



Evaluation of awareness, knowledge, and attitudes level of sustainable nutrition in different age groups: A cross-sectional study

Nilüfer Acar Tek ¹ , Merve Şeyda Karaçıl Ermumcu ² , Nazlıcan Erdoğan Gövez ^{1*} ,
Merve Esra Çıtar Dazıroğlu ¹ 

¹Department of Nutrition and Dietetics, Faculty of Health Sciences, Gazi University, Ankara, TÜRKİYE

²Department of Nutrition and Dietetics, Faculty of Health Sciences, Akdeniz University, Antalya, TÜRKİYE

*Corresponding Author: nazlicanerdogan@gazi.edu.tr

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ABSTRACT

Sustainable nutrition have become widespread throughout the world. It was aimed to question the awareness, knowledge and the attitude of sustainable nutrition in individuals in wide age range. This cross-sectional study was conducted with 3,498 volunteers (1,575 male and 1,923 female) between the ages of 18-95. The questionnaire form was by face to face interview method. The concept of sustainable nutrition was heard higher in women (22.7%), those living in urban areas (22.8%) and in the 18-24 age group (26.6%) ($p<0.05$). Almost half (49.1%) of the individuals aged 65+ had no idea about the best practice about sustainable nutrition and as the age of the group increased, the knowledge decreased ($p<0.05$). Only %6 of the individuals heard about the food mile, while the most heard concept was the carbon footprint (28%). There are differences in the attitudes of individuals regarding sustainable nutrition according to gender, age and region of residence.

Keywords: sustainability, nutrition, sustainable nutrition, eco-nutrition, awareness of sustainability

INTRODUCTION

It has been stated that the world population could increase by two billion in the next thirty years to 9.7 billion and in 2100 to 11.0 billion [1]. Because of the increasing population and the climate change, world resources—especially food resources—will decrease. The decrease in arable agricultural lands, changes in the nutritional habits of individuals and the increase in food consumption made it difficult to provide food security. In other words, it is difficult to provide physical and economical access to adequate, balanced, safe and nutritious food for people around the world to protect, maintain and improve their health [2]. It was reported that 1.3 billion people experienced food insecurity worldwide in 2018 [3]. This situation leads to the emergence of malnutrition, obesity, and noncommunicable diseases (NCDs) at both individual and population levels [4]. It has been reported by Food and Agriculture Organization (FAO) that more than 820 million individuals around the world cannot meet their basic nutritional needs and suffer from hunger [5]. It has been stated that hidden hunger (insufficiency of vitamins and minerals) will reach two billion people in 2050 [3, 6, 7]. In addition, it has

been stated by World Health Organization (WHO) that around two billion adults and 41 million children under the age of five are overweight, more than 650 million adults and more than 340 million children and adolescents between the ages of 5-19 are obese [8].

Sustainable nutrition has gained importance in the prevention of hunger, NCDs—especially obesity—and in the continuation of life. Even today, the importance of sustainable nutrition has been demonstrated in pandemic periods, especially in the coronavirus (COVID-19) epidemic. Individuals' food preferences have an important role in the specified situations and health problems. Suggestions made for preventing hunger and regulating the food preferences of individuals contributed to the emergence of the concept of "sustainable nutrition" [9]. Sustainable nutrition is defined as "those diets with low environmental impacts, which contribute to food and nutrition security and to healthy life for present and future generations." Sustainable diets are protective and respectful of biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable; nutritionally adequate, safe and healthy; while optimizing natural and human resources [9, 10]. It has an important role in ensuring the continuity of human life by

contributing to the health of both people and the environment [11, 12].

In order for the concept of sustainable nutrition to affect the society; it is necessary to take individual and social precautions and to develop policies. Sustainable nutrition is closely related to more than half of the sustainable development goals identified by United Nations (UN) as the “no poverty”, “zero hunger”, “reduce inequalities”, “responsible consumption and production” and “climate change”. These goals are expected to be achieved worldwide by 2030 because each has nutrition-related indicators [13]. Thus, providing sustainable nutrition is one of the most important step to be taken in improving, developing and maintaining the nutritional status of a society, health, education, employment, women’s empowerment, inequality and poverty. Sustainable nutrition will make a significant contribution to improving in health, environment, economy, education and well-being worldwide.

The issue of sustainability and especially sustainable nutrition has become widespread throughout the world recently and significant international initiatives have been taken in this regard. Unfortunately, the awareness of sustainability and sustainable nutrition in our country has not yet reached the desired level. There are very few studies conducted on the concept of sustainability and sustainable nutrition in our country. In this study, it was aimed to question the awareness, knowledge and the attitude of sustainable nutrition in individuals in a wide age range.

MATERIALS AND METHODS

This cross-sectional study was conducted between January and May 2019 with 3,498 volunteers (1,575 male and 1,923 female) between the ages of 18-95.

In this study, which aimed to evaluate the awareness, knowledge and attitude of individuals about sustainable nutrition, a questionnaire form was applied to the individuals by face to face interview method. The questionnaire form consisted of six sections that include questions on general and health information, nutritional habits, awareness, knowledge and attitude of individuals on sustainable nutrition. The individuals’ awareness of sustainable nutrition, whether they have heard of sustainable nutrition and where they heard about it were questioned. In addition, their knowledge on sustainable nutrition, related definitions (carbon footprint, water footprint, ecological footprint, and food mile), environmental factors, the relationship of sustainable nutrition and health have been questioned. On the other hand, their practices or attitudes towards sustainable nutrition were evaluated by questioning food preferences related to sustainable nutrition (such as preferring fish instead of red meat).

SPSS 23.0 program was used to evaluate the data obtained. Qualitative variables were expressed as number (S) and percentage (%), quantitative variables as mean (M) and standard deviation (SD) (M±SD). Chi-square test was used to determine the relationship between categorical variables. In all analyzes, $p < 0.05$ was accepted as a statistically significant difference.

Table 1. Socio-demographic characteristics

Socio demographic variables	n	%
Gender		
Men	1,575	45.0
Women	1,923	55.0
Education level		
Secondary school and below	741	21.1
High school	1,190	34.0
University	1,567	44.8
Age (year)		
18-24	1,173	33.5
25-40	1,186	33.9
41-64	1,033	29.5
>65	106	3.0
Occupation		
Yes	1,462	41.8
No	2,036	58.2
Place of residence		
Urban	2,825	80.8
Rural	673	19.2

RESULTS

The individuals included in the study were between the ages of 18-95, with an average age of 34.6 ± 13.93 years and 55% of the participants were women. It has been reported that almost half of the individuals are university graduates (44.8%), more than half of them (58.2%) do not work, and more than half of them (80.8%) live in urban areas (Table 1).

The evaluation of individuals’ awareness of sustainable nutrition specific to gender, age group and place of residence were shown in Table 2. Only one-fifth (21.1%) of the individuals stated that they had heard about the concept of sustainable nutrition before (the data was not shown in Table 2). It was determined that the concept of sustainable nutrition was heard higher in women (22.7%), those living in urban areas (22.8%) and individuals in the 18-24 age group (26.6%) ($p < 0.05$). When all individuals were questioned about the concept of sustainable nutrition, it was stated that they heard most through the internet (23.8%), dietician (20.8%) and social media (17.6%) (the data was not shown in Table 2). If we consider the main source that individuals heard about this concept, the results were as follows: Internet for men and women (24.1%; 23.6%); television for individuals between the ages of 42-65 (26.3%); television (20.0%) and dietician for individuals over 65 (20.0%), and a dietician for individuals living in rural areas (20.8%). More than half of both men and women, all age groups, and all individuals living in urban and rural areas correctly marked the definition of sustainable nutrition. There was no statistically significant difference in the rate of defining the concept of sustainable nutrition between women and men and those living in urban and rural areas ($p > 0.05$); also, it was observed that the rate of correct definition to sustainable nutrition decreased as the age of the group increased ($p < 0.05$) (Table 2).

It was found that those who have heard about the concept of sustainable diet before were women (22.0%) compared to men (20.0%) ($p < 0.05$), individuals aged 18-24 (25.3%) compared to individuals in the other age groups ($p < 0.05$) and those living in urban areas (22.6%) than those living in rural areas (15.0%) ($p < 0.05$).

Table 2. The evaluation of individuals' awareness of sustainable nutrition specific to gender, age group, & place of residence

	Gender				X ² ; p	Age group								X ² ; p	Place of residence				X ² ; p
	Men (n: 1,575)		Women (n: 1,923)			18-24 years (n: 1,173)		25-40 years (n: 1,186)		41-64 years (n: 1,033)		≥65 years (n: 106)			Urban (n: 2,825)		Rural (n: 673)		
	n	%	n	%		n	%	n	%	n	%	n	%		n	%	n	%	
Heard concept of sustainable nutrition before	302	19.2	437	22.7	6.550; 0.010	312	26.6	241	20.3	171	16.6	15	14.2	37.599; <0.001	643	22.8	96	14.3	23.548; <0.001
The source where the concept of sustainable nutrition is heard																			
Friend	38	12.5	68	15.6	22.251; 0.001	52	16.7	28	11.6	22	12.9	4	26.7	52.954; <0.001	87	13.5	19	19.8	8.609; 0.197
Television	61	20.1	46	10.5		26	8.3	33	13.6	45	26.3	3	20.0		89	13.8	18	18.7	
The Internet	73	24.1	103	23.6		79	25.3	61	25.2	54	19.9	2	13.3		161	25.0	15	15.6	
Dietician	55	18.2	99	22.7		76	24.4	49	20.3	26	15.2	3	20.0		134	20.8	20	20.8	
Newspaper	9	3.0	3	0.7		3	1.0	3	1.2	5	2.9	1	6.7		10	1.6	2	2.1	
Social media	45	14.9	85	19.4		57	18.2	41	16.9	32	18.7	-	-		112	17.4	18	18.8	
Other (doctor, family)	22	7.2	33	7.5		19	6.1	27	11.2	7	4.1	2	13.3		51	7.9	4	4.2	
Ability of defining concept of sustainable nutrition ^a	1,086	69.0	1391	72.3	5.216; 0.74	876	74.7	844	71.2	697	67.5	60	56.6	34.272; <0.001	1,992	70.5	485	72.1	2.622; 0.270
Heard concept of sustainable diet before	315	20.0	424	22.0	2.181; 0.140	297	25.3	235	19.8	185	17.9	22	20.8	20.029; <0.001	638	22.6	101	15.0	18.725; <0.001
The source where the concept of sustainable diet is heard																			
Friend	76	24.1	96	22.6	25.588; <0.001	69	23.2	49	20.9	48	25.9	6	27.3	45.702; <0.001	151	23.7	21	20.8	6.825; 0.337
Television	59	18.7	54	12.7		28	9.4	40	17.0	40	21.6	5	22.7		94	14.7	19	18.8	
The Internet	65	20.6	80	18.9		63	21.2	54	23.0	26	14.1	2	9.1		133	20.8	12	11.9	
Dietician	46	14.6	95	22.4		64	21.5	40	17.0	32	17.3	5	22.7		121	19.0	20	19.8	
Newspaper	14	4.4	3	0.7		3	1.0	3	1.3	10	5.4	1	4.6		14	2.2	3	3.0	
Social media	45	14.3	69	16.3		57	19.3	30	12.7	24	13.0	-	-		95	14.9	19	18.8	
Other (doctor, family)	10	3.3	27	6.4		13	4.4	19	8.1	5	2.7	3	13.6		30	4.7	7	6.9	
Ability of defining concept of sustainable diet ^b	908	57.7	1190	61.9	7.067; 0.029	746	63.6	718	60.5	588	56.9	46	43.4	28.829; <0.001	1,696	60.0	402	59.7	0.337; 0.845
Ability of defining sustainable nutrition model ^c	1,089	69.1	1433	74.5	14.005; 0.001	878	74.9	861	72.6	722	69.9	61	57.5	29.675; <0.001	2,028	71.8	494	73.4	0.719; 0.698
The most sustainable diet/nutrition model																			
Mediterranean diet	761	48.3	1047	54.4	23.882; <0.001	600	51.2	602	50.8	548	53.0	58	54.7	17.730; 0.124	1,428	50.5	380	56.5	11.659; 0.020
Vegetarian diet	141	9.0	159	8.3		106	9.0	99	8.3	89	8.6	6	5.7		244	8.6	56	8.3	
High protein diet	385	24.4	352	18.3		261	22.2	248	20.9	207	19.5	27	25.5		601	21.3	136	20.2	
Low-carbohydrate diet	252	16.0	330	17.2		178	15.2	216	18.2	178	17.3	10	9.4		496	17.6	86	12.8	
Ketogenic diet	36	2.3	35	1.8		28	2.4	21	1.8	17	1.6	5	4.7		56	2.0	15	2.2	

Note. a, b, & c: Three different options that define concepts specified through questionnaire form were shown & correct one was asked to be marked; ^aIt is a nutritionally healthy & adequate type of diet with few environmental effects, economical, accessible, & culturally acceptable; ^bDiets with low environmental impact, contributing to provision of a healthy life & nutritional & nutritional security for present & future generations; & ^cIt is a diet pattern in which chicken, fish, & legumes are preferred rather than red meat as a protein source, vegetables, & fruits are more preferred, & fat & sugar foods are consumed less

The concept of sustainable diet was mostly heard by the internet in men (20.6%), by dieticians in women (22.4%), by friends between the ages of 18-24 and 41-64 (23.2%; 26.3%), and by the internet (20.8%) in those living in urban areas. More than half of women, men, all age groups and urban / rural residents correctly marked the concept of sustainable diet and sustainable nutrition model among the definitions shown in the questionnaire. Women defined the concept of sustainable diet and sustainable nutrition model more accurately than men; and when looked by age group, it was seen that the rate of correct definition for both concepts decreased as the age of the group increased ($p < 0.05$). It was found that 54.4% of women and 48.3% of men answered the question of the most sustainable nutrition model / diet as the Mediterranean diet (Table 2).

The evaluation of the knowledge level and practices of individuals on sustainable nutrition according to gender, age group, and place of residence is shown in Table 3. It was found that more than half of the men and women, all age groups, and individuals living in urban and rural areas stated that their

food choices affected sustainable nutrition (Table 3). Men (47.7%) reported that sustainable nutrition increased the cost at a higher rate than women (43.5%) ($p < 0.05$). However, 45.3% of the 18-24 age group stated that increased meat consumption affects the environment more negatively; but there was no statistically significant difference between the age groups in the answers given to this statement ($p > 0.05$). Women stated this proposition were statistically significantly higher than men (43.9% and 43.0%, respectively) ($p < 0.05$). It was found that 63.4% of individuals in the age group of 41-64 years stated that the use of pesticides in agriculture adversely affected the environment by polluting water and air. As the age group increased, it was observed that the proportion of those who supported the proposition that imported food consumption was not suitable for the sustainable nutrition model decreased. ($p < 0.05$). In this study, it was found that almost half (49.1%) of the individuals over the age of 65 had no idea about the best practice in providing sustainable nutrition and it was determined that as the age of the group increased, the knowledge about this application decreased ($p < 0.05$).

Table 3. Evaluation of knowledge level & practices of individuals on sustainable nutrition according to gender, age group, & place of residence

	Gender				X ² ; p	Age group								X ² ; p	Place of residence				X ² ; p
	Men (n: 1,575)		Women (n: 1,923)			18-24 years (n: 1,173)		25-40 years (n: 1,186)		41-64 years (n: 1,033)		≥ 65 years (n: 106)			Urban (n: 2,825)		Rural (n: 673)		
	n	%	n	%		n	%	n	%	n	%	n	%		n	%	n	%	
Our food choices affect sustainable nutrition	1,216	77.2	1,505	78.3	2.914; 0.233	936	79.8	953	80.4	762	73.8	70	66.0	30.323; <0.001	2,211	78.3	510	75.8	8.893; 0.012
Providing sustainable nutrition increases cost	751	47.7	837	43.5	7.871; 0.020	531	45.3	554	46.7	462	44.7	41	38.7	19.51; 0.003	1,322	46.8	266	39.5	13.229; 0.001
Increased/high meat consumption affects environment more negatively	678	43.0	844	43.9	30.819; <0.001	531	45.3	509	42.9	448	43.4	34	32.1	11.262; 0.081	1,259	44.6	263	39.1	8.735; 0.013
Vegetarian nutrition is a more sustainable diet model	389	24.7	430	22.4	5.121; 0.077	312	26.6	284	23.9	212	20.5	11	10.4	40.954; <0.001	688	24.4	131	19.5	35.511; <0.001
Use of pesticides in agriculture adversely affects environment by polluting water & air	990	62.9	1,183	61.5	4.899; 0.086	741	63.2	720	60.7	655	63.4	57	53.8	8.511; 0.203	1,763	62.4	410	60.9	3.236; 0.198
Consumption of foods imported from abroad is not suitable for sustainable nutrition model	642	40.8	750	39.0	2.369; 0.306	541	46.1	479	40.4	341	33.0	31	29.2	53.633; <0.001	1,163	41.2	229	34.0	16.244; <0.001
First issue to be considered when it comes to sustainable nutrition																			
Growing food without adversely affecting environment	279	17.7	320	16.6	17.247; <0.001	204	17.4	215	18.1	162	15.7	18	17.0	73.793; <0.001	489	17.6	101	15.0	7.121; 0.028
Producing healthy & sufficient food	885	56.2	1,204	62.7		754	64.3	729	61.5	565	54.7	41	38.7		1,697	60.1	392	58.2	
No idea	411	26.1	399	20.7		215	18.3	242	20.4	306	29.6	47	44.3		630	22.3	180	26.7	
Best practice in ensuring sustainable nutrition																			
Providing local/regional organic food production	557	35.4	727	37.8	4.455; 0.108	435	37.1	460	38.8	362	35.0	27	25.5	82.577; <0.001	1,048	37.1	236	35.1	13.585; 0.001
Ensuring food production accessible to everyone	612	38.8	756	39.3		514	43.8	470	39.6	357	34.6	27	25.4		1,130	40.0	238	35.3	
No idea	406	25.8	440	22.9		224	19.1	256	21.6	314	30.4	52	49.1		647	22.9	199	29.6	
Ability to indicate sustainable nutritional behaviors																			
Preferring fish consumption instead of meat	887	56.3	1,128	58.7	2.018; 0.365	674	57.5	686	57.8	590	57.1	65	61.3	12.292; 0.056	1,656	58.6	359	53.3	8.620; 0.013
Consumption of food in season	1,328	84.3	1,665	86.6	3.883; 0.143	1,028	87.6	1,006	84.8	874	84.6	85	80.2	12.141; 0.059	2,432	86.1	561	83.4	6.397; 0.041
Consumption of local foods	1,141	72.4	1,390	72.3	0.389; 0.823	846	72.1	875	73.8	727	70.4	83	78.3	8.427; 0.208	2,066	73.1	465	69.1	4.493; 0.106
Reducing packaged food consumption	1,113	70.7	1,445	75.1	8.831; 0.012	872	74.3	862	72.7	751	72.7	73	68.9	3.554; 0.737	2,083	73.7	475	70.6	13.966; 0.001
Consumption of frozen foods	578	36.7	767	39.9	4.575; 0.102	456	38.9	453	38.2	392	37.9	44	41.5	21.304; 0.002	1,110	39.3	235	34.9	10.819; 0.004
Not choosing sugary, carbonated, & high-energy drinks	1,095	69.5	1,440	74.9	12.925; 0.002	866	73.8	850	71.7	749	72.5	70	66.0	18.156; 0.006	2,056	72.8	479	71.2	12.820; 0.002
Reducing nutritional waste (at home & in public places)	1,139	72.3	1,439	74.8	3.082; 0.214	887	75.6	863	72.8	757	73.3	71	67.0	12.576; 0.050	2,094	74.1	484	71.9	7.470; 0.024

Examining the attitudes of individuals towards sustainable nutrition practices; it was found that there was no significant difference between men and women in terms of preference of fish instead of meat, seasonal and local food consumption ($p > 0.05$). It was observed that the consumption of packaged food and sugary/carbonated or high-energy beverages were more common behaviors in women than men ($p < 0.05$). Consumption of frozen foods was found to be the least sustainable nutrition practice/attitude in all groups ($p < 0.05$).

It was found that individuals living in urban areas contribute more to sustainable nutrition by reducing food waste than those living in rural areas ($p < 0.05$) (Table 3).

The rate of hearing about some of the concepts related to sustainable nutrition before was shown in Figure 1. Among the four different concepts, the percentage of those who heard about the food mile was the least (6%), while the most heard concept was found to be the carbon footprint (28%). The percentages of those who have heard about the water footprint

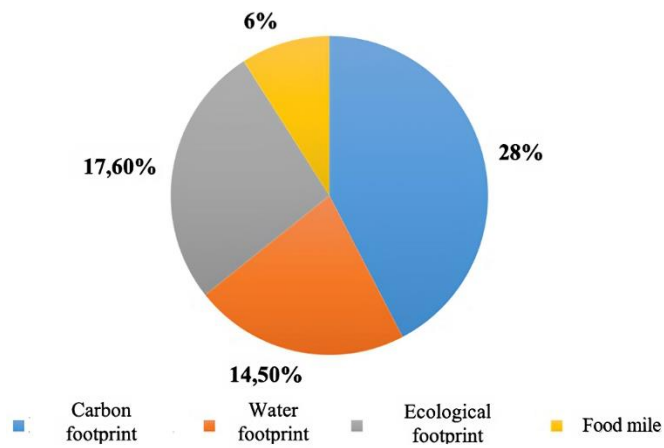


Figure 1. Percentage of individuals having heard about some concepts related to sustainable nutrition before (Source: Authors' own elaboration)

and ecological footprint concepts were close to each other (14.50%; 17.50%, respectively).

DISCUSSIONS

Worldwide environmental degradation, social difficulties and economic fluctuations negatively affect the continuity of life, and the concept of sustainability has gained importance in eliminating these negative effects [14]. The concept of sustainability has been associated with nutrition, which plays an important role in the continuity of life for the last 30 years [15]. As a result of these studies, the concepts of sustainable nutrition and diet have emerged. Sustainable nutrition includes providing adequate nutrients both for today and for the future, as well as finding effective solutions for combating and preventing malnutrition and ensuring a more balanced diet [16]. Sustainable diets were defined by FAO as “diets with low environmental impact that contribute to food and nutritional security and healthy living for present and future generations”. It has also been described as protective and respectful to biodiversity and ecosystems, culturally acceptable, accessible, economically fair and affordable, optimizing natural and human resources while at the same time nutritionally adequate, safe and healthy [17]. In other words, it considers the nutritional aspects aimed at healthy nutrition of individuals, including environmental, economic and social aspects [18].

Today, sustainable nutrition and sustainable diets come to the fore in ensuring the continuity of life. Therefore, the importance and awareness of these concepts are increasing around the world. In this study, only one fifth of the individuals stated that they had heard about the concept of sustainable nutrition before, and the proportion of these individuals varies according to gender, age and the region of residence. In terms of gender, the concept of sustainable nutrition has been heard before in women compared to men ($p < 0.05$) (Table 2). It has been reported that women are more sensitive to the environment than men and are more concerned about future generations. This raises the awareness of both human and environmentally friendly concepts such as sustainable nutrition by women. Research findings on

environmental anxiety revealed that women have more pro-environmental values, beliefs and attitudes than men [19]. Similarly, Urena et al. showed that women were more sensitive to health problems, nutrition, and the environment, so they were more likely to adopt organic foods related to their lifestyle [20]. In this study, it was found that the proportion of those who have heard about the concepts of sustainable nutrition and diet before are higher in those living in urban areas than those living in rural areas ($p < 0.05$) (Table 2). It is known that the knowledge and awareness of those living in rural areas is lower than those living in urban areas. Therefore, raising the awareness of individuals in rural areas about environmental issues, especially for the sustainable development of the environment, is one of the most important national plans in developing countries [21]. Considering all age groups, it was determined that the concept of sustainable nutrition and diet was heard more among individuals in the 18-24 age group ($p < 0.05$) (Table 2). It is argued that the individuals with higher education levels, especially young people, are more attentive to environmental problems as they have more access to information [22]. Access to nutritional information has also gained importance in today's society, and the internet, which has become an integral part of life, is preferred as the primary option for accessing most of this information. In a study on sustainable diets in Brazil, it was determined that the participants' sources of information about foods were respectively internet, television, food labels and health professionals [18]. Similarly, in this study, the sources that individuals heard about the concept of sustainable nutrition and diet were found as internet, dietician and social media, respectively. While the internet has been the main source for the concept to be heard by men, dietitian and social media have been the main sources for women ($p < 0.05$) (Table 2).

Various international organizations (FAO and Bioversity International, CIHEAM-Bari, and INRAN) agreed on the sustainable diet in 2010 and accepted the Mediterranean diet as an example of a sustainable diet [23] because the Mediterranean diet is based on a variety of traditional local foods that are firmly connected to the Mediterranean environment and offer biodiversity for nutritional security and sustainable development [24]. It also plays an important role in improving health, preventing many diseases and has less negative impact on the environment [25]. In this study, 54.4% of women and 48.3% of men expressed the Mediterranean diet as the most sustainable nutrition model (Table 2).

Some recent studies have included consumer opinions and behaviors regarding environmentally friendly dietary behavior [26], information on the price, brand, health of foods, and the selection of healthy and environmentally sustainable foods [27]. Studies have also examined the relationship between healthier diets, namely dietary patterns, and reducing negative environmental impact [14, 28]. The effects of nutrients on the environment are interpreted using some indicators in the life cycle. Among these, there are four different concepts related to sustainable nutrition [29-31]. In this study, among the four different concepts, the percentage of those who heard the food mile was the least (6%), while the most heard concept was found to be carbon footprint (28%). The rates of those who

have heard about the water footprint and ecological footprint concepts before were 14.5% and 17.5%, respectively (**Table 2**).

Food consumption is associated with a variety of environmental impacts, and therefore consumers' food choices include significant environmental impacts [32]. It is stated that the nutritional choices of individuals in sustainable nutrition will be particularly effective in reducing greenhouse gas emissions, thus significantly affecting both human and environmental health [33]. Thus, besides the health effects of individual food choices, environmental effects should also be considered [27]. There are two most prominent types of behavior towards sustainable food consumption in individual food preferences. The first is that individuals prefer sustainable food according to the way they are produced, and the other is to adopt sustainable nutrition models such as reducing the consumption of food (reducing red meat consumption) [34]. It was found that 45.3% of the individuals in the 18-24 age group in this study stated that increased meat consumption affected the environment more negatively. There was no statistically significant difference between age groups in the answers given to this proposition ($p > 0.05$), and the rates of women to support this proposition were statistically significantly higher than men. (43.9% and 43.0%, respectively) ($p < 0.05$) (**Table 3**). Since local food production is an environmentally friendly production option, individuals' emphasis on the consumption of locally grown foods will help reduce greenhouse gas emissions [35]. In addition, consumers can significantly increase the sustainability of their food consumption by consuming organic products and reducing meat consumption [36]. It was stated that 85% of people think that using less packaging and purchasing locally grown food will benefit the environment; however, only 22% of those who think eating less meat would be beneficial [37]. In other studies, the most commonly cited behaviors that people think will benefit the environment are avoiding excessive packaging, purchasing locally grown foods, eating organic foods and reducing food waste [32, 38]. Therefore, it should be kept in mind that food choices are of paramount importance for a more sustainable world. More than half of the men and women included in this study, all age groups, and individuals living in urban and rural areas stated that their food choices affect sustainable nutrition. However, in this study, almost half (49.1%) of the individuals over the age of 65 had no idea about the best practices in providing sustainable nutrition, and it was determined that as the age of the group increased, the knowledge about this practice decreased ($p < 0.05$) (**Table 3**). In this study, 45.3% of the individuals in the 18-24 age group stated that the increase in excess meat consumption affected the environment more negatively, and it was observed that the higher the age group, the lower the rate of supporting this statement ($p > 0.05$) (**Table 3**). The guidelines from different countries for sustainability in nutrition were summarized and suggested that these countries should reduce the meat consumption due to the health benefits of plant-based diets and less negative impact on the environment [39]. By replacing meat with other various foods, annual greenhouse gas emissions could be reduced by 18-31% [40]. Therefore, avoiding the consumption of red meat and processed meat products will be effective for both health protection and sustainable environment as they contribute to greenhouse gas

emissions [41]. When looking at the relationship between various dietary types and greenhouse gas emissions, it was stated that greenhouse gas emissions are low in vegans [42]. It is thought that switching to a diet in which more plant foods are consumed would be more beneficial for health and the environment. However, the importance of nutritional education in changing the eating habits of individuals with the predominant consumption of animal products has come to the fore [43]. It is important to give the correct messages in reducing the consumption of animal foods because they are important sources of protein and micronutrients. Insufficient intake of these nutrients, especially in children at risk, may also have adverse health effects [44]. Therefore, a holistic nutritional model change may be necessary in proposals to reduce the consumption of meat and animal products.

The sustainable nutrition system promotes local production and distribution infrastructures, making nutritious food accessible and affordable for all [45]. Thus, the changes people make in their food consumption due to their motivation for healthy eating and their concern for future generations can be a good start to developing a sustainable lifestyle [46]. When we look at the attitudes of individuals towards sustainable nutrition practices, it has been determined that there was no statistically significant difference between males and females in the behaviors of preference of fish instead of red meat, the consumption of seasonal foods and local foods ($p > 0.05$) (**Table 3**). The consumption of frozen foods was determined to be the least applied sustainable nutrition habits/in all groups ($p < 0.05$) (**Table 3**). It has been observed that the consumption of packaged food, sugary, carbonated or high-energy beverages were more common behaviors shown by women than men ($p < 0.05$) (**Table 3**). In a study, individuals who wanted to make more sustainable food choice stated that they considered the food packaging as well as the consumption of seasonal foods [47]. Alternative diets that offer significant health benefits, if widely adopted, can reduce agricultural greenhouse gas emissions globally [48].

The main determinant among the factors affecting food consumption preferences is the price of the product. The low prices of food diversify the diet/nutritional pattern by increasing the availability and variety of food. However, low food prices may cause direct negative environmental effects due to increased food waste [49]. One of the most important features of sustainable diets/nutrition models are that they are fair and affordable [17]. In other words, it is important that sustainable nutrition is economical. In this study, men and those living in urban areas reported that sustainable nutrition increased the costs at a higher rate than women and those living in rural areas, respectively ($p < 0.05$) (**Table 3**). As a result of a systematic review and meta-analysis covering ten countries, it was stated that healthier foods and dietary patterns cost more than less healthy alternatives. Thus, it was emphasized that financial obstacles such as inequality in income distribution should be reduced in order to ensure healthy and sustainable nutrition [50].

CONCLUSIONS

The limitation of our study is that we could not use a scale with validity and reliability for our subject. In this study, it was determined that there are differences in the attitudes and behaviors of individuals regarding sustainable nutrition according to gender, age group and region of residence. Sustainability is important in ensuring public and environmental health worldwide. All individuals should be informed about sustainable nutrition and life, and awareness should be increased. Nutritional recommendations should be included in the dietary guidelines prepared today in line with the concept of sustainability, and it should be emphasized that a sustainable nutrition model should be adopted for the continuation of life and the future of the world, as well as adequate and balanced nutrition.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

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