		Frequency	**Percent (%)**	**Mean**
Age				39.92
Gender	Female	1574	43.88	
	Male	2013	56.12	
Education Status	No training	57	1.59	
	Primary School	686	19.12	
	Secondary School	501	13.97	
	High school	1152	32.12	
	Associate degree	653	18.20	
	University	485	13.52	
	Graduate	53	1.48	
Marital Status	Single	532	14.83	
	Married	3055	85.17	
Monthly Average Income of Consumers (Turkish lira, Dollars, Euro)				3.593,50 TL 611.97 $ 545.49 €
Household members				3.90
Child Status	Have	2486	69.31	
	Don't Have	1101	30.69	
Health Status	Have health problem	841	23.45	
	Don't have health problem	2746	76.55	

$1 equals to 5.87 TL and 1 Euro equals to 6.59 TL in June, 2019 (CBRT, 2019)

Factors affecting the honey consumption and purchase

Honey preferences and annual consumption of consumers and unit prices in the market are given in Table 4. The proportion of individuals who consume extracted honey is 44.33%, while 11.37% of them prefer comb honey. Almost half of the population (44.30%) consume less than 0.25 kg honey. The consumers who prefer extracted and comb honey consume an average of 1 kg per year which is in agreement with the annual average honey consumption in Turkey (1.26 kg) reported by FAO (2019). The prices of extracted and comb honey are 28.28 TL/kg ($4.82 or €4.82) and 27.86 TL ($4.74 or €4.23), respectively. Krystallis *et al*. (2007) reported that 48.2% of consumers consume more than 0.5 kg honey per year in in

Eastern European. Guzidy *et al*. (2017) determined that annual honey consumption in Slovakia is 1 kg, and between 0.5 and 2.5 kg in Russia.

Table 4. Honey preference and consumption of consumers

Preference	**Frequency**	**Percent (%)**	**Food supply quantity (kg/capita/year)**	**Unit Price (TL)**
Extracted honey	1590	44.33	1.02	₺28.28 $4.82 €4.29
Comb honey	408	11.37	1.07	₺27.86 $4.74 €4.23
Not prefer to consume honey	1589	44.30	-	-

$1equals to 5.87 TL and 1 Euro equals to 6.59 TL in June, 2019 (CBRT, 2019)

The features that consumers consider when purchasing honey are given in Table 5. The quality is the most important criteria (83.44%) of consumer, follows by the brand (68.30%) and price (61.75%). Similar to our findings Ványi *et al*. (2011) indicated that the quality of honey is the most important criteria of honey consumers in Hungary and the price is the third important criteria purchasing the honey. Guziy *et al*. (2017) stated that the consumers in Slovakia do not care about the packaging of honey, while the package is the most important criteria of honey the consumers in Russia and the price has the least importance in purchasing honey.

Table 5. Some features to consider in honey purchase

	Frequency	**Percent (%)**
Quality	2993	83.44
Brand	2450	68.30
Price	2215	61.75
Package	2110	58.82
Advertisement	1308	36.47

Some socio-demographic characteristics of honey consumers were determined by binary logit analysis (Table 6). The binary logit analysis indicated that the explanatory variables of age, education status, marital status, number of individuals, income, advertisement and health status have significant effects ($p<0.01$) on the explained variable. The relationship between honey preferences and marital status, education, age, gender, occupation, and income levels of consumers in the Democratic Republic of Congo was examined (Gyau et al., 2014). Similarly, Ványi et al. (2011) investigated the relationship between honey consumption in Hungary and age, gender, place of residence, qualifications, net monthly income per person in the family using chi square analysis. Significant relationship was reported between honey consumption in Slovakia and Russia and age, education status, monthly income using chi square analysis (Guziy et al. (2017).

The chi square test indicated that a very significant ($p< 0.0001$) relationship between the dependent variable and the set of independent variables (Table 6). However, the relationship between the dependent and independent variables would be considered as moderate, when we apply the criteria used in this study to the McFadden R^2 (64%).

Honey consumption decreases with the increase in the age of consumers. One-unit increase in the age of a consumer causes 1% decrease honey consumption. The results on relationship between the age of consumers and the honey consumption preference are contradicting with others. The findings of Brščić et al. (2017) and Ványi et al. (2011) who carried studies in Croatia and Hungary were in agreement with our results. The researchers reported significant relationship ($p<0.01$) between honey consumption and the age of consumers. In contrast, Testa et al. (2019) reported proportional positive relationship between the age and honey consumption of consumers in Italy using ordered logistic model. The differences in the relationship between age and honey consumption in Turkey and Italy can be attributed to the differences in the ages of consumers interviewed.

The increase in the education level of consumers increased the probability of preferring honey consumption. One unit of progress in the education level will increase probability of preferring honey 3%. Significant positive relationships were reported between honey consumption and education level of consumers in Croatia (Brščić et al. 2017) and in Democratic Republic of Congo (Gyau et al., 2014). Married people consume 11% more honey compared to the singles. Similarly, the logit model revealed a positive relationship between honey consumption and marital status of consumers in Democratic Republic of Congo (Gyau et al., 2014).

The consumption of honey increased with the increase in the number of individuals living in a household. The results indicated that the probability of preferring honey is expected to increase by 2% with the increase in number of individuals living in a household. The results of ordinal regression analysis indicated a positive relationship between honey consumption in Albania and the number of individuals in a household (Thoma et al., 2018).

The increase in income of consumers increases the possibility of preferring honey. One-unit increase in the income of consumers increases the probability of preferring honey by 2%. The positive relationship between honey consumption and income of consumers complies with the economic rules. Positive relationship between income and honey consumption assessed by different econometric models have been reported by Testa et al. (2019) in Italy, Schifani et al. (2016) in Southern Italy, and Ványi et al. (2011) in Hungary. The advertisements through written and visual media have a positive effect on preferring the honey consumption. The honey consumption preference of those who believe in the effect of advertisements is 11% more than those who do not believe in the effect of advertisement. Positive effect of advertisement on honey consumption has also been reported by Zorbas et al. (2020). Similarly, Wu et al. (2015) emphasized the importance of advertisement on the preference of USA local honey.

Many people prefer honey consumption due to health issues (Sacchi et al., 2017). However, the results indicated that healthy people prefer to consume 14% more honey compared to the people who have a health problem. There are many studies reporting a relationship between honey consumption and honey quality (Brščić et al., 2017; Kowalczuk et al., 2017). Several studies indicated that that honey is a protective and therapeutic food against many diseases (Alvarez-Suarez et al., 2012; Romero-Silva et al., 2011). The importance of health issues in honey consumption has been reported by Guziy et al. (2017) and Thomé et al. (2016). The results of this study revealed a relationship between honey consumption and income and age. Previous studies indicated an increase in honey consumption with the age (Pocol, 2011; Pocol and Teselios, 2012). Kearney et al. (2000) reported that women and individuals with a high level of education consume more honey.

Table 6. The results of binary logit analysis

	Coefficient	Standard Error	z	Prob. $\|z\|>Z^*$	Partial Effect
Constant	-0.974***	0.234	-4.16	0.000	
AGE	-0.013***	0.003	-3.96	0.000	-0.003***
GENDER	-0.051	0.071	-0.71	0.476	-0.012
EDUCATION	0.140***	0.029	4.78	0.000	0.033***
MARITAL STATUS	0.450***	0.107	4.21	0.000	0.106***
MEMBER	0.079***	0.022	3.56	0.000	0.018***
CHILD	0.076	0.099	0.77	0.443	0.018
INCOME	0.065***	0.024	2.65	0.008	0.015***
PRICE	-0.037	0.095	-0.39	0.695	-0.009
QUALITY	0.085	0.103	0.82	0.410	0.020
BRAND	0.090	0.085	1.06	0.287	0.021
PACKAGE	0.032	0.085	0.38	0.705	0.007
ADVERTISEMENT	0.452***	0.102	4.42	0.000	0.105***
HEALTH	0.622***	0.088	7.07	0.000	0.142***
***, **, * ==> Significance at 1%, 5%, 10% level					
Log likelihood function: -2353.751, Restricted log likelihood: -2462.950 Chi squared [13] (P= .000): 218.398, Significance level:0.000, McFadden Pseudo R-squared: 0.644					

4. Conclusion

The relationship between honey consumption and some socio-demographic characteristics affecting honey consumption in Turkey has been examined. The results revealed that consumers in Turkey are mostly composed of young, more than half of the consumers are male and married. The consumers in Turkey mostly prefer extracted honey, and the effect price on honey consumption comes after the quality and brand. The results indicated that safety and health are more important factors in honey consumption of consumers compared to the price.

The effects of socio-demographic factors on honey consumption were also assessed using binary logit analysis. Elderly consumers are expected to prefer consuming honey more than young people. The results could be attributed to the daily hustle and bustle of the tasty breakfast reducing honey consumption, and the majority of the interviewed consumers were working people. The increase in preference of honey consumption with the increase in educational level of consumers revealed that conscious consumption is related to education. Honey consumption is expected to increase with the increase in the income of consumers Written social media has significant effect on honey consumption; therefore, the attractiveness of honey produced by the companies can be increased with appropriate advertisement. Healthier and safer production of honey products will contribute to increasing profit margins of producers.

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