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ARAŞTIRMA MAKALESİ **RESEARCH ARTICLE**

Has Household Purchasing of Confectionery Products in Turkey Changed in the Last Decade?

Türkiye'de Son On Yılda Şekerleme Ürünleri Satın Alımı Değişti Mi?

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Abstract

Although consumption of confectionery and chocolate products per capita in Turkey is considerably lower than that of the developed counties, there has recently been a rising trend in sugar consumption. The purpose of this study was to identify how and to what extent the significant changes in socio-demographic and economic structures of households in Turkey during the period of 2002-2013 influence monthly real spending on sugar, jam-marmalade, and confectionery products. The data was obtained by the annual household budget surveys of the Turkish Statistical Institute (TURKSTAT) between 2002 and 2013. These surveys are annually conducted by TURKSTAT with nearly varying ten thousand randomly selected households throughout the nation for the period between January 1 and December 31. A multivariate Tobit model was used to determine factors affecting Turkish monthly household expenditure on three foods. Cross correlation coefficients among food pairs and marginal impacts of exogenous variables were also estimated. Almost 79% of households spend on confectionery foods, followed by 73% on sugar products and low 20% on jam-marmalade foods. According to results compared to the 2002 reference year, spending on sugar and jam-like food has declined over the years, while more spending on confectionery was emerging. Over the course of twelve years period, the sample households monthly spend 13.84, 3.73 and ₺ 12.91 on sugar, jam-marmalade and confectionery foods, respectively. The correlation coefficients among the food items were all positive and statistically significant, indicating that after controlling the role of independent variables in our model, uncontrolled variables along with measurement errors and any other functional forms induce both the spending on the two food pairs. Impacts of many socio-demographic and economic factors on monthly household spending of confectionery products including sugar were identified, and also years' impacts on spending patterns were confirmed. By years, the age variable had different effects on the food spending of the three categories. Nonetheless, it has been identified that the families whose household heads have a green card spend different amounts both for sugar and confectionery products annually. It has also been identified that while only confectionery food product spending of the families who receive in-kind and financial aids differs annually, all three categories of food spending differ significantly as the numbers of working individuals changes yearly. Results permitted us to draw relevant policy implications and to shape policy formation for future effective food programs or policies.

Keywords: Confectioneries, Household spending, Multivariate Tobit model, Turkey

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Özet

Türkiye'de kişi başına şekerleme ve çikolata ürünleri tüketimi gelişmiş ülkelerden önemli ölçüde düşük olmasına rağmen, son zamanlarda şeker tüketiminde artış eğilimi görülmektedir. Çalışmanın amacı, 2002-2013 döneminde Türkiye'deki hane halklarının sosyo-demografik ve ekonomik yapılarındaki değişikliklerin şeker, reçel marmelatı ve şekerleme ürünlerinin aylık harcamalarına etkisinin ortaya konulmasıdır. Araştırmanın verileri, Türkiye İstatistik Kurumu (TÜİK) tarafından 2002-2013 yılları arasında gerçekleştirilen yıllık hanehalkı bütçe anketlerinden elde edilmiştir. TÜİK, 1 Ocak-31 Aralık tarihleri arasında yaklaşık on bin hane halkı ile anketleri yapmıştır. Türkiye'deki hane halklarının 3 ürüne yönelik aylık harcamalarını etkileyen faktörlerin ortaya konulmasında, çok değişkenli Tobit modeli kullanılmıştır. Bununla birlikte, gıdalar arasındaki çapraz korelasyon katsayıları ve egzojen değişkenlerin marjinal etkileri de tahmin edilmiştir. Hanelerin yaklaşık %79'u şekerleme gıdalarına, %73'ü şeker ürünlerine ve %20'si reçel marmelat gıdalarına harcama yapmaktadır. İkibiniki referans yılı ile karşılaştırılan sonuçlara göre, dönem içinde hane halklarının harcamaları şeker ve reçel benzeri yiyeceklerde azalırken, şekerleme ürünlerinde artmıştır. On iki yıllık süre boyunca örneklemdeki tüm hanelerin aylık şeker, reçel-marmelat ve şekerleme harcamaları sırasıyla 13.84, 3.73 ve 12.91 ₺ olarak gerçekleşmiştir. Gıda maddeleri arasındaki korelasyon katsayılarının hepsi, pozitif ve istatistiksel olarak anlam bulunması, modelde ele alınan bağımsız değişkenlerin kontrol dışı değişkenler ve ölçüm hatalarıyla birlikte şeker ve şekerleme ürünlerin harcamalarına etkisinin olduğunu göstermektedir. Birçok sosyo-demografik ve ekonomik faktörün hane halklarının şeker ve şekerleme ürünleri aylık ve yıllık harcamalarına etkileri bulunmaktadır. Yaş değişkeninin üç kategoride de yıllara göre gıda harcamaları üzerinde etkileri farklılaşmaktadır. Bununla birlikte, hanehalkı reisinden yeşil karta sahip olan ailelerin her yıl hem şeker, hem de şekerleme ürünleri için farklı miktarlarda para harcandığı tespit edilmiştir. Ayrıca, ayni ve nakdi yardım alan ailelerin sadece şekerleme gıda ürünü harcamaları her yıl farklılaşmasına rağmen, çalışanların sayısının her yıl değişmesi, üç kategoride de gıda harcamalarını önemli ölçüde değiştirmektedir. Araştırma sonuçlarının etkili gıda programları veya politikalarının oluşturulmasına katkısı olabilecektir. .

Anahtar Kelimeler: Şekerlemeler, Hane halkı harcamaları, Çok Değişkenli Tobit modeli, Türkiye

1. Introduction

Sugar is a strategic food product produced and consumed in almost every part of the world. The total annual production of sugar in the world is approximately 170 million tons. While almost 70% of the production is consumed where it is produced, 30% of the production flows into international markets. Approximately 80% of the total raw sugar production is obtained from sugar cane, while 20% is obtained from sugar beets (Anonymous, 2016a). While countries such as Turkey, Russia, Ukraine and the European Union (EU) produce sugar from sugar beets, countries such as Brazil, India, Mexico, Pakistan, Thailand and Australia manufacture it from sugar cane. On the other hand, countries such as the USA, Japan and China produce sugar from both sugar cane and sugar beets (Anonymous, 2016b).

Approximately 90% of sugar produced each year is consumed throughout the world. While the world's total sugar consumption was 155 million tons in 2010, the consumption increased to 178 million tons in 2014. The major consumer countries of sugar in the world are India, the EU, China and Brazil respectively whose consumptions exceed more than 40% of the world production. For example, in 2014, 15.8% of the total production was consumed by India; 10.8% by EU; 10.2% by China; and 6.7% by Brazil. Brazil had the highest level of sugar consumption per capita with 57 kg, whilst China had the lowest with 11 kg.

On the other hand, the sugar consumption per capita in Turkey was 25 kg in 2013 (Anonymous, 2016b). Historically per capita sugar consumption reached an all-time of 30.1 kg in 1997 and an all-time low of 6.10 kg in 1961. When compared to the country's neighboring countries, per capita sugar consumption in Bulgaria amounted to 23.50 kg, 22.60 kg in Greece, 16.50 kg in Iraq, and 26.20 kg in Iran in 2013. In terms of per capita sugar consumption, Turkey has been ranked 61st within the group of 160 nations, 31 places above the position since 10 years ago (Anonymous, 2017a). On the other hand, it is estimated that per capita sugar consumption in Turkey will amount to 40.5 kg by 2024 with an increase of 1.47 per cent per year (Anonymous, 2015). This is because the recent economic growth and political stability in Turkey has enabled nationwide rapid development. The Turkish economy has grown by approximately 4.8% during the period of 2002-2015. While many countries have been struggling against economic crises, Turkey has distinguished herself among developing countries due to her incredible growth performance. This trend overlaps with the fact that per capita income increase achieved by the economic growth in Turkey is expected to boost the demand primarily for sugar and confectionery products.

According to the World Health Organization (WHO)' sugar guideline (2015), adults should limit their daily sugar intake to less than 10% of their total energy intake, which is almost equivalent to 2.5 tea spoons of sugar. WHO also recommends that the daily sugar intake for adults and children should be lower than 5% of the total daily energy intake. Although consumption of confectionery and chocolate products per capita in Turkey is considerably lower than that of the developed counties, there has recently been a rising trend in sugar consumption. Being a country with a young and fast growing population and their boosting demand for toys, developments in distribution channels and new products, heavy commercialization (advertisements), and growing multinational investments across the nation, the country is expected to have regular increases in the dynamic demand for sugar and chocolate confectionery products in the coming years (Anonymous, 2016c). For example, in Turkey, chocolate confectionery is worth about US $ 500 million a year and consists of four different categories: tablets, sticks, wafers and pralines (Anonymous, (2017b). Studies have reported that the annual consumption of chocolate per person in Turkey is still low at just 1 kg compared to 8 kg in the UK and 9 kg in Germany and the Netherlands (Anonymous, 2016c). Thus, manufacturers should diversify the number of existing products and boost the demand especially for confectionery products in the country. On the other hand, the chocolate confectionery market has a volume of 75 tons per year in the country, whilst chocolate coated products (rods and wafers) account for 70% of the market (Anonymous, 2017b). It is worth mentioning the country is a net exporter in terms of confectionery products. The export value of sugar and chocolate confectionery is worth US $ 762.8 million in 2011, which is equivalent to about 0.57% of the country's total export value (US $ 135 billion) (Anonymous, 2016c). On the other hand, sugar confectionery has a great historical heritage in Turkish tradition, being widely served as gifts during the famous two religious festivals (Ramadan and Sacrifice Feast), wedding ceremonies, celebrations, and at home invitations and friends visits. This traditional popularity is a distinguishing feature that sets apart the country from the rest of the world in terms of the confectionery industry.

As is compatible with other developing countries, food consumption patterns and their compositions in Turkey have undergone a major change due to changes in other socio-economic and food structures accompanied by the recent per capita increased income, rapid growing population and technological advancements (Terin et al., 2015; Akbay et al., 2007; Gül et al., 2007; Tekgüç, 2012; Bilgic and Yen, 2013; 2014). At the same time, it would be a great proposition to examine the consumption habits of households, the mass target of the sugar and confectionery industry, which, as we have noted above, have a great economic value for the country, but less understood among national consumers compared to their western peers in terms of per capita consumption of confectioneries. Therefore, identifying how the changes in Turkish households' socio-demographic and economic structures during the period 2002-2013 affected monthly real spending on sugar and confectionery products is essential to revealing the influential factors in making predictions and addressing the future needs when they arise. While consumer choices and preferences are becoming increasingly important in shaping food consumption, socio-demographic and economic characteristics of consumers should also be included in the analyses. Micro data at household level is used in such analyses (Burton et al., 1996).

The purpose of this study is thus to identify how and to what extent the significant changes in socio-demographic and economic structures of households in Turkey during the period 2002-2013 influence monthly real spending on sugar and confectionery products. In this study, we used a 12-year pool data[1] regarding Turkish households' spending on sugar and confectionery products along with their socio-demographic and economic characteristics. Many time-trending exogenous variables (e.g., households' real income, age and education levels of householders, the number of working family member, the use of Internet, in-kind and cash aids to poorer, and etc.) interacted with years are also included in the analysis in order to see how changes of some key socio-demographic and economic variables over time determine the monthly spending of sugar and confectionery products in Turkey. The multivariate Tobit model is used to estimate influential factors which determine the spending levels, and their marginal effects on the households spending on sugar and confectionery products were then derived. To our knowledge, this study is first of its kind which applies to households spending on sugar and confectionery products with a very large exogenous variable set of households and householders. The findings of the study can be useful for the sugar and confectionery industry sectors and decision makers in the related public institutions towards making more efficient predictions, policies and strategic planning.

In the following parts, materials and multivariate Tobit model are specified. Findings are presented in the fourth section. Discussions and conclusions were given in Section 5 and 6, respectively.

2. Materials and Methods

2.1. Materials

The data was obtained by the annual Household Budget Surveys of the TURKSTAT between 2002 and 2013. These surveys are annually conducted by TURKSTAT with nearly varying ten thousand randomly selected households throughout the nation for the period between January 1 and December 31.

TURKSTAT classifies these annual data in three categories as household, family member and spending. The data in these three categories involve the socio-demographic and economic characteristics of households and family members' (particularly head of the family) spending on products. These data were combined by us in compliance with the SAS statistical program. Afterwards, these three categories were then combined into an annual data and then the pool data were formed by combining 12 years data. Dummy variables were then created for the respective years. The food items including the spending on sugar and confectionery products were then divided into three sub-categories as sugar, jam-marmalade and confectionery (e.g., cholates, edible ice and ice creams, confectionery and confectionery products) products according to the food classification of TURKSTAT. All monetary variables such as monthly income, monthly total and food spending of the families were converted into real terms taking 2013 as reference year. The Consumer Price Index (CPI) of 2013 was divided by the CPI of other corresponding years and multiplied by the spending amount or income level of the relevant year. After removing the missing observations and outliers in the data, the remaining 124,814 observations of the twelve years were

[1] We used pool data in this study because households (e.g., approximately an average of 10 thousand households per year) randomly selected by the TURKSTAT vary from year to year and thus it impedes the use of a panel data modelling in our analysis.

utilized in the study. The descriptive statistical values of the data were shown in Table 1. Over the course of twelve years period, the sample households monthly spend 13.84, 3.73 and ₺ 12.91 on sugar, jam-marmalade and confectionery foods, respectively. Almost 79% of households spend on confectionery foods, followed by 73% on sugar products and low 20% on jam-marmalade foods. Marmalade in the country is usually served at breakfast time and the majority of families might have preferred animal based products such as honey, cheese, eggs, olive, and pastry foods instead of jam-marmalade foods leading to monthly low rate and spending levels.

Table 1. Descriptive statistics for the variables

Variables	Definition	Mean	Std. Dev.
Dependent Variables			
Sugar	Monthly real expenditures on sugar among all households (₺ per month)	13.839	22.695
	Percentage of households who spend on sugar (%)	73.2	
Jam-Marmalade	Monthly real expenditures on jam-marmalade among all households (₺ per month)	3.729	13.144
	Percentage of households who spend on jam-marmalade products (%)	20.3	
Confectioneries	Monthly real expenditures on confectionery products among all households (₺ per month)	12.908	18.887
	Percentage of households who spend on confectionery products (%)	79.2	
Independent Variables			
Age	Household head's age (year)	46.511	12.553
Gender	1 if the householder is male, 0 otherwise	0.888	0.316
CmpIns	1 if the householder has a compulsory health insurance, 0 otherwise	0.736	0.441
GrnCrd	1 if the household head receives health support from the government, 0 otherwise	0.104	0.306
Maritsatat	1 if the householder is married, 0 otherwise	0.879	0.326
Employed	1 if the householder currently is employed, 0 otherwise	0.706	0.456
IncAid	1 if the family receives cash and/or in-kind aid from the government, 0 otherwise	0.100	0.300
Workngp	Number of working people in a family	1.115	0.812
PrvtHouse	1 if the family resides in a private house, 0 otherwise	0.391	0.488
Apartment	1 if the family lives in an apartment, 0 otherwise	0.517	0.500
Homowner	1 if the family owns in his residing house, 0 otherwise	0.659	0.474
Renters	1 if the family lives in a rented house, 0 otherwise	0.245	0.430
Urban	1 if the family lives in urban, 0 otherwise	0.683	0.465
Internet	1 if the family has an access to Internet at home, 0 otherwise	0.171	0.377
Fmlytyp1	1 if a couple is only with one kid, 0 otherwise	0.182	0.386
Fmlytyp2	1 if a couple is only with two kids, 0 otherwise	0.225	0.418
Fmlytyp3	1 if a couple is only with three kids, 0 otherwise	0.175	0.380
Fmlytyp4	1 if a couple is without kids, 0 otherwise	0.137	0.344
Fmlytyp5	1 if a couple is more than three kids, 0 otherwise	0.174	0.379
Kids0-5	Number of kids aged between 0-5 years	0.395	0.693
Kids6-14	Number of kids aged between 6-14 years	0.727	1.018
Kids15-19	Number of kids aged between 15-19 years	0.375	0.676
Adultnmb	Number of adults who aged more than 19 years in a family	1.498	1.059
Educn	Householder education levels in years	6.820	4.189
Income	Family real monthly income (₺ 1000)	2.258	1.776
# of obs.	Number of observations	124,650	

The average amounts of household spending for sugar and confectionery products in Turkey during the period of 2002-2013 were shown in Table 2. Although the real spending for all three products remained stable during these years for the low-income families (LIFs), coefficient of variations of their monthly real spending for each food item within a year varies by more than 100% as compared to their own average amounts of spending. Therefore, there is a high

level of spending variability within a year even in the LIFs. On the other hand, while there is a considerable variability in the coefficient of variation for sugar and marmalade spending among the LIFs, there is a relatively similar level of variability in confectionery product spending. Besides, especially during the periods of world food crises (2003, 2006 and 2008), the variabilities in annual spending among poor households are more apparent than volatilities of other years, while food spending averages decreased substantially. Consequently, world food crises, as expected, initially influenced the LIFs, and unless such families are financially supported on time, they may suffer from serious problems regarding balanced nutrition, education of children, healthcare access etc. Moreover, pregnant women in poor families may suffer problems like stillbirth, mental disorder and unproductivity at work.

When we examine the annual variability between the LIFs and high-income families (HIFs) shown in Table 2, it can be observed that there is a vast difference between the two groups in terms of income due to the alteration of coefficient variations by less than 100%, while the annual real spending excluding the crisis periods are close to each other. The variability in the coefficient of variations for such food spending particularly in the HIFs diminishes with time. When we examine the monthly average real spending of households in Turkey for sugar and confectionery products, it is understood that there had been some sharp fluctuations in the monthly average real spending by the LIFs for sugar until 2007, and after this year it became stable with other food products. A similar fluctuation can be observed in confectionery products, though not very sharp. There have been relatively less fluctuations in jam and marmalade; and increases in the spending on these products in recent years, their real spending amounts have caught up with that of sugar. There were sharp fluctuations also in the spending of the LIFs before 2007. In recent years, these fluctuations have become stable for all groups due to the increase in spending of confectionery products. Although a decrease was observed in the annual real average jam and marmalade spending by HIFs, it was discovered that this average value was above sugar spending. Consequently, while HIFs spend more on jam and marmalade products as expected, the LIFs are clingier with sugar products.

2.2. Econometric method

In this study, the multivariate Tobit model was applied for estimating factors and their unitary (marginal) impacts on household expenditures on sugar and confectionery products. The monthly sugar and confectionery spending amounts of the households were divided into three sub-categories as sugar, jam-marmalade and confectionery products (chocolates, ice-creams and others). We work the system of censored equations as (Eq.1):

$$q_i = \max\left(0, x'\beta_i + \varepsilon_i\right),\ i = 1,2,3 \qquad \text{(Eq.1)}$$

Where i refers to food category, β_i are the predicted parameter vectors, and $\left(\varepsilon_1, \varepsilon_2, \varepsilon_3\right)$ are the residual terms distributed as trivariate normal with zero means, standard deviations $\left(\sigma_1, \sigma_2, \sigma_3\right)$, correlation matrix $R = \left[\rho_{ij}\right]$ and probability density function (pdf) $f\left(\varepsilon_1, \varepsilon_2, \varepsilon_3\right)$. Let $z_i = \dfrac{\left(y_i - x'\beta_i\right)}{\sigma_i}, i = 1,2,3$, the k-variate standard normal function (pdf) as ϕ_k and cumulative density function (cdf) as Φ_k if the likelihood function is to be defined (Tan et al. 2009). When the spending on all three products is positive and zeros, the likelihood contributions are the trivariate normal pdf $L_c = \sigma_1^{-1}\sigma_2^{-1}\sigma_3^{-1}\phi_3\left(z_1, z_2, z_3; R\right)$ and the trivariate normal cdf $L_c = \Phi_3\left(\dfrac{x'\beta_1}{\sigma_1}, \dfrac{x'\beta_2}{\sigma_2}, \dfrac{x'\beta_3}{\sigma_3}; R\right)$, respectively. When one of the three spending is zeros (e.g., $y_1 = 0, y_2 > 0, y_3 > 0$), the likelihood contribution is:

$$L_c = \sigma_2^{-1}\sigma_3^{-1}\phi_2\left(z_2, z_3; \rho_{23}\right)\Phi_1\left[\frac{z_1 - w_2 z_2 - w_3 z_3}{\left(1 - w_2\rho_{21} - w_3\rho_{31}\right)^{1/2}}\right] \qquad \text{(Eq.2)}$$

where $w_2 = \left(\rho_{12} - \rho_{13}\rho_{23}\right) / \left(1 - \rho_{23}^2\right)$ and $w_3 = \left(\rho_{13} - \rho_{12}\rho_{23}\right) / \left(1 - \rho_{23}^2\right)$. Lastly, when two of three spending of products are zeros (e.g., $y_1 = 0, y_2 = 0, y_3 > 0$), the likelihood contribution is:

$$L_c = \sigma_3^{-1}\phi_1\left(z_3\right)\Phi_2\left(\frac{z_1 - \rho_{13}z_3}{\left(1-\rho_{13}^2\right)^{1/2}}, \frac{z_2 - \rho_{23}z_3}{\left(1-\rho_{23}^2\right)^{1/2}}; \frac{\rho_{12} - \rho_{13}\rho_{23}}{\left(1-\rho_{13}^2\right)^{1/2}\left(1-\rho_{23}^2\right)^{1/2}}\right) \quad \text{(Eq.3)}$$

The likelihood contributions for other observations with one and two-zeros are based on equations (2) and (3), respectively, by rearranging the spending of the products so that the zeros come first (Tan et al., 2009). After obtaining estimates of the system, the unitary (marginal) effects of each exogenous variable on the conditional mean function of each spending is as follows:

$$\frac{\partial y_i}{\partial x_{ik}} = \frac{\partial\left(E\left(y_i \mid y_i^* > 0\right)\right)}{\partial x_{ik}} \quad \text{(Eq.4)}$$

Where $E\left(y_i \mid y_i^* > 0\right) = X\beta_i + \sigma_i \frac{\phi\left(X\beta_i\right)}{\Phi\left(X\beta_i\right)}$ with suppressing j observations is the expected conditional mean spending of food product belonging to each sub-category i. The hypothesis which suggests that all pair cross correlation coefficients (e.g., in total three correlation coefficients) among the product pairs in the food categories are zero will be tested using the Wald statistical test. The zero hypotheses which suggest that there is no difference among the year variables for each food product will also be simultaneously determined using the same test. Similarly, the hypothesis states that the interaction of years with some key independent variables is zero, which will also be tested using the same test.

Table 2. The descriptive statistics on the real sugar, jam-marmalade, and confectionery food spending of Turkish families during the period 2002-2013.

Years	Sugar						Jam and Marmalades						Confectionery Products					
	LIF[a]		HIF[b]		OAF[c]		LIF		HIF		OAF		LIF		HIF		OAF	
	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.	Mean (Std.dev)	Var. Coef.
2002	24.04 (28.14)	117.06	24.36 (35.03)	143.80	25.38 (30.80)	121.36	14.93 (17.61)	117.97	23.85 (35.59)	149.22	19.67 (29.08)	147.81	10.97 (16.73)	152.55	27.50 (29.62)	107.69	16.72 (21.42)	128.10
2003	17.65 (27.42)	155.32	17.04 (28.54)	167.48	17.39 (27.34)	157.23	14.66 (17.07)	116.39	19.26 ()35.10	182.27	16.59 (23.94)	144.23	7.01 (10.84)	154.58	12.53 (15.71)	125.39	8.84 (12.53)	141.76
2004	18.51 (26.23)	141.70	14.62 (23.68)	161.92	16.80 (25.35)	150.88	14.76 (21.37)	144.85	20.57 (32.75)	159.18	17.26 (25.91)	150.05	7.14 (10.43)	145.96	11.90 (12.59)	105.85	9.09 (12.21)	134.41
2005	31.05 (33.77)	108.76	26.40 (35.91)	136.01	28.25 (33.95)	120.20	17.10 (23.48)	137.30	26.64 (41.96)	157.49	22.28 (33.29)	149.45	14.60 (18.52)	126.80	30.92 (31.15)	100.73	20.66 (23.45)	113.49
2006	14.68 (22.87)	155.78	12.00 (19.82)	165.12	12.92 (19.97)	154.53	12.45 (13.33)	107.12	17.14 (26.29)	153.41	14.68 (19.77)	134.71	8.02 (9.98)	124.40	12.02 (13.76)	114.50	9.72 (11.91)	122.43
2007	22.45 (24.30)	108.27	18.77 (23.33)	124.32	20.65 (23.87)	115.59	13.10 (12.82)	97.83	22.29 (36.87)	165.42	17.37 (26.72)	153.83	12.98 (14.65)	112.84	27.75 (27.69)	99.79	19.19 (20.84)	108.64
2008	21.90 (26.92)	122.92	19.35 (25.13)	129.89	19.92 (23.75)	119.21	16.44 (24.32)	147.92	29.31 (60.98)	208.05	22.46 (40.40)	179.90	13.51 (17.19)	127.27	30.46 (29.50)	96.86	20.71 (22.92)	110.69
2009	22.71 (26.08)	114.86	19.14 (23.20)	121.22	20.98 (25.80)	122.98	17.01 (22.42)	131.81	27.25 (74.86)	274.69	21.35 (44.38)	207.85	14.68 (18.41)	125.44	31.19 (32.65)	104.67	20.56 (24.10)	117.21
2010	20.13 (25.62)	127.30	17.11 (29.68)	173.51	18.50 (24.37)	131.72	13.79 (18.79)	136.31	27.00 (65.41)	242.25	20.33 (38.40)	188.84	13.10 (15.91)	121.44	28.78 (28.56)	99.25	19.56 (23.29)	119.08
2011	19.57 (22.30)	113.96	16.98 (22.51)	132.56	17.50 (21.57)	123.22	17.53 (25.09)	143.08	25.37 (39.56)	155.95	20.50 (30.78)	150.17	12.86 (15.96)	124.12	29.09 (30.10)	103.48	19.81 (22.69)	114.51
2012	17.79 (22.19)	124.74	15.12 (20.27)	134.07	16.69 (20.97)	125.63	17.58 (26.87)	152.80	25.31 (41.88)	165.50	21.19 (36.06)	170.18	13.77 (17.19)	124.80	30.48 (30.73)	100.84	20.81 (23.69)	113.89
2013	18.41 (25.03)	135.94	16.01 (20.77)	129.73	17.16 (22.82)	133.05	17.14 (28.31)	165.17	22.23 (34.02)	153.04	19.42 (30.16)	155.31	13.56 (17.62)	129.95	29.85 (30.48)	102.12	20.85 (23.48)	112.58

Note: [a, b and c] indicate the Low-Income Families, High-Income Families and Overall Families, respectively.

3. Results and Discussion

The Wald test results regarding sugar, jam-marmalade, and confectionery food spending was given in Table 3. The hypothesis that all of the correlation coefficients are equal to zero is rejected with a large level of statistical significance (Wald statistic = 6637, df = 3, $p < 0.0001$), indicating that these three products must be solved simultaneously within a system rather than a univariate Tobit model. The signs of the correlation coefficients between all pairs of expenditures are positive, showing that after controlling the independent variables in the system, the uncontrolled variables including measurement errors or other types of functional form errors that increase one of the categories of food spending will likely increase the other food expenditure, or vice versa. Consequently, there is a positive relationship between uncontrolled factors of the two expenditures in question. The combined effects of the years other than the reference year (2002) on spending of all three products are identified different from zero at least for one year (Wald statistic = 25.79, df = 11, $p < 0.007$), indicating that the mean expenditures differ statistically significantly across years[2]. Results of Wald tests for some key independent variables interacted with years.

Table 3. The Wald Test Results Regarding Sugar, Jam-Marmalade, and Confectionery Food Spending

Hypothesis				Statistics value	Pr > ChiSq
Sugar					
H_0: β for Year 2003	= … =	β for Year 2013	= 0	25.79	0.007
H_0: β for Age 2003	= … =	β for Age 2013	= 0	175.44	<.0001
H_0: β for GrnCrd 2003	= … =	β for GrnCrd 2013	= 0	18.65	0.0676
H_0: β for IncAid 2003	= … =	β for IncAid 2013	= 0	12.06	0.3589
H_0: β for Workngp 2003	= ... =	β for Workngp 2013	= 0	32.41	0.0007
H_0: β for Internet 2003	= … =	β for Internet 2013	= 0	8.88	0.6333
H_0: β for Educn 2003	= … =	β for Educn 2013	= 0	55.14	<.0001
H_0: β for Income 2003	= ... =	β for Income 2013	= 0	273.9	<.0001
Jam and marmalade					
H_0: β for Year 2003	= … =	β for Year 2013	= 0	9.13	0.6099
H_0: β for Age 2003	= … =	β for Age 2013	= 0	108.8	<.0001
H_0: β for GrnCrd 2003	= … =	β for GrnCrd 2013	= 0	9.82	0.5466
H_0: β for IncAid 2003	= … =	β for IncAid 2013	= 0	8.13	0.7018
H_0: β for Workngp 2003	= ... =	β for Workngp 2013	= 0	21.12	0.0322
H_0: β for Internet 2003	= … =	β for Internet 2013	= 0	8.06	0.708
H_0: β for Educn 2003	= … =	β for Educn 2013	= 0	127	<.0001
H_0: β for Income 2003	= ... =	β for Income 2013	= 0	169.35	<.0001
Confectionery products					
H_0: β for Year 2003	= … =	β for Year 2013	= 0	25.71	0.0072
H_0: β for Age 2003	= … =	β for Age 2013	= 0	336.97	<.0001
H_0: β for GrnCrd 2003	= … =	β for GrnCrd 2013	= 0	35.06	0.0002
H_0: β for IncAid 2003	= … =	β for IncAid 2013	= 0	22.09	0.0237
H_0: β for Workngp 2003	= ... =	β for Workngp 2013	= 0	24.41	0.0111
H_0: β for Internet 2003	= … =	β for Internet 2013	= 0	31.93	0.0008
H_0: β for Educn 2003	= … =	β for Educn 2013	= 0	85.99	<.0001
H_0: β for Income 2003	= ... =	β for Income 2013	= 0	772.08	<.0001
H_0: rho_{12}	=… =	$rho_{(n-1)n}$	= 0	6637	<.0001

Table 4 shows the parameter estimates of the multivariate Tobit model and marginal effects of exogenous variables on the expected conditional mean spending for each product in question. Results show that all the pair cross-correlation coefficients among the spending amounts on sugar, jam-marmalade and confectionery products were found to be statistically significant.

[2] Although this result implies that the data of each year must be analyzed separately within a system, the presentation and interpretation of the twelve years times three variables (estimates and their marginal impacts of 36 equations) are impossible and therefore we remain with the pooled data.

According to results compared to the 2002 reference year, spending on sugar and jam-like food has declined over the years, while more spending on confectionery is emerging.

By years, the age variable had different effects on the food spending of the three categories. Nonetheless, it has been identified that the families whose household heads have a green card spend different amounts both for sugar and confectionery products annually. It has also been identified that while only confectionery food product spending of the families who receive in-kind and financial aids differs annually, all three categories of food spending differ significantly as the numbers of working individuals changes yearly. The usage levels of the Internet annually contributed a significant difference on only confectionery food spending. However, changing the mean education levels of household heads by years resulted in different household spending for all staple foods. Similarly, changing the mean real income levels of households by years had different significant effects on household's monthly spending levels for the three food categories. All the results above indicate that yearly effects of different variables on the conditional mean expenditures of each food item are identified with varying impacts. For example, the change in the mean of exogenous variables of household heads over time had different impacts on all three food spending categories.

The effects of only statistically significant exogenous variables on the conditional mean equations of the households' food expenditures for the three products were given, because the study includes very vast subjects related to each food item. Taking 2002 as the reference year, the households' monthly spending on sugar and jam-marmalade decreased, whilst confectionery product spending increased. For instance, according to the reference year 2002, the monthly households sugar spending in 2004 and 2012 increased by 6.65 and ₺ 5.05, respectively, whilst the jam-marmalade spending decreased by 0.69 and ₺ 0.43. On the other hand, confectionery product spending of the households in 2007 and 2012 increased by 2.42 and ₺ 4.74, respectively. There had been similar developments in other countries. Thus, there was a consistent and substantial decline in the total refined or added sugar consumption in Australia and a modest reduction in refined sugar intake in the UK (Anonymous, 2003). However, these trends contrast with a sizeable increase in the intake of nutritive sweeteners in the USA (Anonymous, 2003; Chun et al., 2010) or sugar (sucrose) intake in China, India and South Asia (Ismail et al., 1997). Added sugars are considered an important factor in the obesity crisis, and it is advised that strict guidelines be taken for added sugar intake (Johnson et al., 2009).

The results revealed that many socio-demographic and economic factors of households and heads of households affected on household spending on the sugar and confectionery products. However, Rumm-Kreuter (2001) stressed also that dietary patterns in Mediterranean countries changed rapidly, and this could have been caused by the socio-economic changes in Europe over the past years (Tur et al., 2004). Despite that, Honkala et al. (2012) found that socio-demographics and economics factors were only weakly associated with the consumption of sugar-rich products.

As household heads got one year older, the monthly households spending on sugar increased by ₺ 0.04, while, on the other hand, the monthly households' spending on jam-marmalade and confectionery products decreased by 0.09 and ₺ 0.04, respectively. While the aging of household heads by years generally had positive impacts on the monthly sugar and jam-marmalade spending taking 2002 as the reference year, it had a negative impact on the expenditures of confectionery products. For example, compared to 2002, the age of the head of household increased the families' monthly sugar and jam-marmalade spending in 2005 and 2013, but decreased the monthly households spending on confectionery products. Average life expectancy in Turkey has increased recently, and this may increase households' spending on sugar and marmalade and decrease spending on confectionery products. The confectionery sector should take these developments into account in their business planning.

While the monthly household sugar spending increased by ₺ 0.60 with male household heads, the spending on jam-marmalade and confectionery products decreased by 0.24 and ₺ 1.34, respectively, indicating that female head of households was more prone to these two products. To restrain spending on sugar and confectionery products, confectionery sectors and public policies should target different genders.

Compared to the households have no compulsory health insurance, households holding a compulsory health insurance spent more on jam-marmalade and confectionery products by 0.19 and ₺ 2.06. These households monthly spent almost ₺ 2 more on confectionery products than that of the jam-marmalade. Compared to the reference year, the effect of each year was different from each other in the households owning a green card. The

family spending on these three types of food items decreased with household heads owning a green card, while their coefficients were found to be statistically insignificant. The Turkish government has tried to ignore all employees under insurance, and an increase in the ratio of insured people would increase spending on jam-marmalade and confectionery products.

The households with married household heads spent 1.1, 0.47, and ₺ 1.99 more on sugar, jam-marmalade, and confectionery products per month, respectively, whilst the household spending on the confectionery products was higher than their spending on the sugar and jam-marmalade. There was a downward trend for the ratio of married people in the households in Turkey, and this trend may increase their expenditures on confectionery products, while it may decrease their spending on jam and marmalade products.

The households whose household heads had a job spent ₺ 0.54 more on sugar and ₺ 0.85 less on jam-marmalade than the households with unemployed head of households. According to the 2002 reference year, a change in the number of working individuals within the family each year had different effects on confectionery product spending. That is, according to the number of working individuals, families spent more on sugar in 2004 compared to 2002, while they spent less in 2013. Typically, as the number of working individuals increased within families, spending on sugar also increased.

Households receiving cash/in kind aid spent more on each of the three products in all the years compared to that of 2002 as shown by the parameter coefficient of sugar which was statistically significant. Without considering years, households which received in kind and financial aid spent ₺ 3.82 less for sugar than households without the government support. The negative effects of the in-kind and financial aids on monthly households' spending on sugar and confectionery products were probably due to the fact that these aids might have been used to meet other needs when the aid is provided in the form of cash, or they most probably received in-kind aid as sugar, jam-marmalade or confectionery products. Musaiger (1993) stressed that subsidies for sugar use may influence dietary patterns in developing countries. Consequently, providing these food supports through food coupons can promote balanced nutrition.

According to the 2002 reference year, a change in the number of working individuals in the family ach year had different effects on food spending. That is, according to the number of working individuals, the families spent ₺ 1.41 more on sugar in 2004 compared to 2002, while they spent ₺ 0.97 less in 2013. Typically, as the number of working individuals increased, the sugar spending also increased by ₺ 0.80.

The households living at detached houses spent 1.30 and ₺ 1.04 less on sugar and jam-marmalade, respectively, than those households living in apartments. Households residing in apartments spent ₺ 2.46 more on sugar, while they spent ₺ 0.68 more on confectionery products than households residing at other dwellings. On the other hand, the households who resided in their own abodes spent ₺ 1.02 more on sugar, 0.22 and ₺ 0.35 less on jam-marmalade and the confectionery products, respectively. Tenant families spent 0.46, 0.61 and ₺ 0.97 less on sugar, jam-marmalade and confectionery products, respectively, indicating that spending on rent had a negative effect on confectionery food spending among Turkish households.

The households living in urban areas spent less on sugar (₺ 2.65), jam-marmalade (₺ 0.95) and confectionery products (₺ 0.22) per month than rural households. In the developing world, urbanization is highly correlated with access to confectionery products, greater access to modern mass media, better transportation systems, and larger modern supermarkets (Reardon et al., 2003). Grosso et al. (2013) also confirmed that rural adolescents in Southern Italy were more likely to consume sweets compared with urban ones. Contrary to these studies, our results showed that the households living in urban areas spent less on sugar, jam-marmalade and confectionery products per month compared to the rural households. It is considered that this was caused by the households living in rural areas using sugar and confectionery products for producing other products (e.g., pie, cake and confectionery products etc.) or such households receiving a rather limited proportion of food items (e.g., mostly produced at home) compared to urbanites who receive a variety of food products. The findings of Popkin and Nielsen (2003) are consistent with our results, which indicate that as residing in urban areas increased, so did sugar intake. However, other studies showed that there are minor or no substantial differences regarding diet composition of rural and urban children (Yannakoulia et al., 2004; Roma-Giannikou et al., 1994).

Households with Internet access spent ₺ 1.72 more on confectionery products (chocolate, ice-cream etc.) than those who do have an Internet at home. During the 12-year period, especially spending on confectionery food had significantly increased. In the future, a rapid increase in the ratio of households accessing the internet is expected. That is, it can be asserted that instant Internet access, frequent advertisement of confectionery products, sharing food recipes by women on social media and effective use of the internet by children would increase their spending on confectionery products. The variable of Internet use had no significant effect on spending on sugar and jam-marmalade.

The rising number of children in the family increases spending on confectionery products. While spending on confectionery products was ₺ 0.95 higher in single-child families, findings revealed the same spending to be 1.88 and ₺ 1.79 higher in the families with two children and three or more children, respectively. As the number of children in a family raised, spending on sugar gradually decreased. In families with one child, sugar spending was ₺ 0.69 less than that of the other family types. The result was 1.56 and ₺ 1.58 less in the families with two-children and those with three or more children, respectively. Similar results were also valid for the patriarchal families. As expected, the families with children spent less on sugar compared to confectionery products. However, the kids with each age group spent more for sugar than jam-marmalade and confectionery products. There was a downward trend in each group of children, and it is expected that household expenditures would decrease on each confectionery product. As the number of adults in the households increased, their expenditures on sugar and confectionery products increased as well.

As the educational level of household heads increased, the households' sugar spending decreased (₺ 0.10) while the households' monthly spending on confectionery products increased by ₺ 0.36. Meanwhile, if year comparisons were considered, the effects of householder education level differed significantly from that of 2002. In Turkey, there was an upward trend of education level during the studied period, and it is expected that this trend would be the same in the future. As expected, since the importance of a balanced diet along with increased level of education is getting more pronounced, the households with higher educated heads decreased their spending on sugar significantly. However, this was not valid for the confectionery products.

Increases in household income rose with the household's monthly spending on sugar and confectionery products. For example, when the monthly real income of the family increased by ₺ 1000, spending on sugar, jam-marmalade and confectionery product increased by 0.11, 0.579 and ₺ 1.749, respectively. Notice that confectionery products were mostly influenced by the rise in the monthly income. Interestingly, compared to 2002, the changes in the households' income in each year reflected negatively on the spending on the three category products. Conversely, Popkin and Nielsen (2003) found that as income per capita increased, so did sugar intake. An increase in the income level of the households is expected, and this may also increase their confectionery products expenditures. Thus, as in the past in the country, as per capita income continues to rise in the future, the confectionery industries will be happy to benefit from such developments.

When 2002 is taken as reference year for comparison, there were statistically significant differences both between years and many interactions of some basic independent variables, with years found as statistically significant. While the variable of in-kind and financial aid had structurally changed annually and the variable of internet had no significant effect on sugar and jam-marmalade spending, changes in all other variables by years reflected in different ways on the spending.

Table 4. The Multivariate Tobit Model Results Regarding Sugar, Jam-Marmalade, and Confectionery Foods

Variables	Sugar				Jam and marmalade				Confectionery foods			
	Coeff	t value	Pr> |t|	ME	Coeff	t value	Pr> |t|	ME	Coeff	t value	Pr> |t|	ME
Constant	4.834	3.010	0.003		-9.231	-2.880	0.004		-3.487	-2.950	0.003	
Year2003	-5.738	-3.290	0.001	-3.567	-3.459	-0.980	0.325	-0.687	-3.473	-2.680	0.007	-2.350
Year2004	-10.693	-4.770	<.0001	-6.647	-3.449	-0.770	0.440	-0.685	-2.878	-1.740	0.082	-1.948
Year2005	-0.451	-0.200	0.840	-0.280	-1.894	-0.430	0.668	-0.376	3.891	2.370	0.018	2.633
Year2006	-4.074	-1.790	0.073	-2.532	-1.060	-0.240	0.812	-0.210	-0.935	-0.560	0.575	-0.633
Year2007	-5.190	-2.300	0.021	-3.226	-1.933	-0.440	0.660	-0.384	3.569	2.160	0.031	2.415
Year2008	-6.431	-2.760	0.006	-3.998	-2.683	-0.600	0.547	-0.533	2.541	1.510	0.132	1.720
Year2009	-3.893	-1.790	0.074	-2.420	-1.673	-0.400	0.688	-0.332	2.822	1.780	0.075	1.910
Year2010	-4.712	-2.140	0.032	-2.929	-1.982	-0.470	0.635	-0.394	4.871	3.060	0.002	3.297
Year2011	-8.018	-3.610	0.000	-4.984	-3.228	-0.770	0.439	-0.641	3.725	2.330	0.020	2.521
Year2012	-8.126	-3.650	0.000	-5.051	-2.145	-0.510	0.611	-0.426	7.002	4.370	<.0001	4.739
Year2013	-6.046	-2.710	0.007	-3.758	-3.324	-0.790	0.432	-0.660	5.537	3.440	0.001	3.747
Age2003	0.008	0.280	0.777	0.005	0.010	0.170	0.862	0.002	0.035	1.600	0.109	0.023
Age2004	0.073	2.020	0.044	0.045	0.061	0.830	0.406	0.012	0.058	2.160	0.030	0.040
Age2005	0.092	2.560	0.010	0.057	0.076	1.050	0.293	0.015	-0.003	-0.130	0.898	-0.002
Age2006	-0.048	-1.300	0.195	-0.030	0.038	0.510	0.607	0.008	0.055	2.010	0.045	0.037
Age2007	0.060	1.630	0.102	0.037	0.095	1.320	0.188	0.019	-0.023	-0.840	0.403	-0.015
Age2008	0.068	1.820	0.068	0.042	0.165	2.290	0.022	0.033	-0.001	-0.040	0.966	-0.001
Age2009	-0.006	-0.180	0.858	-0.004	0.172	2.500	0.012	0.034	0.012	0.450	0.655	0.008
Age2010	-0.014	-0.390	0.694	-0.009	0.187	2.730	0.006	0.037	-0.030	-1.160	0.247	-0.020
Age2011	0.026	0.730	0.462	0.016	0.283	4.190	<.0001	0.056	-0.004	-0.160	0.876	-0.003
Age2012	0.028	0.780	0.437	0.017	0.197	2.890	0.004	0.039	-0.063	-2.430	0.015	-0.042
Age2013	0.023	0.630	0.527	0.014	0.206	3.000	0.003	0.041	-0.028	-1.070	0.286	-0.019
Age	0.070	2.740	0.006	0.043	-0.473	-9.100	<.0001	-0.094	-0.065	-3.410	0.001	-0.044
Gender	0.961	2.330	0.020	0.598	-1.208	-1.590	0.111	-0.240	-1.983	-6.670	<.0001	-1.342
Com.Ins.	-0.061	-0.250	0.801	-0.038	0.593	1.240	0.215	0.118	3.041	17.030	<.0001	2.058
GrnCrd2003	-2.173	-1.180	0.240	-1.351	-0.066	-0.020	0.988	-0.013	1.470	1.010	0.313	0.995
GrnCrd2004	1.794	0.860	0.392	1.115	0.687	0.150	0.884	0.136	0.834	0.510	0.609	0.565
GrnCrd2005	6.585	3.460	0.001	4.093	0.953	0.220	0.823	0.189	1.826	1.220	0.221	1.236
GrnCrd2006	-0.499	-0.270	0.790	-0.310	1.447	0.350	0.729	0.287	3.002	2.050	0.041	2.032
GrnCrd2007	3.385	1.820	0.068	2.104	0.925	0.220	0.823	0.184	1.058	0.730	0.467	0.716
GrnCrd2008	0.195	0.120	0.908	0.121	1.644	0.430	0.665	0.326	5.266	3.960	<.0001	3.564
GrnCrd2009	1.856	1.010	0.315	1.154	1.597	0.390	0.696	0.317	2.679	1.850	0.064	1.813
GrnCrd2010	0.900	0.490	0.628	0.560	0.733	0.180	0.858	0.146	2.324	1.610	0.108	1.573
GrnCrd2011	0.651	0.340	0.736	0.405	0.927	0.220	0.825	0.184	1.564	1.040	0.296	1.058
GrnCrd2012	-0.250	-0.120	0.901	-0.155	0.611	0.140	0.888	0.121	0.447	0.290	0.773	0.302
GrnCrd2013	1.547	0.800	0.426	0.962	0.918	0.220	0.829	0.182	2.629	1.730	0.083	1.779
GrnCrd	-0.505	-0.320	0.749	-0.314	-2.898	-0.800	0.425	-0.575	-1.665	-1.320	0.186	-1.127
Maritstat	1.761	3.980	<.0001	1.095	-2.389	-2.890	0.004	-0.474	2.942	9.180	<.0001	1.991
Employed	-0.874	-3.160	0.002	-0.544	-4.256	-8.050	<.0001	-0.845	0.085	0.420	0.674	0.058
IncAid2003	3.968	1.700	0.089	2.467	2.083	0.420	0.674	0.414	0.216	0.130	0.900	0.146
IncAid2004	3.995	1.730	0.083	2.483	1.465	0.300	0.763	0.291	0.165	0.100	0.922	0.112
IncAid2005	5.918	2.600	0.009	3.679	0.800	0.170	0.868	0.159	2.960	1.770	0.077	2.003
IncAid2006	5.171	2.270	0.023	3.214	1.304	0.270	0.786	0.259	-0.050	-0.030	0.976	-0.034
IncAid2007	6.983	3.080	0.002	4.341	1.378	0.290	0.774	0.274	0.903	0.540	0.588	0.611
IncAid2008	4.266	1.900	0.058	2.652	0.444	0.090	0.926	0.088	2.835	1.720	0.085	1.919
IncAid2009	4.304	1.830	0.068	2.676	1.422	0.290	0.773	0.282	0.714	0.410	0.679	0.483
IncAid2010	4.826	2.010	0.045	3.000	0.490	0.100	0.923	0.097	0.694	0.390	0.694	0.470
IncAid2011	5.128	2.110	0.035	3.187	1.110	0.220	0.826	0.220	-0.144	-0.080	0.936	-0.097
IncAid2012	4.868	1.970	0.049	3.026	0.870	0.170	0.866	0.173	0.450	0.250	0.804	0.304
IncAid2013	4.298	1.770	0.077	2.672	1.583	0.310	0.755	0.314	0.573	0.320	0.748	0.387
IncAid	-6.149	-2.900	0.004	-3.822	-2.551	-0.560	0.574	-0.506	-0.914	-0.590	0.558	-0.619
Workngp2003	0.176	0.390	0.698	0.109	-1.043	-1.120	0.262	-0.207	-0.262	-0.770	0.441	-0.177
Workngp2004	2.264	4.040	<.0001	1.408	-0.024	-0.020	0.983	-0.005	-0.562	-1.340	0.180	-0.380
Workngp2005	0.887	1.640	0.100	0.551	0.385	0.350	0.723	0.076	-0.181	-0.450	0.652	-0.123
Workngp2006	-2.077	-3.760	0.000	-1.291	0.785	0.710	0.477	0.156	-0.357	-0.870	0.384	-0.242
Workngp2007	-0.556	-1.040	0.301	-0.346	0.275	0.260	0.799	0.055	0.256	0.640	0.521	0.173
Workngp2008	-1.142	-2.040	0.041	-0.710	-0.464	-0.420	0.672	-0.092	-0.038	-0.090	0.927	-0.025
Workngp2009	-0.249	-0.480	0.632	-0.155	-0.817	-0.800	0.425	-0.162	-0.061	-0.160	0.873	-0.041
Workngp2010	-0.669	-1.250	0.211	-0.416	-0.453	-0.430	0.666	-0.090	0.313	0.790	0.427	0.212

Workngp2011	-0.764	-1.380	0.167	-0.475	-0.114	-0.110	0.915	-0.023	-0.183	-0.450	0.652	-0.124
Workngp2012	-0.924	-1.680	0.092	-0.574	0.360	0.340	0.735	0.071	-1.099	-2.730	0.006	-0.744
Workngp2013	-1.567	-2.840	0.005	-0.974	0.054	0.050	0.960	0.011	-0.511	-1.270	0.205	-0.346
Workngp	1.294	3.160	0.002	0.804	-1.272	-1.530	0.127	-0.252	-0.050	-0.160	0.870	-0.034
PrvtHouse	-1.993	-5.150	<.000 1	-1.239	-5.238	-6.680	<.000 1	-1.040	-0.302	-1.040	0.297	-0.204
Apartment	-3.949	-10.580	<.000 1	-2.455	-1.289	-1.710	0.087	-0.256	0.997	3.580	0.000	0.675
Homenowner	1.645	5.750	<.000 1	1.023	-1.119	-2.090	0.037	-0.222	-0.510	-2.490	0.013	-0.345
Renters	-0.741	-2.410	0.016	-0.461	-3.068	-5.340	<.000 1	-0.609	-1.439	-6.560	<.000 1	-0.974
Urban	-4.259	-20.670	<.000 1	-2.647	-4.777	-11.940	<.000 1	-0.948	-0.328	-2.170	0.030	-0.222
Internet2003	-0.774	-0.370	0.715	-0.481	1.059	0.280	0.777	0.210	-1.195	-0.790	0.429	-0.809
Internet2004	0.405	0.160	0.874	0.252	0.902	0.200	0.840	0.179	-0.419	-0.230	0.819	-0.284
Internet2005	-2.202	-0.900	0.367	-1.369	-0.855	-0.200	0.842	-0.170	-1.138	-0.650	0.514	-0.770
Internet2006	1.201	0.560	0.577	0.746	1.652	0.430	0.664	0.328	-1.704	-1.110	0.265	-1.153
Internet2007	0.317	0.160	0.875	0.197	0.339	0.090	0.925	0.067	1.177	0.810	0.415	0.796
Internet2008	-0.083	-0.040	0.966	-0.051	0.667	0.190	0.847	0.132	0.352	0.250	0.801	0.238
Internet2009	-0.670	-0.350	0.728	-0.416	1.962	0.580	0.564	0.390	-0.072	-0.050	0.958	-0.049
Internet2010	0.100	0.050	0.959	0.062	0.743	0.220	0.826	0.148	-0.215	-0.160	0.875	-0.146
Internet2011	0.404	0.210	0.833	0.251	0.332	0.100	0.922	0.066	-0.709	-0.520	0.603	-0.480
Internet2012	-0.090	-0.050	0.963	-0.056	1.500	0.440	0.657	0.298	-0.388	-0.280	0.776	-0.262
Internet2013	0.279	0.150	0.884	0.173	0.541	0.160	0.873	0.107	-0.994	-0.730	0.465	-0.673
Internet	-1.802	-1.010	0.313	-1.120	0.541	0.170	0.864	0.107	2.543	2.000	0.046	1.721
Fmlytyp1	-1.117	-2.290	0.022	-0.694	-1.797	-1.970	0.049	-0.357	1.410	4.000	<.000 1	0.954
Fmlytyp2	-2.506	-5.190	<.000 1	-1.558	-1.242	-1.370	0.171	-0.247	2.781	7.950	<.000 1	1.882
Fmlytyp3	-2.545	-4.930	<.000 1	-1.582	0.458	0.470	0.638	0.091	2.644	7.050	<.000 1	1.790
Fmlytyp4	1.513	2.960	0.003	0.941	0.531	0.550	0.580	0.105	-0.677	-1.820	0.069	-0.459
Fmlytyp5	-2.905	-5.820	<.000 1	-1.806	0.273	0.290	0.771	0.054	2.873	7.900	<.000 1	1.945
Kids0-5age	3.271	24.590	<.000 1	2.033	-2.290	-8.810	<.000 1	-0.455	1.182	12.120	<.000 1	0.800
Kids6-14age	3.886	38.850	<.000 1	2.415	0.984	5.090	<.000 1	0.195	1.420	19.310	<.000 1	0.961
Kids15-19age	3.327	25.410	<.000 1	2.068	-0.347	-1.380	0.169	-0.069	0.840	8.750	<.000 1	0.569
Adultnmb	3.717	34.240	<.000 1	2.311	2.229	10.920	<.000 1	0.442	0.329	4.120	<.000 1	0.223
Educn2003	-0.024	-0.240	0.807	-0.015	-0.045	-0.240	0.813	-0.009	-0.265	-3.690	0.000	-0.179
Educn2004	-0.115	-0.950	0.340	-0.072	0.010	0.040	0.965	0.002	-0.261	-2.940	0.003	-0.177
Educn2005	-0.309	-2.520	0.012	-0.192	0.014	0.060	0.953	0.003	-0.137	-1.530	0.127	-0.093
Educn2006	-0.060	-0.490	0.627	-0.037	-0.042	-0.180	0.857	-0.008	-0.421	-4.710	<.000 1	-0.285
Educn2007	-0.134	-1.100	0.271	-0.083	0.050	0.220	0.829	0.010	-0.061	-0.690	0.492	-0.041
Educn2008	-0.135	-1.130	0.259	-0.084	0.233	1.050	0.296	0.046	0.021	0.240	0.811	0.014
Educn2009	-0.019	-0.160	0.871	-0.012	0.070	0.320	0.747	0.014	0.005	0.050	0.957	0.003
Educn2010	-0.264	-2.260	0.024	-0.164	-0.044	-0.210	0.837	-0.009	-0.074	-0.880	0.377	-0.050
Educn2011	-0.126	-1.070	0.285	-0.078	-0.047	-0.220	0.828	-0.009	-0.012	-0.140	0.889	-0.008
Educn2012	-0.071	-0.600	0.547	-0.044	-0.135	-0.620	0.537	-0.027	-0.079	-0.930	0.352	-0.054
Educn2013	-0.308	-2.610	0.009	-0.191	0.149	0.690	0.493	0.030	-0.027	-0.320	0.751	-0.018
Educn	-0.168	-2.020	0.044	-0.104	0.250	1.560	0.119	0.050	0.531	8.690	<.000 1	0.359
Income2003	-0.305	-1.330	0.184	-0.190	0.319	0.780	0.433	0.063	-1.490	-8.940	<.000 1	-1.008
Income2004	-0.916	-3.240	0.001	-0.570	-0.669	-1.340	0.181	-0.133	-1.629	-7.970	<.000 1	-1.102
Income2005	-0.143	-0.490	0.621	-0.089	0.175	0.340	0.734	0.035	0.379	1.800	0.072	0.256
Income2006	-0.190	-0.680	0.498	-0.118	-0.406	-0.810	0.418	-0.081	-1.543	-7.640	<.000 1	-1.044
Income2007	0.001	0.000	0.998	0.001	-0.400	-0.790	0.429	-0.079	-0.134	-0.650	0.516	-0.090
Income2008	0.167	0.600	0.551	0.104	-0.169	-0.350	0.726	-0.034	0.082	0.410	0.681	0.056
Income2009	-0.071	-0.260	0.792	-0.044	-0.296	-0.640	0.523	-0.059	-0.019	-0.100	0.922	-0.013
Income2010	0.042	0.150	0.880	0.026	-0.228	-0.480	0.634	-0.045	-0.263	-1.330	0.184	-0.178
Income2011	-0.205	-0.770	0.442	-0.127	-0.839	-1.850	0.064	-0.167	-0.171	-0.910	0.364	-0.116
Income2012	-0.256	-0.940	0.347	-0.159	-0.511	-1.100	0.273	-0.102	0.208	1.050	0.295	0.141
Income2013	-0.218	-0.810	0.419	-0.135	-1.006	-2.170	0.030	-0.200	-0.055	-0.290	0.772	-0.037
Income	0.177	0.920	0.359	0.110	2.914	8.550	<.000 1	0.579	2.650	19.000	<.000 1	1.794
Sigma (Std S)	26.464	412.200	<.000 1		38.06 7	185.190	<.000 1		-3.487	-2.950	0.003	

Rho (a.b)	0.078	19.410	<.0001						
Rho (a.c)							0.064	20.920	<.0001
Rho (b.c)				0.136	36.560	<.0001			

Note: a: Sugar, b: Jam and marmalade, c: Confectionery products, and ME refers to marginal effects

4. Conclusions

It is of utmost importance to know the silent driving forces that shape food expenditures at the household scale in determining food and health policies on the country scale. In this study, we, therefore, analyzed the possible effects of changes in the socio-demographic and economic structures at the household scale in Turkey during the period of 2002-2013 on monthly expenditures of sugar, jam-marmalade, and confectionery products using the multivariate Tobit model. Information on sugar and confectionery spending by Turkish households facilitates the segmentation of food marketing on the one hand and helps us provide more meaningful information to both industry stakeholders and policymakers on the other hand. When we focus on the family's spending on three kinds of food; first, the statistical test result shows that each year has a unique expenditure structure in all three products considered. Secondly, compared to the 2002 reference year, spending on sugar and jam-like food has declined over the years, while more spending on confectionery is emerging, possibly indicating increased income and health sensitivity over the years by families. On the other hand, increased spending on confectionery products may be due to increased family income, which may cause the family to socialize by spending more spare time in places such as restaurants including fast-food places and patisseries, thus consuming more confectionery food. As health awareness increases with increasing income among families, a decrease in food expenditures that threaten human health is actually an expected result. However, it can be expected that the demand for various confectionery foods discovered with socialization will decrease as a result of a gradual understanding of their direct and indirect side effects on human health. Meanwhile, health policies in the country should have priority to determine the harmful effects of such foods on human health through the written, visual media, and public spots.

Considering the latent effect of some variables on income, for example, as increasing education level and increasing the number of working people in a household are considered to be related to income, slight improvements in these may trigger the family income. In this context, it is extremely important for policymakers to attract the family to healthier foods with the help of intensive food campaigns and public spots. To further increase the impact, it would be of great benefit to lead food programming studies that support the driving factors in which they play a reducing role in these three types of food expenditures. In particular, monitoring supportive food programs for women who are in charge of the household may have a relatively slowing effect on the consumption of these sugary foods as compared to their non-sugary peers. In another example, by focusing on more nutritious food in families in need of food aid, the government can both prioritize the growth of healthy generations in the future and increase the roles of important drivers such as work productivity nationwide.

Future studies on the Turkish households' spending on sugar, jam-marmalade, and confectionery products may be strengthened by including assessment of the household panel data to capture both the cross section and time variant variabilities among the corresponding food spending equations. Also, by relaxing the assumption of each spending on sugar, jam-marmalade, and confectionery products presumed independent from the other basic food sub-categories, more dependencies among expenditures of the basic food staples can be examined without the failure of finding optimal solutions to multivariate censored regimes, if the computer capacity allows to do so. The findings in this study can be used by the confectionery sector to make their production and marketing plans. The government can also use these findings to estimate future demand and expenditure patterns of Turkish households on sugar, jam-marmalade, and confectionery products.

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