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Red Meat, White Meat and Seafood Consumption Patterns in Turkey

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Abstract: This study explorers consumption of red meat, white meat and seafood in Turkey by utilizing the raw data of Household Budget and Consumption Expenditures survey conducted by Turkish Statistical Institution in the years 2003-2006. A total of 51.423 households' expenditure of red meat, white meat and seafood pattern were analyzed with regards to income, education, occupation, rural-urban, gender and household size. According to results within 4 years period in average 50% of the householders in Turkey consumed red meat, 70% of them consumed white meat and 33% of them consumed seafood. In terms of mean monthly expenditure of red meat, white meat and seafood was 41, 12 and 9 TL, respectively. Overall, preference and consumption of these three food categories were statistically significantly varied among socioeconomic and demographic factors.

Key words: Red meat, white meat, seafood consumption, household, socioeconomic and demographic factors, Turkey

INTRODUCTION

The most widely consumed foodstuff group is cereals and cereal products in Turkey. These products are placed on the top of consumption culture of Turkey. The 2nd most consumed food product is vegetables. Although, meat and meat products are important in terms of protein because of high prices, consumption percentage is just 3% across Turkey. Although total protein consumption is enough in Turkey, majority of protein needs is vegetative. To healthy and balanced diet, 40-50% of daily protein need should be animal origin. Especially, seafood in the proteins of animal origin is an important food source for healthy and balanced diet (Guven and Gulmez, 2006).

According to data of United Nations Food and Agriculture Organization in the years of 1960 and 2003 in main food categories while cereals and cereal products increases 4.1%, vegetables 58.9%, white meat 420% and seafood 200%, red meat and fruits decrease 15.3%. Despite this rise, especially fish consumption is not at the desired level. For example, average fish production per capita in Asian countries is 50 and 25 kg year^{-1} in European Union countries; this rate is only 7-8 kg year^{-1} in Turkey (Akbay, 2005; Koc *et al*., 2009; Sayin *et al*., 2010). Red meat consumption per capita in Turkey was 8.19 kg year^{-1} in 2009, 6.78 kg year^{-1} in 2008 and 5.73 kg year^{-1} in 2009. Total meat consumption including white meat and fish is estimated about 20-22 kg year^{-1} in Turkey. One of most important point in the field of food preference and consumption is how different categories of food show distribution between socioeconomic and demographic variables with the preference and consumption. In Turkey when literature review about different types of food categories is done, it is looked from only economic aspect and studies analyzing socioeconomic and demographic sides of food consumption are not found very much (Tansel, 1986; Ekinci, 1996; Orhan, 1996; Ucdogruk, 1997; Akbay, 2005, 2006; Akbay *et al*., 2007; Armagan and Akbay, 2008). In Turkey, what kinds of food, how and how often is preferred and consumed are not emphasized very much. The consumption rate and expenditures of these 3 food groups are discussed over 50.000 households in this study. In Turkey, on the basis of households, red meat, white meat and seafood are consumed average in each month how much and how often and in which socioeconomic and demographic groups it is prevail are searched. The answers of what is the place of these three meat groups and what is the consumption rate in nourishment in Turkey show us the distribution of meat consumption and how often they consume. Most of the researches about red meat and fish consumption do not go beyond a general review. With household budget and consumption expenditures surveys conducted per year by Turkey Statistical Institute (TUIK) throughout Turkey, all details about how much households consume these 3 meat groups in each month and how much money they pay are recorded. The information obtained from these data analysis includes most important information for surveying 3 groups of meat consumption on the basis of

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households. Especially in today, rise in the price of red meat with the gaining health awareness in the society, determining the direction of changes in white meat and fish consumption gains importance for the supply-demand and socioeconomic aspects.

In this study, the relationship between consumption and buying behavior of red meat, white meat and seafood, the socioeconomic and demographic factors in Turkey, analyzing the raw data of household budget consumption expenditures surveys conducted by Turkey Statistical Institution (TUIK) in the years of 2003-2006 is examined. Independent variables of research are composed of monthly income, education level, occupational categories, gender, household number and rural-urban categories. Dependent variables of the research are composed of red meat, white meat and seafood.

MATERIALS AND METHODS

In this study, raw data of household budget and consumption expenditures surveys conducted by Turkey Statistical Institution (TUIK) in the years of 2003-2006 in every month is used.

The scope of surveys is all the households living in the whole parts of Turkey. The population of urban areass defined as settlement >20.001, rural areas is defined as settlements having population <20. The survey is conducted in 1st January and 31st December in the year. Stratified two-stage Cluster sampling method is used in the surveys.

In the analysis, preference of red meat (fresh and frozen beef, veal, mutton, lamb, doe and goat meats), white meat (chicken, turkey meat, etc.) and seafood (fresh and frozen fish and other seafood) of 25.764 households in the year of 2003, 8.544 in 2004, 8.559 in 2005 and 8.556 in 2006, total 51.423 households average expenditures in each month and the years in which how often and what percentages of the households prefer these food categories, the rural-urban, gender, number of household, monthly income, education level and occupational categories are analyzed.

With the statistics program SPSS, education status and monthly income variables are rearranged and the income is calculated in terms of Turkish Lira (TL). Consumption expenditure files with socioeconomic status of the households are combined according to the bulletin numbers in terms of the head of household. About 36% of households participated into the survey is in rural, 64% is in urban. Also, 10% is female participator and 90% is male participator in this survey.

Four different statistic techniques, descriptive statistics, Chi-square (χ^2) independence test, variance analysis and multiple regression analysis, respectively are used in this study. Monthly consumption rates, average, standard deviation and median values of each food category examined in the table are calculated. Whether, there is a statistical relationship between dependent and independent variables or not with Chi-square (χ^2) tests and whether the average values of expenditures of the food categories are different from each other or not are tested with variance analysis. Since cross tabs, Chi-square (χ^2) tests and variance analysis occupies too space, only the results of tests are saved. To show that how much independent variable has effect on the dependent variable, Eta-squared (η^2) technique is applied. In Chi-square (χ^2) and F test and multiple regression analysis, *p<0.05, **p<0.01, ***p<0.001 and ****p<0.0001 indicates the significant value.

RESULTS AND DISCUSSION

Average monthly expenditure, preference rates, standard deviation and median values of consumption of red meat, white meat and seafood products of 51.423 households in the years of 2003 and 2006 are shown in Table 1. According to the results of statistical tests, white meat is placed on the top with 69%, red meat is the 2nd with 49% and seafood is the 3rd with 33%.

In other words, the years between 2003 and 2006 in the survey conducted with 51.423 in a month as average, 69% of households in Turkey consumes white meat, 49% of them red meat and 33% of them consumes seafood.

Table 1: Red meat, white meat and seafood monthly mean consumption rate and expenditures by years (2003-2006)

	Red meat				White meat				Seafood			
Years	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
2003	48	29	63	13	68	10	10	8	34	7	9	5
2004	49	36	77	16	72	12	10	9	31	9	10	6
2005	51	40	88	19	72	13	12	10	31	9	12	8
2006	49	60	127	21	69	13	12	10	33	12	13	8
Total	49	41	89	17	69	12	11	9	33	9	10	6
χ^2	36****				1.3****				40****			
F test	156****				183****				268****			
η^2	0.015				0.015				0.045			

χ^2 = Chi-square, η^2 = Eta-square

Rise in the consumption of white meat from 5% in 1990's to the 70% in 2000 is remarkable. Rising from 10% in 1990's to 50% in the recent years, although its price increases is also important.

However, according to the 4 years average, not buying red meat of more than half of households is related much more its price, not the preference. In the years between 2003 and 2006, households spend monthly 41 TL for red meat, 12 TL for white meat and 9 TL for seafood as average.

The expense amount in the households for these 3 food groups is monthly 62 TL as average. The annual increase in price in food groups is shown in Table 1. Red meat in 2003 is paid average 29 TL in each month, 36 TL in 2004, 40 TL in 2005 and 60 TL in 2006.

In 2003, average 7 TL is spent in each month for the seafood, 12 TL in 2006. There are statistically significant differences in terms of preference and purchase according to F-test and Chi-square (χ^2), Eta-square (η^2) results are shown in Table 1.

According to the Eta-square (η^2) values, the effects of years are at normal level in seafood and not significant for the others. Not having effect of years on the consumption of red meat is related with average consumption rate. The consumption rate of red meat in the years between 2003 and 2006 varies at the rate of 48 and 50% in terms of household in monthly average (Table 1).

When interpreting the Table 1, there are two points to be considered. They are with 25.000 households are participated into the survey in 2003 and with 8.000 households are participated into the survey in recent years. This affects some results directly. Slipping 2-3% of other years compared with 2003 is related with the number of subjects.

In the years between 2003 and 2006, 51.423 households are divided into 20% in 5 groups as shown in Table 2. According to this when the red meat consumption is analyzed, it can be seen that 27% of households in the 20% part, 42% in the 2nd 20% part, 49% in the 3rd part, 57% in the 4th part and 67% in the highest partition consume red meat in the month in which surveys are conducted. As for white meat consumption, it is respectively 58, 65, 69, 74 and 78% through highest income to the lowest income. Seafood consumption is respectively 31, 30, 32, 37 and 41% according to the highest income from the lowest income. The average price paid in a month for the all income groups as a total 4 years and 48 months for the red meat is 37 TL, standard deviation is 85 TL and media is 15 TL. As shown in the Table 2, the number of households participated in the survey is very much and since they are heterogenic, there are big difference among the average, standard deviation and median values.

If the survey is conducted with a homogeny group, it is expected that these values are close to each other. For 3 groups, Chi-square (χ^2) and variance analysis, according to test results is significant with the average price and consumption rate for the all income groups. According to the results of Eta-square (η^2), the effects of income on the red meat and white meat expense is low and it can be seen that it has a strong effect on the seafood and fish expense.

In the years between 2003 and 2006, 8.101 (44%) of 18.762 households living in the rural, 17.043 of 32.751 households living in urban during 48 months when the surveys are conducted, reported to buy red meat. About 12.102 (65%) of households living in the rural prefers white meat, 5.759 (31%) of households reported to buy fish during the months when the surveys are conducted. The total number buying white meat in 32751 households living in urban is 23.280 (71%) and the number who buys white meat and fish is 11.398 (35%). People living in the rural, during these years, pay 39 TL for the red meat, 12 TL for white meat and 9 TL for seafood. People living in the urban pay, respectively 36, 11 and 9 TL. According to the Chi-square (χ^2) and variance test results, there are significant differences in 3 groups and Eta-square (η^2) test results are not important (Table 3).

Table 2: According to monthly income red meat, white meat and seafood mean consumption rate and expenditures (2003-2006)

	Red meat				White meat				Seafood			
Monthly incom	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
20%	27	28	74	11	58	10	9	7	31	31	6	7
20%	42	30	72	12	65	10	10	8	30	7	7	5
20%	49	31	75	13	69	11	10	8	32	8	10	5
20%	57	39	88	17	74	12	12	9	37	9	9	6
20%	67	47	97	23	78	14	13	10	41	12	14	8
Total	50	37	85	15	69	11	11	9	34	9	10	6
χ^2	3.9****				1.5****				3.3****			
F test	47****				160****				219****			
η^2	0.008				0.01				0.049			

Table 3: Red meat, white meat and seafood mean consumption rate and expenditures in rural and cities (2003-2006)

	Red meat				White meat				Seafood			
Location	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
Rural	44	39	9	16	65	12	12	9	31	9	11	6
Urban	52	36	8	15	71	11	10	9	3	9	10	6
Total	49	37	9	15	69	12	11	9	33	9	9	6
χ^2	4****				2****				9****			
F test	7**				11****				83****			
η^2	0				0				0.011			

Table 4: According to numbers of household red meat, white meat and seafood mean consumption rate and expenditures (2003-2006)

	Red meat				White meat				Seafood			
Household number	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
1-3	55	33	74	14	67	10	9	8	35	9	10	6
4-6	48	39	88	16	70	11	11	9	34	9	11	5
7 and up	31	56	119	20	72	16	16	12	28	8	8	6
Total	49	37	85	15	69	11	11	9	34	9	10	6
χ^2	10****				73****				97****			
F test	57****				412****				3****			
η^2	0.005				0.023				0			

Table 5: Red meat, white meat and seafood mean consumption rate and expenditures by gender (2003-2006)

	Red meat				White meat				Seafood			
Gender	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
Man	49	39	88	16	69	12	12	9	34	9	11	9
Woman	47	36	83	12	65	11	10	9	27	9	10	5
Total	48	37	85	15	68	11	11	9	33	9	10	6
χ^2	8****				47****				1****			
F test	36****				145****				23****			
η^2	0.001				0.004				0.001			

If the household number increases, the ratio of households buying red meat and seafood decreases, if the number of person living in the households increases, then the ratio of people buying white meat also increases. The average expenditure in each month of household number in 1-3 is respectively 33, 10 and 9 TL for these three food categories; it is respectively 39, 11 and 9 TL for the household number in 4-6. It is 56, 16 and 8 TL for the household number at 7 and up. According to Chi-square (χ^2) and F test results, there is a statistically significant difference between household number and the expenditures for these three food categories (Table 4). About 5.108 (9.9%) of people surveyed in the years of 2003 and 2006 is women and 46.312 (90.1%) is men. Average expenditure and purchasing rate in each month of households whose head is woman, in these three food categories are almost the same in terms of both the choose ratio and average amount paid in each month, men respondents choose seafood more 7% than the other (Table 5).

About 6.434 (12%) of respondents is not literate, 26.126 (50.8%) is primary school graduate, 5.441 is middle school graduate and 9.779 (19%) is high school graduate, 3.387 is under-graduate and 253 is graduate and postgraduate. There is a significant difference between red meat consumption andeducation level and if the education level rises, red meat consumption increases very much (Table 6). These three different consumption tendencies are in subject for the fish consumption. In the households who have people not literature, average fish consumption in each month is about 24% in the years of 2003 and 2006. It is 32% for the middle, 38% for the high school, 47% for undergraduates and 53% for the graduates (Table 6).

Therefore, there are statistically significant differences between consumption of these three food categories and education groups. On the other hand, red meat expenditures are the same for the all education groups. The difference in the expenditures of white meat and fish is significant. If the education level rises, red meat, white meat and especially fish consumption increases very much. The results of the consumption rates and average expense amount in each month of red meat, white meat and seafood of different occupational groups is parallel to the educational level. While the white meat is preferred evenly for all the occupational groups, there is a 30% difference between the lowest and the highest ratio and 18% in fish. Monthly expense of unqualified occupational groups is under the average expense in each month. According to the results of

Table 6: Red meat, white meat and seafood mean consumption rate and expenditures by education level (2003-2006)

Educational	Red meat				White meat				Seafood			
sector	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
Not literate	32	36	8	13	64	11	11	9	24	6	6	5
Primary school	45	37	9	14	66	11	13	8	32	8	7	5
Elementary school	53	38	85	15	71	12	10	9	35	8	10	5
High school	60	36	78	17	74	12	11	9	38	9	11	6
Under graduate	72	40	69	23	79	13	11	10	47	12	13	8
Post graduate	78	39	74	23	80	14	12	11	53	18	20	11
Total	49	37	53	18	69	12	11	9	33	9	17	7
χ^2	2****				4****				7****			
F test	Not important				11****				100			
η^2	0				0.002				0.03			

Table 7: According to occupational status red meat, white meat and seafood mean consumption rate and expenditures (2003-2006)

	Red meat				White meat				Seafood			
Occupation	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.	(%)	Ave.	Sd.	Med.
Managers	63	46	97	20	76	13	12	10	38	11	13	7
Professionals	67	41	81	20	78	12	10	10	45	11	12	7
Assistant professionals	62	37	89	19	75	12	15	9	39	11	13	7
Office and customer services	59	31	59	16	73	11	10	9	38	9	8	9
Service and salesperson	49	30	65	13	71	11	11	9	32	7	10	5
Agriculture and livestock	33	47	100	17	58	12	12	9	28	9	12	6
Craftsmen	44	35	80	14	68	10	9	8	32	7	8	5
Facility and machine operators	46	35	84	13	70	11	10	9	33	7	9	5
Unqualified jobs	33	27	67	12	66	11	10	8	28	6	6	5
Total	47	38	86	16	69	11	10	8	32	9	10	6
χ^2	2****				7****				4****			
F test	14****				19****				41****			
η^2	0.006				0.006				0.027			

Table 8: Multiple regression analysis of the red meat and seafood (2003-2006)

	Red meat			Seafood		
Multiple regression	B	Sd.	t test	B	Sd.	t test
2004	6.32****	1.66	3.810	1.63****	0.24	6.74
2005	11.17****	1.47	7.980	4.46****	0.21	20.60
2006	32.22****	1.47	21.790	5.43****	0.22	24.57
Urban	-2.41	1.32	-1.820	-0.34	0.19	-1.79
1. 20%	-24.89****	2.13	-11.630	-5.3****	0.29	-18.02
2. 20%	-22.26****	1.86	-11.910	-4.87****	0.27	-17.77
3. 20%	-18.12****	1.68	-10.760	-3.87****	0.25	-15.25
4. 20%	-9.13****	1.53	-5.950	-3.13****	0.23	-13.44
Not literate	4.8	2.61	1.842	-1.29***	0.37	-3.46
Middle school	-0.69	1.76	-0.400	-0.58*	0.26	-2.23
High school	-4.47*	1.94	-2.302	-0.15	0.29	-0.51
Under graduate	-8.53****	2.44	-3.492	1.26***	0.36	3.44
Post graduate	-1.18*	6.26	-1.891	6.43****	0.92	6.95
Managers	-2.58	1.88	-1.373	-0.18	0.28	-0.64
Associates professors	-8.79**	2.85	-3.075	0.34	0.43	0.80
Office and Customer services	-12.75****	2.98	-4.272	-2.09****	0.44	-4.66
Artists	-8.88****	1.93	-4.605	-1.96****	0.27	-7.06
Agriculture and livestock	3,98*	2.08	1.909	-0.19	0.28	0.68
Services and sales person	-13.01****	2.30	-5.641	-2.04****	0.34	-5.96
Facility and machine operators	-10.34****	2.20	-4.689	-1.86****	0.32	-5.81
Elementary works	-13.62****	2.41	-5.637	-2.17****	0.32	-6.64
Constant	51.15****	0.51	99.560	11.22	0.37	30.31
F test	38****			93****		
R^2	0.042			0.11		
Freedom degree	22			22		
Total household number	51.423			51.423		

P.S.: *p<0.05, **p<0.01, ***p<0.001 and ****p<0.0001

Chi-square (χ^2) and F test, there are statistically significant differences between the different occupational groups and monthly food categories expense (Table 7). Finally, relativistic statistical effect of each independent variable is examined with the multiple regression technique in Table 8. Multiple regression technique and variance analysis are similar to each other but since the multiple regression technique provides us to test the desired independent variables using control group, it brings a different dimension to understand the preference

and purchase habit of food categories we examined. The statistical effects in the consumption of red meat and seafood of socioeconomic and demographic factors are analyzed in Table 8. Since, there is no significant difference in the preference and consumption of white meat it is not integrated in regression analysis. The year 2003, rural areas, five 20% bracket, secondary school and equivalent schools and professional occupations are used as control variables in the regression test below (Table 8). When the results of regression coefficients defining the relationship between the red meat expense and socioeconomic factors, it has a positive effect on the red meat expense of income and agriculture-livestock with the years of 2004-2006 and it can be seen that there is no statistically difference between rural and urban. While the regression coefficients in the households having high school and upper educational level in all other groups is statistically positive, it is negative in the expense of red meat. In contrary to the expense of other food categories if the education level increases, read meat expense decreases.

In seafood expenditure, the effect of years, monthly income and higher educational level are statistically significant. There is no significant difference between rural and urban areas in seafood expenditure. In terms of occupation status, controlling professional occupations the rest of the other occupational categories are statistically less likely to spend in seafood and according to regression results 11% of the seafood expenses can be accounted by the independent variables of this study (Table 8).

CONCLUSION

In this study, analyzing the raw data of household budget and consumption expenditure surveys by Turkey Statistical Institution, conducted with 51423 households between the years of 2003-2006, average food consumption in each month and expenses over 4 years of 3 different food groups, namely red meat, white meat and seafood consumption are examined in terms of income, education, occupation, rural-urban and number of person living in the households between the years 2003 and 2006 in Turkey. What ratio and how often they are consumed is given in the cross tab. According to the results, 70% of households in Turkey average consume white meat over 4 years in each month, 50% red meat and 33% seafood. Average expense in each month of 4 years is 41 TL for red meat 12 TL for white meat and 9 TL for seafood. Thus in the years between 2003 and 2006, households in Turkey pay average 62 TL in each month for the meat. When the results are summarized with households living in rural and urban, about 44% of households living in rural pay average 39 TL in each month, it is (52%) less 3 TL as in regression results for the households living in the urban. Both ratio and expense in the other 2 food groups are close to each other. In male and female households, there is not significant difference in both ratio and monthly average expense without seafood.

When we examine the socioeconomic and demographic features in the analysis, households having the lowest educational level are also in the first 20% part, as occupational category, they are in the unqualified worker and their consumption is at the low level. As in other categories, monthly average expenses among the different education levels are close to each other. However, the heads of households having the lowest education level is underlying on the average. When the results in terms of constant variables in the multiple regression analysis are summarized, red meat coefficients is 6.32 in 2004, 11.17 in 2005, 32.22 in the year of 2006 and this indicated the rise in the price of red meat (Table 8). If the education level rises while the red meat expenses decreases, seafood expenses increases.

To sum up, understanding the food preference, consumption and expense system and its relationship with the socioeconomic factors is important for the public health. When the obtained data in this study is evaluated, not buying the red meat over 4 years for the 50% of households in Turley and being at the level 33% for the fish consumption should be considered. Going up 80% from 50% through households improving the livestock industry in Turkey in the same way, going up more acceptable level of consumption rate of seafood which is low are necessary for adequate animal protein intake for the people.

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