Meat Consumption and Sustainability in Turkey

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ABSTRACT

This study was carried out to determine the amount of meat consumption by adult individuals and its affecting factors in Turkey and to evaluate them within the framework of sustainable nutrition and climate change. The study was completed with 613 adult individuals between 1-31 March 2021. It was determined that the average red meat consumption was per capita 49.34±53.73 g/day Those with an income of more than 15000 Turkish lira consumed 45.95 g more red meat than those with an income of less than 3000 Turkish lira. "Taste" was the most commonly cited reason for consuming red meat. While 60.8% of the participants reported that they would reduce their red meat consumption for environmental health, 76.7% of them stated that they would not consume artificially produced red meat. In this study, it was determined that women consumed less meat group foods than men and participants with lower incomes consumed less than those with higher incomes. The amount of red meat consumption was found to be about half of the global average. More studies are required to evaluate the effect of nutrition style on climate change in Turkey.

Türkiye'de Et Tüketimi ve Sürdürülebilirlik

ÖZET

Bu çalışma, Türkiye'de yetişkin bireylerin et tüketim miktarını ve etkileyen faktörleri belirlemek ve sonuçları sürdürülebilir beslenme ve iklim değişikliği çerçevesinde değerlendirmek amacıyla yapılmıştır. Çalışma verileri 1-31 Mart 2021 tarihlerinde 613 yetişkin bireyden toplanmıştır. Çalışmada kırmızı et tüketiminin ortalama kişi başı 49,34±53,73 g/gün olduğu belirlenmiştir. Geliri 15000 TL üstü olanların, geliri 3000 TL altı olanlara göre 45.95 g daha fazla kırmızı et tükettiği belirlenmiştir. Kırmızı et tüketme nedeni olarak "lezzet" en çok belirtilendir. Katılımcıların %60,8'i çevre sağlığı için kırmızı et tüketimini azaltabileceğini bildirirken, %76,7'si yapay olarak üretilmiş kırmızı eti tüketmeyeceğini belirtmişlerdir. Bu çalışmada kadınların erkeklerden, düşük gelirlilerin de yüksek gelirlilerden daha az miktarda et grubu besinleri tükettiği belirlenmiştir. Kırmızı et tüketim miktarı küresel ortalamanın yaklaşık yarısı kadar bulunmuştur. Türkiye'de beslenme tarzının iklim değişikliğine etkisini değerlendirecek daha fazla çalışmaya ihtiyaç vardır.

INTRODUCTION

It is possible for a society to lead a healthy life and improve its economic and social welfare with sufficient and balanced nutrition (Karacan, 2017). Meat and meat products are vital to sufficient and

balanced nutrition (Dogan, 2019). Red meat is a good source of protein with high biological value and high levels of essential amino acids. It is also the main source of intake of iron, zinc minerals, and vitamin B12 (Mann and Truswell, 2017). In terms of human health, however, the high levels of saturated and trans fatty acids in red meat and their excessive consumption lead to cardiovascular diseases and cancer (Struijk et al., 2018). Meat consumption has helped in the development of humanity, but it has also drastically changed nutritional habits in the last century. In previous studies, it was reported that the meat demand increased by 204% between 1960 and 2010 (Basu, 2015) and by 500% between 1992 and 2016 (Katare et al., 2020). In the last 20 years, a 58% increase has been observed in global meat demand (Whitnall and Pitts, 2019) and it is expected that the market will expand by another 15% by 2027 (OECD/FAO, 2018). The most important reasons for this growing demand were found to be population growth, economic growth, and changes in nutrition (FAO, 2018).

The average global meat consumption is 100 g per person per day, while this value is half of the global average in underdeveloped countries and twice the global average in developed countries (Clonan et al., 2016). Europeans consume an average of 36% more meat than the amount recommended in their nutritional guidelines and 49% more meat than the amount recommended by the EAT-Lancet Commission's planetary health diet (Springmann et al., 2020). The high levels of meat and animal protein consumed in Europe are considered not only unsustainable but also extremely unhealthy (Willett et al., 2019). While there are relatively few publications on the amount of meat consumption in Turkey, it is known that meat consumption varies according to socioeconomic status, especially in studies conducted in the fields of nutrition and dietetics. However, the needs of people do not change according to their economic situation.

According to the Turkish Dietary Guidelines, the meat group nutrient requirement is 2.5-3 servings per day for adults and teenagers. One serving equals 80 g of cooked red meat and chicken, 150 g of cooked fish, 130 g of cooked legumes, 30 g of hazelnuts and walnuts, or 2 eggs (Pekcan et al., 2016). According to data from the 2019 Turkish Nutrition and Health Survey (TNHS), average total meat group consumption per person is 86.25 g (39.09 g red meat, 28.24 g poultry, 13.17 g fish, 3.31 g meat products, and 2.48 g other) (Turkey Nutrition and Health Survey, 2020). According to the 2020 data from the Organisation for Economic Co-operation and Development (OECD), the total amount of red meat consumed per capita in the world is 22 kg/year; this rate is 39 kg/year in developed countries while it is

2.85 kg in underdeveloped countries. The total consumption of red meat in Turkey is 12.5 kg/year. This amount of meat is below both the world's average and the average of developed countries (OECD-FAO, 2021). Furthermore, according to 2019 data TNHS, the total average protein intake in Turkey is 83.4 g and 58.6 g in adult men and women, respectively. Women consume 60.8% vegetable protein, while men consume 57.6% (Turkey Nutrition and Health Survey, 2020). Vegetable protein intake is higher in Turkey than meat protein intake. In the world, 57% of protein intake is provided by vegetables, 18% by meat, 10% by milk and dairy products, 6% by fish and shellfish, and 9% by other animal foods (Lonnie et al., 2018). However, the main source of protein in Western societies is animal foods, accounting for two-thirds of daily protein intake (Sanchez-Sabate and Sabaté, 2019). At the same time, the negative effects of excessive intake of animal protein on health are known and the related environmental damage is one of the most discussed issues today. The increase in red meat production due to the increase in consumption of animal proteins is known to cause a decrease in diversity and deforestation with more land use, increase greenhouse gas emissions, and cause water and soil pollution. (Godfray et al., 2018). Sustainability of the environment is essential for nutrition and the continuation of all life. It is now clear that the meat demand of the estimated 9.8 billion population for 2050 will not be able to be met. Moreover, the effects of this supply and demand intensity on natural resources and the environment pose irreversible danger for the future (Masson-Delmotte et al., 2018). In a previous study, the requirements for obtaining 1 kg of protein from beef and from kidney beans were compared. It was found that beef requires 18 times more land, 10 times more water, and 9 times more fuel (Sabate and Soret, 2014). There is an urgent need to change the current lifestyle and consumption habits for both planetary and human health (González et al., 2020). It was found that, by 2050, if meat consumption can be reduced in accordance with a sustainable nutrition model, food related greenhouse gas emissions will be reduced by 29-70% (Springmann et al., 2016). In a study conducted by Vatanparast et al., they calculated that if 25-50% of animal foods were replaced with plant foods, it would result in a 25-40% reduction in greenhouse gas emissions, a 40% reduction in nitrogen emissions, and 23% less use of plantation land per person for food production (Vatanparast et al., 2020).

The EAT-Lancet Commission's successive publications on healthy eating and sustainable food systems and the Intergovernmental Panel on Climate Change's Special Report on Climate Change and Land highlighted the need to reduce meat

consumption at the forefront of the debate on sustainability and food (Sahakian et al., 2020). Considering the global importance of this situation, it is crucial to determine the amount of meat consumption in Turkey. This study therefore aims to determine the amount of meat consumption and its affecting factors in Turkey and to discuss meat consumption within the framework of sustainable nutrition.

MATERIAL and METHODS
Study Design and Participants
This study is a cross-sectional study conducted March 1-31, 2021, via an online survey. The target audience comprised individuals between the ages of 18 and 65 living in Turkey. The exclusion criteria were pregnancy, lactation, having cancer, living abroad, ages under 18 and over 65, and surveys with unanswered questions or with typing mistakes as obtained for height and weight values. Digital informed consent was obtained from participants confirming their willingness to voluntarily participate before they completed the online survey. The study was conducted in accordance with the principles of the Declaration of Helsinki. The study protocol was approved by the University of Health Sciences Research Ethics Committee on February 19, 2021, with registration number 21/190.

There were 631 participants who met the study inclusion criteria. However, due to representing deviant samples, 9 vegans, 5 primary school graduates, and 4 secondary education graduates were excluded from the study. The study was completed with 613 people.

Data Collection
Survey questions were created to include images of food portion sizes. The survey consisted of 3 sections and 41 questions. The first section had 11 questions related to sociodemographic variables such as gender, age, education level, income level, employment status, place of residence, marital status, and professional status. Furthermore, body weight (kg) and height (cm) measurements were requested to calculate body mass index (BMI). In the second section, there were a total of 24 questions. The frequency and amount of consumption of meat group foods (red meat (bovine and ovine meat, offal, processed meat), poultry such as chicken and turkey, fish, shellfish, legumes, and oilseeds) included in the Turkish Dietary Guidelines were asked (Pekcan et al., 2016). Considering consumption in the last 30 days, participants were asked to mark the consumption frequency for each food separately. Consumption frequencies were grouped as "every day," "5-6 times a week," "3-4 times a week," "1-2 times a week," "once in 15 days," "once a month," and "never." At the same time, the

participants were asked how much (amount) they ate of the food at one time for each food for which they had indicated frequency of consumption. Images showing portion sizes for portions, basis weights, or quantities were added. Participants marked their answers according to their consumption amounts. In the third section of the survey, 6 questions were included to examine the impact of red meat consumption on the environment and animal welfare, artificial meat consumption, vegan or vegetarian status and reasons for being so, reasons for consuming meat, and whether there was any fear of catching diseases that can be transmitted from animal foods.

Statistical Analysis
Categorical variables were summarized as numbers and percentages and numerical variables as averages and standard deviations. One-way analysis of variance was employed to analyze whether there was a statistically significant difference between the means of the groups. Multiple linear regression was conducted to clarify the factors associated with meat consumption. While categorical variables were included in the model, dummy variable coding was done. With the backward elimination method, the variables that contributed the least to the model were removed from the model, respectively, and the final model was obtained. In the backward elimination method, beginning from the first model, the variable with the highest value that has the cut-off value above $P > 0.10$ was removed and step by step the same method was applied in each new formed model. The model was stopped when the p-value of all variables in the model was below 0.10. All of the variables that were thought to have a relation with red meat, chicken, and fish consumption (sex, age, education status, marital status, occupation status, income status, chronic disease status, BMI categories, household size (number of people), legume consumption g/d; oilseed consumption g/d) were included in the multiple linear regression model. With the backward elimination method, the variables that contributed the least to the model were removed from the model, respectively, and the final model was obtained. The left variables from the first model to the final model were for red meat consumption as follows: income status, age and BMI categories, legume consumption g/d; oilseed consumption g/d); for chicken consumption as follows: gender, marital status, age, education status, legume consumption g/d; oilseed consumption g/d); and for fish consumption as follows: gender, chronic disease status, income status, oilseed consumption g/d. The distributions of the residuals (normal/symmetrical distribution and predictive versus residual plots) were examined for the model validity. The R square

adjusted R-square and SE values obtained at each step showed very small changes, and the simplest model was preferred according to the parsimony principle. The significance level was accepted as 5%. Data were analyzed with IBM SPSS Statistics for Windows version 26 (IBM SPSS, 2019).

RESULTS and DISCUSSION

The study was completed with 613 people with an average age of 34.49±13.04 years. Participants were at least high school graduates, and more than half (54.6%) were university graduates. According to their employment status, 54.3% of the participants had a job that generated income. In terms of the income distribution, 30.3% of the participants had an income of 3000-6000 Turkish lira (TL), while 31.3% of them had an income of 6001-10000 TL (Table 1).

There is increasing evidence of the negative effects of meat consumption on the environment and health. Calls to reduce meat consumption for global environmental health, human health, and animal welfare continue to increase worldwide.

Table 1. General characteristics of the participants
Çizelge 1. Katılımcıların genel özellikleri

Characteristics	Categories (Kategoriler)	(n=613) n (%)	Mean ± SD**
Sex (Cinsiyet)	Male	168 (27.4)	
	Female	445 (72.6)	
Age (years) Yaş (yıl)	18-30	317 (51.7)	34.49 ± 13.04
	31-50	201 (32.8)	
	51-65	95 (15.5)	
Marital Status (Medeni Durum)	Married	280 (45.7)	
	Single	333 (54.3)	
Educational Status (Eğitim Durumu)	High school graduate	188 (30.7)	
	Undergraduate	335 (54.6)	
	Postgraduate	90 (14.7)	
Employment Status (Çalışma Durumu)	Student	144 (23.5)	
	Unemployed	72 (11.7)	
	Employed	333 (54.3)	
	Retired	64 (10.4)	
Household Population (Hanedeki Nüfus Sayısı)	1 or 2 people	183 (29.9)	3.24 ± 1.32
	3 people	172 (28.1)	
	4 people and more	258 (42.1)	
Household Income (TL)* (Hane Geliri (TL))	< 3.000	55 (9.0)	
	3.000-6.000	186 (30.3)	
	6.001-10.000	192 (31.3)	
	10.001-15.000	113 (18.4)	
	> 15.000	67 (10.9)	
Presence of Chronical Diseases (Kronik Hastalık Durumu)	Yes	125 (20.4)	
	No	488 (79.6)	
Body Mass Index (kg / m²) (Beden Kütle İdeksi (kg / m²))	Underweight	47 (7.7)	24.34 ± 4.85
	Normal weight	334 (54.5)	
	Overweight	163 (26.6)	
	Obese	69 (11.3)	

*: According to the average exchange rate of dollar in March 2021. 1 $ = 7.62 TL; **: Standard Deviation

For many, consuming meat is a traditional social practice reinforced by economic, ecological, technological, and institutional factors, including media and marketing. In this study, the majority of the participants stated that they would reduce their meat consumption if asked to do so for environmental health and animal welfare, and about half of them stated that they were afraid of catching diseases transmitted by animal food consumption (Table 2). However, it is known that even though most people state that they intend to reduce their meat consumption for global environmental health and animal welfare, they do not turn that intention into behavior (Stubbs et al., 2018). The main reasons for this may be habits and cultural factors. It is thought that determining the individual characteristics associated with the satisfaction obtained from meat-free foods may facilitate their marketing (Pohlmann, 2021). In this study, when participants were asked their reasons for consuming animal products, most of

them reported consuming meat because they found it delicious (51.1%) (Table 2).

Table 2. Distribution of the participants according to their opinions about reducing meat consumption and artificial meat consumption due to environmental damage and animal welfare, fear of diseases that can be transmitted by animal foods and reasons for red meat consumption (n=613)

Çizelge 2. Katılımcıların çevre ve hayvan refahına zararı nedeniyle et tüketimini azaltma ve yapay et tüketimi ile ilgili düşünceleri, hayvansal besinler ile bulaşabilecek hastalıklardan korkma durumları ve kırmızı et tüketme nedenlerine göre dağılımları (n=613)

	n	%
Would you reduce your red meat consumption due to its environmental effects?		
(Çevresel etkisi nedeniyle kırmızı et tüketiminizi azaltır mısınız?)		
Yes *(Evet)*	373	60.8
No *(Hayır)*	114	18.6
Not sure *(Kararsızım)*	126	20.6
Would you reduce your red meat consumption for animal welfare?		
(Hayvan refah için kırmızı et tüketiminizi azaltır mısınız?)		
Yes *(Evet)*	322	52.5
No *(Hayır)*	139	22.7
Not sure *(Kararsızım)*	152	24.8
Would you consume artificially produced red meat?		
(Yapay olarak üretilmiş kırmızı et tüketir misiniz?)		
Yes *(Evet)*	61	9.9
No *(Hayır)*	470	76.7
Not sure *(Kararsızım)*	82	13.4
Are you afraid of diseases that can be transmitted from animal foods?		
(Hayvansal besinlerden bulaşacak hastalıklardan korkuyor musunuz?)		
Yes *(Evet)*	241	39.3
No *(Hayır)*	271	44.2
I do not know about the diseases *(Hastalıkları bilmiyorum)*	101	16.5
What are the reasons for your red meat consumption? *		
*(Kırmızı eti yeme nedenleriniz nedir? *)*		
Delicious *(Lezzetli)*	313	51.1
Source of protein *(Protein kaynağı)*	189	30.8
Healthy *(Sağlıklı)*	103	16.8
Habit *(Alışkanlık)*	71	11.6
Necessary for life *(Yaşam için gerekli)*	59	9.6
Vitamin content *(Vitamin almak için)*	45	7.3
Fulfilling *(Doyurucu)*	20	3.3
Iron content *(Demir minerali almak için)*	17	2.8
Easy to cook *(Pişirmesi kolay)*	8	1.3
Helps to get skinny *(Zayıflatıcı)*	3	0.5

*Evaluated over more than one answer.

Artificial meat produced from animal cells in a laboratory environment has recently started to be used commercially. However, it is unclear to what extent artificially produced meat will be accepted by consumers, especially in Turkey. In line with this, in this cross-sectional study, almost 4 out of 5 participants stated that they would not consume artificially produced meat (Table 2). In a study conducted by Siegrist and Sütterlin, it was concluded that even though it is known that artificially produced meat is more environmentally friendly and less harmful to animals, a decrease in perceived naturalness during consumption will reduce the acceptability of the product (Siegrist and Sütterlin, 2017). The acceptability of artificial meat is also thought to depend, in part, on how the product is presented. In another study, the terms "clean meat," "cultured meat," "animal-free meat," and "meat produced in the laboratory" were used for artificial meat and the attitudes and behavioral intentions of consumers toward the product were examined. According to the results, the expressions "clean meat" and "animal-free meat" caused significantly more positive responses compared to the expression "meat produced in the laboratory" (Bryant and Barnett, 2019). The question in this study used the word "artificial," and we do not know whether the use of that particular word changed the responses. Further

studies can be conducted on this subject.

It is known that both high inflations of food prices and inequalities in income distribution have a significant impact on nutritional status in Turkey. In particular, it was determined that meat consumption was strongly associated with economic factors (Turkey Nutrition and Health Survey, 2020) and that

the average meat consumption was below the global average (OECD-FAO, 2021). In this study, the daily average amount of total amount of bovine and ovine meat consumption of all participants was found to be 49.34±53.73 g (Table 3). This value is the same as the average for an undeveloped country (Clonan et al., 2016).

Table 3. Evaluation of the daily consumption of the meat group foods of participants (n=613)
Çizelge 3. Katılımcıların et grubunda yer alan besinleri günlük tüketim miktarlarının değerlendirilmesi

Meat Group Foods (Et grubunda yer alan besinler)	Mean (Ortalama)	SD*	Min. - Max.
Bovine meat (Büyükbaş hayvan eti)	34.96	39.32	0 - 302.5
Ovine meat (Küçükbaş hayvan eti)	14.38	25.98	0 - 175
Total red meat (Toplam kırımız et)	49.34	53.73	0 - 412.8
Chicken (Tavuk eti)	36.04	42.70	0 - 300
Fish (Balık eti)	38.16	48.80	0 - 375
Egg (Yumurta)	40.06	35.53	0 - 150
Offal (Sakatat)	3.80	13.32	0 - 235.8
Salami, sausage (Salam, sosis)	28.21	30.24	0 - 200
Traditional dried sausage (Sucuk)	46.05	43.81	0 - 300
Legumes (Baklagiller)	30.11	31.12	0 - 235.8
Oilseeds (Yağlı tohumlar)	18.88	20.77	0 - 90

*: Standard Deviation

In table 4, the daily average consumption of eggs, offal, legumes, and oilseeds is compared according to age, BMI, education level, employment status, marital status, number of people living in the household, income level, and presence of chronic diseases. While there was no significant difference in egg, offal, and oilseed consumption according to age, BMI, or education level, there were significant differences for legume consumption (p=0.003, p=0.001, p=0.002 respectively). There was a significant difference in the consumption of eggs and legumes among employment status (p=0.005, p=0.001 respectively). Students compared to other occupational groups, the daily average consumption of eggs and legumes was higher. Single people consumed more legumes than married respondents and the difference was significant (p=0.002). There was a significant difference for oilseed consumption only among income levels (p=0.001). The oilseed consumption of those with an income above 15000 TL was higher compared to the other groups (Table 4). Oilseeds have high protein content apart from fatty acid contents. Oilseeds are important in terms of both having a positive effect on nutritional status and causing limited environmental damage. But oilseed production in Turkey is faced with political problems, issues of product variety, and the climate and soil conditions of the regions in which those plants are grown. It was reported that oilseed products are expensive and individuals with lower incomes consume them less (Kıllı and Beycioğlu, 2019). In this study, oilseed consumption was found to be significantly higher among those with the highest

incomes (Table 4). In the 2019 EAT-Lancet planetary health diet, 25 g of oil seeds and 25 g of nuts are recommended daily (Willett et al., 2019). In this study, a significant difference was found in the levels of consumption of legumes, which are good vegetable protein sources, for age, education, employment status, marital status, and BMI (Table 4). However, it was seen that no group consumed legumes as much as recommended (Pekcan et al., 2016).

The results of multiple regression analysis applied with the backward Euler method and the variables that were found to have significant relationships with red meat, chicken, and fish consumption are shown in Table 5. For each 1 g increase in legume consumption, red meat consumption increased by an average of 0.151 g, and for an increase of 1 g in oilseed consumption, red meat consumption increased by an average of 0.388 g. For each 1 g increase in legume consumption, chicken meat consumption increased by an average of 0.201 g, and for an increase of 1 g in oilseed consumption,

chicken meat consumption increased by an average of 0.339 g. For each 1 g increase in oilseed consumption, fish meat consumption increased by an average of 0.386 g (Table 5). Those with the highest incomes consumed approximately 46 g more red meat per day than those with the lowest incomes (Table 5). There are very limited studies examining the effects of high inflation of food prices on nutrition in Turkey. In one of those few studies, it was determined that the income level of 149 health workers significantly affected their consumption of red meat (Alparslan and

Table 4. Comparison of participants' average daily consumption of eggs, offal, legumes and oilseeds according to general characteristics

Çizelge 4. Katılımcıların günlük ortalama yumurta, sakatat, baklagiller ve yağlı tohum tüketimlerinin genel özelliklerine göre karşılaştırılması

General Characteristics (Genel Özellikleri)	Eggs Day/Amount (Yumurta Gün/ Miktar)			Offal Day/Amount (Sakatat Gün/ Miktar)			Legumes Day/Amount (Baklagiller Gün/ Miktar)			Oilseeds Day/Amount (Yağlı Tohumlar Gün/ Miktar)		
	n	$\bar{x}$	F-P	n	$\bar{x}$	F-P	n	$\bar{x}$	F-P	n	$\bar{x}$	F-P
Age Group (Yaş grupları)												
18-30	317	41.212		317	2.718		317	34.189		317	20.472	
31-50	201	40.314	F=0.899 P=0.407	201	5.424	F=2.557 P=0.078	201	26.549	F=5.927 P=0.003*	201	16.747	F=2.069 P=0.127
51-65	95	35.661		95	3.954		95	24.062		95	18.075	
BMI Group (BKİ grup)												
Underweight (Zayıf)	47	50.249		47	1.691		47	47.077		47	23.06	
Normal weight (Normal Kilolu)	334	37.677	F=2.222 P=0.084	334	3.051	F=2.000 P=0.113	334	31.206	F=7.134 P=0.001*	334	19.87	F=2.602 P=0.051
Overweight (Fazla Kilolu)	163	42.875		163	4.786		163	25.944		163	17.951	
Obese (Şişman)	69	37.979		69	6.506		69	23.131		69	13.426	
Educational Status (Eğitim Durumu)												
High school (Lise)	188	42.201		188	3.05		188	36.264		188	17.336	
Undergraduate (Üniversite)	335	40.132	F=1.151 P=0.317	335	3.696	F=1.257 P=0.285	335	28.496	F=6.397 P=0.002*	335	19.453	F=0.769 P=0.464
Postgraduate (Lisansüsüt)	90	35.299		90	5.733		90	23.294		90	19.964	
Employment Status (İş Durumu)												
Student (Öğrenci)	144	47.826		144	2.355		144	39.518		144	20.415	
Employed (Çalışan)	72	45.116	F=4.327 P=0.005*	72	1.456	F=2.103 P=0.099	72	26.917	F=5.901 P=0.001*	72	21.536	F=1.082 P=0.356
Unemployed (Çalışmıyor)	333	36.16		333	4.919		333	27.49		333	18.085	
Retired (Emekli)	64	37.165		64	3.838		64	26.209		64	16.565	
Marital Status (Medeni Durum)												
Married (Evli)	280	39.187	F=0.309 P=0.579	280	3.675	F=0.043 P=0.835	280	25.932	F=9.438 P=0.002*	280	17.243	F=3.21 P=0.074
Single (Bekar)	333	40.789		333	3.90		333	33.631		333	20.255	
Household Population												
1 or 2 people (1 veya 2 kişi)	183	35.217		183	3.419		183	24.685		183	17.906	
3 people (3 kişi)	172	36.162	F=6.564 P=0.002*	172	3.622	F=0.196 P=0.822	172	27.451	F=7.802 P=0.001*	172	17.779	F=1.048 P=0.351
4 people and more (4 ve üzeri)	258	46.087		258	4.182		258	35.741		258	20.303	
Income Status (TL) (Gelir Durumu (TL))												
< 3.000	55	40.147		55	1.611		55	24.725		55	9.509	
3.000-6.000	186	35.604		186	4.441		186	32.932		186	15.644	
6.001-10.000	192	41.662	F=1.439 P=0.22	192	4.045	F=0.983 P=0.416	192	28.21	F=1.706 P=0.147	192	19.662	F=8.028 P=0.001*
10.001-15.000	113	40.631		113	2.487		113	27.897		113	22.294	
>15.000	67	46.779		67	5.303		67	35.913		67	27.547	
Presence of Chronical Diseases (Kronik Hastalık Durumu)												
Yes (Evet)	125	43.462	F=1.443 P=0.23	125	4.144	F=0.106 P=0.745	125	31.011	F=0.13 P=0.718	125	19.995	F=0.453 P=0.501
No (Hayır)	488	39.185		488	3.708		488	29.885		488	18.593	

*: P<0.05, significance level.

Table 5. Multiple Linear Regression Analysis of the determinants of intake red meat, fish meat and chicken meat
Çizelge. Kırmızı et, balıketi ve tavuk eti tüketiminde etkili faktörler için elde edilen modellerin sonuçları

Regression model for red meat consumption
(Kırmızı et tüketimi için regresyon modeli)

Associated Factors *(İlişkili Faktörler)*	B	Std. Err.	Beta	t	P	95,0% CI for B	
						Lower Bound	Upper Bound
(Constant)	44.537	11.023		4.040	0.000	22.890	66.185
Gender *(Cinsiyet)*	-23.045	4.679	-0.191	-4.925	0.000	-32.235	-13.855
Age=51-65 *(Yaş=51-65)*	-11.365	5.816	-0.077	-1.954	0.051	-22.787	0.057
*BMI=Overweight *(*BKİ=Fazla Kilolu)*	14.470	4.999	0.119	2.894	0.004	4.651	24.288
BMI=Obese *(BKİ=Şişman))*	24.878	6.617	0.146	3.760	0.000	11.883	37.873
Income=3000-6000 *(Gelir=3000-6000)*	19.320	7.591	0.165	2.545	0.011	4.411	34.229
Income=6001-10000 *(Gelir=6001-10000)*	32.781	7.591	0.283	4.318	0.000	17.872	47.690
Income=10001-15000 *(Gelir=10001-15000)*	36.094	8.196	0.261	4.404	0.000	19.998	52.190
Income=Over 15000 *(Gelir=15000 üstü)*	45.952	9.167	0.267	5.013	0.000	27.948	63.955
Legume consumption (g / day) *(Kurubakalgil tüketim miktarı g / gün)*	0.151	0.068	0.088	2.221	0.027	0.018	0.285
Oily seed consumption (g/day) *(Yağlı tohum tüketim miktarı g / gün)*	0.388	0.103	0.150	3.755	0.000	0.185	0.592

R Sqr=0.182; Adj. R Sqr=0.168; Std. Error of the Estimate=49.001; F=13.375; P<0.01; * Body Mass Index, Beden Kütle İndeksi

Regression model for chicken meat consumption
Tavuk eti tüketimi için regresyon modeli

Associated Factors *(İlişkili Faktörler)*	B	Std. Err.	Beta	t	P	95,0% CI for B	
						Lower Bound	Upper Bound
(Constant)	39.497	9.838		4.015	0.000	20.176	58.817
Gender *(Cinsiyet)*	-18.367	3.780	-0.192	-4.860	0.000	-25.790	-10.945
Marital status *(Medeni durum)*	9.580	3.655	0.112	2.621	0.009	2.401	16.758
Age=51-65 *(Yaş=51-65)*	-8.738	4.916	-0.074	-1.778	0.076	-18.393	0.916
Education=Postgraduate *(Eğitim=Lisansüstü)*	-13.949	4.749	-0.116	-2.937	0.003	-23.276	-4.623
Employment=Employed *(İş durumu=Çalışan)*	8.141	3.803	0.095	2.140	0.033	0.671	15.610
Legume consumption (g/day) *(Kurubaklagil tüketim miktarı g / gün)*	0.201	0.055	0.146	3.624	0.000	0.092	0.309
Oily seed consumption (g/day) *(Yağlı tohum tüketim miktarı g / gün)*	0.339	0.082	0.165	4.150	0.000	0.179	0.500

R Sqr=0.14; Adj. R Sqr=0.13; Std. Error of the Estimate=39.822; F=14.086; P<0.01

Regression model for fish meat consumption
Balık eti tüketimi için regresyon modeli

Associated Factors (*İlişkili Faktörler*)	B	Std. Err.	Beta	t	P	95,0% CI for B	
						Lower Bound	Upper Bound
(Constant)	52.377	8.752		5.984	0.000	35.189	69.565
Gender (*Cinsiyet*)	-8.582	4.341	-0.079	-1.977	0.049	-17.108	-0.056
Presence of chronical diseases (*Kronik hastalık varlığı*)	-10.413	4.787	-0.086	-2.175	0.030	-19.814	-1.012
Income=Over 15000	14.624	6.277	0.094	2.330	0.020	2.296	26.952
Oily seed consumption (g/day) (*Yağlı tohum tüketim miktarı g / gün*)	0.386	0.094	0.164	4.105	0.000	0.201	0.570

R Sqr=0.053; Adj. R Sqr=0.047; Std. Error of the Estimate=47.634; F=8.581; P<0.01

Demirbaş, 2020). Moreover, a study conducted in one of the Turkish provinces in which animal husbandry is performed concluded that monthly income has a statistically significant effect on the frequency of consuming red meat (Özyürek et al., 2019). The low amount of meat consumption in Turkey can be considered more beneficial in terms of avoiding environmental damage and especially the damage caused by beef farming. However, inequality in income distribution in developing countries must be taken into account. In the context of sustainable nutrition and the environment, calls for individuals with higher income levels to reduce their consumption may be necessary. At the same time, according to the EAT-Lancet Commission's report, these levels of consumption are above the recommendations for red meat (14 g), chicken (29 g), eggs (13 g), and fish (28 g) as animal foods for a sustainable environment (Willett et al., 2019). Although prices affect food intake in Turkey, it was still observed that the participants consumed animal foods in amounts above those recommended by the EAT-Lancet Commission report. On the contrary, the consumption of legumes and oilseeds, which are sources of vegetable protein, is less than half of what is recommended (Pekcan et al., 2016). It is known that this situation adversely affects human health as well as the environment.

Women report being vegetarian or vegan more often than men. Moreover, it is noted that men tend to try to justify meat consumption more strongly than women (Mertens et al., 2020). In a study conducted by Baba et al. in Romania, it was found that the amount of beef consumption was higher among men than women and also, it was determined that the age groups in which individuals take care of their health most among both men and women were the age groups over 50 years old and 21-30 years old (Baba et al., 2016). In a study conducted by Mota et al. in France, it was determined that participants of both sexes consumed more meat than recommended, and the average daily meat consumption was higher in men (Mota et al., 2021). In this study, it was determined that women consumed less red meat, chicken meat, and fish meat compared to men, and individuals over the age of 51 consumed less meat compared to the age group of 18-30 (Table 5). In a study conducted in China, it was stated that increased red meat consumption was associated with larger waist circumference and abdominal obesity, especially in men (Wang et al., 2014). Another study conducted in Iran reported that red meat consumption was positively and significantly related not to general obesity but to abdominal obesity (Dabbagh-Moghadam et al., 2017).

It is an undeniable fact that the worldwide increasing trend of meat consumption poses a great risk when environmental health, human health, and animal welfare are considered. It is obvious that nutritional habits regarding meat consumption in general and especially red meat should be changed as quickly and significantly as possible. This has caused initiatives, companies, and brands that produce artificial meat or advocate plant-based nutrition to emerge, such as "Green Monday" initiatives (Hong Kong) or the Beyond Meat and Impossible Foods companies (USA), in order to combat climate change and global food insecurity (Cheah et al., 2020). Despite all these attempts, many difficulties are encountered in reducing meat consumption. Barriers to reducing meat consumption may include the nutritional value of meat, food neophobia, habitual behaviors, implementation difficulties, debates about vegetarianism and veganism, attachment to a social group, and the desire to be loved (Cheah et al., 2020; Hielkema and Lund, 2021).

Concern about the future of the world is increasing day by day. In particular, the pressure created by climate change shows that urgent measures must be taken. It is highly crucial that all countries of the

world share the responsibility in this regard and do their part.

There are some limitations to the study. One of the limitations of this study was that consumption data were based on personal remember. Therefore, the participants might have thought that they eat more or less about their consumption. On the other hand, this study was performed online by participants that had access to the internet and equipment such as computers and tablets. This equipment is closely related both to education and economic status. As a result of this situation, the undergraduate and postgraduate participants constituted the majority of the participants in the study.

CONCLUSIONS

In this study, it was determined that BMI, income level, and age were effective in the amount of red meat consumed. Those who stated that they would limit their meat consumption for environmental health and animal welfare constituted the majority of the participants. This sensitivity of the participants to the environment is quite encouraging because it is well recognized that the natural equilibrium of the world's ecosystems is degrading on a daily basis. Global biocapacity must be conserved in order for the resources we utilize to meet today's demands to use by future generations. As far as we are aware, this study is the first study of its kind to be conducted in Turkey. It is essential to create government policies that give due importance to climate change and sustainability for the environment, nutrition, and life. Therefore, in order for the notion of sustainable nutrition to have an impact on society, both individual and social measures, as well as administrative policies, are required.

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Author Contributions

The contribution of the authors is equal.

Conflicts of Interest

The authors declare no potential conflicts of interest.

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