RESEARCH ARTICLE

International Journal of Agriculture, Environment and Food Sciences 2023; 7(1): 21-28
DOI: https://doi.org/10.31015/jaefs.2023.1.3

Analysis of housewives' knowledge levels and behaviors toward food waste and sustainable nutrition

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Abstract

This article aims to reveal the knowledge, attitudes and behaviors of housewives living in Turkiye about food waste and sustainable nutrition. This study was conducted with 90 housewives between the ages of 25-65 from Turkey using the survey method. According to the research results; 24% of the participants stated that they waste food, while 53% stated that they do it sometimes. A significant positive correlation was found between education level and red meat and meat products, milk and dairy products and egg waste ($p<0.05$). Sustainable nutrition knowledge scores of the participants were found to be insufficient, with an average of 22.54 ± 3.80. A positive correlation was found between the amount of protein and zinc intake and the level of sustainable nutrition knowledge ($p=0,027$, $r=0,233$ and $p=0,033$, $r=0,225$). A significant and positive relationship was found between the scores of the participants in the scale of sustainable nutrition and healthy eating behaviors and their age ($p=0,040$, $r=0,220$). It has been determined that the knowledge levels of housewives about sustainable nutrition are deficient and insufficient. The issues of food waste and sustainable nutrition gain importance in terms of raising awareness and taking precautions for today and future generations, both economically and socioculturally.

Keywords: Level of knowledge, Housewife, Food waste, Sustainable nutrition, Turkiye

Citation: Turk, M., Saleki, N. (2023). Analysis of housewives' knowledge levels and behaviors toward food waste and sustainable nutrition. International Journal of Agriculture, Environment and Food Sciences, 7 (1), 21-28

Received: 27 September 2022
Revised: 25 Novemberr 2022
Accepted: 28 November 2022
Published Online: 22 January 2023

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INTRODUCTION

Food waste refers to discarded, leftover, and decaying human food regardless of any cause at the consumer level, leading to potentially serious environmental and socioeconomic consequences (Oral, 2015). According to Food Waste Index Report 2021; food waste occurs at the rate of 39% among manufacturers, 5% among retailers, 14% in the catering sector, and 42% at homes. Considering that housewives often spend time at home, where the majority of food waste occurs, the demonstration of awareness, attitudes, and behaviors toward food waste and sustainable nutrition among housewives shall be important for the reduction and prevention of food wastage. A total of 931 million tons of food are wasted worldwide annually. Globally, 17% of ready-to-eat foods go directly to waste at retail outlets, homes, and restaurants. While 40% of food waste occurs during post-harvest handling and processing in developing countries, more than 40% of the loss occurs at the retail and consumer levels in industrialized countries. Consumer food waste is reported as 95-115 kg/year in Europe and North America, and 6-11 kg/year in Sub-Saharan Africa and South/Southeast Asia.

The United Nations' 2021 report on Food Waste states that 931 million tons of food are wasted globally every year. Food waste in Turkey is 93 kg per capita per year, bringing the country to the top tiers of the list among others with the highest wastage in the world. Various causative factors such as improper processing of food, poor storage conditions, poor planning, failure to pay attention to recommended shelf lives, uneaten cooked food, and environmental factors are major contributors to food waste (UNEP Food Waste Inde Report, 2021).

Sustainable nutrition refers to those diets with low environmental impacts, contributing to food and nutrition security and healthy lives of current and future generations (FAO/WHO, 2019). Such diets are mindful of biodiversity and the ecosystem, helping preserve environmental resources. Sustainable nutrition should ensure healthy diets, which are acceptable culturally, accessible, economically affordable, nutritionally sufficient, and safe. The term sustainable nutrition was first used by Gussow and Clancy in 1986 (FAO, 2012). Adoption of a sustainable nutrition model with consequent reductions in food wastage is necessary to ensure food security and promote nutrition for the future, and improve the livability of the world for future generations. Sustainable diets are essential for the sustainability of the Earth. Sustainable nutrition aims to ensure optimal growth and development for all individuals globally, enhance the physical, mental, and social well-being and promote the functionality of the current and future generations, prevent any kind of malnutrition, reduce the risk of nutritionally-related non-communicable diseases, and contribute to the protection of the Earth's biodiversity and sustainability (FAO/WHO, 2019).

Our study aimed to examine the knowledge levels and behaviors of housewives toward food waste and sustainable nutrition. Because housewives usually spend most of their time at home, where the majority of food waste occurs, the study shall provide important results for reducing and avoiding food waste by demonstrating the awareness, attitudes, and behaviors of housewives toward food waste and sustainable nutrition. Because only a few studies on this subject matter are available in the literature, we think that the results of our study will be important for paving the way for future studies.

MATERIAL AND METHOD

Study Sample and Data Collection Tools

The research was carried out between January 2022 and June 2022**.** The sample of study consisted of 90 housewives aged 25-65 years, who lived in the following cities of Turkey, including Istanbul, Şanlıurfa, Aydın, İzmir, Kars, Kırklareli, Sivas, and Gaziantep. The majority of participants were from Istanbul. Employed women were excluded but women, who spent most of their time at home, were included in the study. The minimum number of participants required to be included in the study was calculated using G-POWER to achieve a 5% margin of error, 95% power, and moderate effect size. Accordingly, the minimum number of participants to be included in the study was calculated to be 84. Because the number of subjects, who voluntarily agreed to participate in the study was 90, it can be argued that the sample size was sufficient for the generalizability of the results. A questionnaire form was used as a data collection tool. The questionnaire was administered to participants during face-to-face interviews. The approval to conduct the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University (Decision No.03/02/2022 /127). After informed consent forms were obtained, subjects were sequentially interviewed on scheduled dates. The study complies with the provisions of the Declaration of Helsinki.

Demographic Characteristics and Anthropometric Measurements

The first part of the questionnaire consisted of questions about demographic information including age, educational status, marital status, city of residence, monthly income, and anthropometric measurements (height, weight, and Body Mass Index -BMI-). The body weight and the height of the subjects were recorded based on their statements. BMI was calculated by the researcher dietitian. The BMI value was obtained by dividing the body weight (kg) by the square of the height (m^2) and was evaluated according to the World Health Organization (WHO) classification. According to the WHO classification, subjects with a BMI of <18,5 kg/m^2 were categorized as underweight, those with a BMI of 18,5-24,9 kg/m^2 were categorized as having a normal body weight, those with a BMI of 25,0-29,9 kg/m^2 were categorized as overweight, and those with a BMI of >30,0 kg/m^2 were categorized as obese (WHO. WHO STEPS Surveillance)

Evaluation of the Nutritional Status

As the second part of the questionnaire, a 24-hour retrospective food intake form was used. To ensure the correct reporting of the quantities of food intake by participants, the visuals and measures in the "Food and Nutrition Image Catalogue-Measures and Quantities" book were utilized (Rakıcıoğlu et al., 2017). Collected data were analyzed using the Nutrition Information System Software (BeBis 8.1) and the intakes of energy, macronutrients, and micronutrients were calculated. Participants' food intake records were evaluated according to Turkey Dietary Guidelines 2015 (TÜBER, 2015).

Knowledge Levels and Attitude toward Food Waste and Sustainable Nutrition

The third part of the questionnaire consisted of questions about food waste specific to each study participant

(causes of food waste, quantities and frequencies of buying and wasting foods according to food groups, and practices toward non-consumable foods). The last part of the questionnaire included questions about participants' approaches toward the concept of sustainable nutrition and their knowledge levels of this subject matter. For the assessment of sustainable and healthy eating behaviors in the study, the Turkish version of the Sustainable and Healthy Eating Behaviors Scale was used. The scale was developed based on sustainable nutrition principles, the LiveWell Approach®, and Food and Agricultural Organization's (FAO) definition of the concept of sustainable nutrition as described by Zakowska-Biemans et al. (Zakowska-Biemans et al. 2016). The validity and reliability analysis of the Turkish version of the scale was conducted by Koksal et al. (Koksal et al. 2022). The Sustainable and Healthy Eating Behaviors Scale consists of a total of 8 factors and 34 items. The 8 factors of the scale are listed as Healthy and Balanced Diet, Quality Labels (Regional and Organic), Reducing Meat Consumption, Local Food, Low Fat, Avoiding Food Waste, Animal Welfare, and Seasonal Food. Participants were asked to respond to each item by marking one of the following options, including "never", "very rarely", "rarely", "sometimes", "often", "very often", and "always". Measurements were performed on a 7-point scale, where "never" was scored as 1 point and "always" was scored as 7 points.

The Sustainable Diet Index was used to measure participants' knowledge levels of sustainable nutrition. There were 15 different expressions in this index and participants were asked to score their behavior on a 5-point Likert-type scale, concerning the expressions. The expression, which did not suit the sustainable nutrition behavior of the participant, was scored 0 points. The expressions, which were found appropriate by participants, were scored on a scale from 1 to 4 points. Because the index consisted of 15 questions, the highest score that could be obtained was 60. Participants with a score of ≤ 30, which was 50% of the highest score that could be obtained, were considered to have inadequate knowledge levels of sustainable nutrition. Participants with scores of > 31 were considered to have adequate knowledge levels.

Statistical Analysis

The statistical analysis of the study data was performed using the IBM SPSS 26.0 software. The conformity of the numerical variables to the normal distribution was examined using the Shapiro-Wilk normality test. As descriptive statistics for numerical variables, mean and standard deviation were used for normally distributed data, and median, minimum, and maximum were used for variables, which did not conform to a normal distribution. Categorical variables were presented as numbers and percentages. Correlations between numerical variables were examined by Pearson's or Spearman's correlation coefficients, depending on the conformity of variables to the normality assumption. The relationship between categorical and numerical variables was examined using the Chi-square test.

RESULTS

The study included 90 housewives from several cities in Turkey. The majority of participants (75,3%, n:70) were from Istanbul. Demographic and socioeconomic information about participants is presented in Table 1. Table 1 shows that participants were 25-68-year-old housewives. Of the participants; 30% (n:27) were 35-44 years old; 34,4% (n:31) were 45-54 years old. The examination of the educational status of participants revealed that 2,2% (n:2) were illiterate. Of the participants; 30% (n:27) were graduates of high school, and 29.8% (n:27) were graduates of a university. Of the participants, 81,1% (n: 73) were married and 7,8% (n:7) were single. Subjects with 4 or more household members and subjects with 1-3 household members accounted for 46,7% (n:42) and 53,3% (n:48) of participants, respectively. The average household income was ≤3000 TL in 6,7% (n:6) of participants, 3001-4000 TL in 13,3% (n:12), 4001-5000 TL in 17,8% (n:16), 5001-6000 TL in 18,9% (n:17), and ≥6001 TL in 43.3% (n:39) of participants.

Regarding the question of whether they had ever heard of the term "sustainable nutrition", 32,6% (n:29) and 67,4% (n:60) of participants answered "yes" and "no", respectively. Figure 1 shows how subjects, who answered "yes" to the question, first encountered the term, sustainable nutrition. Accordingly, 37% (n:11) of housewives first heard of the term sustainable nutrition on social media, 30% from television and radio, and 23% first heard of the term from healthcare professionals including physicians, dietitians, etc.

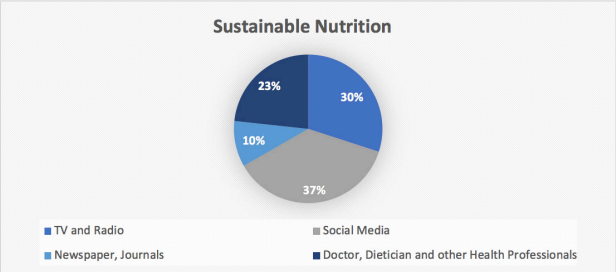

Figure 1. Source/Person/Place Where They Heard The Concept of Sustainable Nutrition

To the question "Do you waste food unintentionally?", 53% (n:48) of participants answered "sometimes", 24% (n:22) answered "yes", and 22% (n:20) answered "no". Participants, who reported wasting food, were asked about their causes of food wastage. The results are presented in Figure 2. Figure 2 shows that 20,4% (n:19) of the participants reported wasting food because of the expiration of shelf lives, and 31% (n:22) reported wastage because of storing foods for too long.

Table 1. Sociodemographic Characteristics of the Participants

Features		Number	Percentage (%)
Age	25-34	15	16,7
	35-44	27	30
	45-54	31	34,4
	55-64	15	16,7
	>65	2	2,2
Education	No read-write	2	2,2
	Primary School	17	18,9
	Middle School	17	18,9
	High School	27	30
	Bachelor	25	27,8
	Master	2	2
Marital Status	Single	7	7,8
	Married	73	81,1
	Divorced	5	5,6
	Widow	5	5,6
Number of Persons in Household	1	2	2,2
	2	21	233
	3	25	27,8
	≥ 4	42	46,7
City	İstanbul	70	75,3
	Other cities (Adana, Aydın, Gaziantep, Mersin. Izmir, Diyarbakır, Sivas, Şanlıurfa, Kars)	20	24,7
Average Income	≤3000 TL	6	6,7
	3001-4000 TL	12	13,3
	4001-5000 TL	16	17,8
	5001- 6000 TL	17	18,9
	≥6000 TL	39	43,3

Figure 2. Reasons for Wasting Food

The chi-square test was used to examine the relationsh ip between the educational status of housewives and their levels of food waste. The analysis results are presented in Table 2. Educational status was positively correlated with the waste of red meat and meat products, milk and dairy products, eggs, poultry meat and products, bread and bakery productsand pulses (p<0,05). With higher levels of educational status, the level of waste of red meat and meat products, milk and dairy products, eggs, poultry meat and products, bread and bakery products, and pulses increased.

Table 2. The relationship between education level and food waste level

Educational Level	Food Waste							
	Red Meat and Meat Products					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	0	0	0	1	46,054	10	0,000*
Primary school	17	0	0	0	0			
Middle School	16	1	0	0	0			
High school	25	2	0	0	0			
Bachelor's Degree	24	1	0	0	0			
Master	2	0	0	0	0			
	Milk and Dairy Products					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	0	0	0	1	33,577	20	0,029*
Primary school	13	4	0	0	0			
Middle School	12	1	0	0	0			
High school	17	9	0	0	1			
Bachelor's Degree	14	6	2	1	0			
Master	1	1	0	0	0			
	Poultry and Products					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	0	0	1	0	31,670	15	0,007*
Primary school	16	0	0	1	0			
Middle School	14	2	1	0	0			
High school	22	4	0	0	0			
Bachelor's Degree	23	1	0	0	0			
Master	2	0	0	0	0			
	Fish Products					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	2	0	0	0	0	7,724	10	0,656
Primary school	16	1	0	0	0			
Middle School	14	3	0	0	0			
High school	24	3	0	0	0			
Bachelor's Degree	24	0	0	1	0			
Master	2	0	0	0	0			
	Cooked Food					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	1	0	0	0	9,524	20	0,976
Primary school	9	7	0	1	0			
Middle School	9	5	2	1	0			
High school	14	8	2	2	0			
Bachelor's Degree	12	10	1	0	1			
Master	0	1	0	0	0			
	Packaged Food					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	1	0	0	0	6,456	15	0,971
Primary school	10	5	1	0	0			
Middle School	11	6	0	0	0			
High school	13	12	2	0	0			
Bachelor's Degree	14	7	2	1	0			
Master	1	0	0	0	0			
	Bread and Bakery Products					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	0	0	0	1	25,569	15	0,043*
Primary school	7	9	1	0	0			
Middle School	9	8	0	0	0			
High school	13	12	2	0	0			
Bachelor's Degree	10	13	1	0	1			
Master	1	1	0	0	0			
	Egg					Chi-Square		
	1	2	3	4	5	Value	sd	*p
No read-write	1	0	0	1	0	43,278	10	0,000*
Primary school	16	1	0	0	0			
Middle School	16	1	0	0	0			
High school	25	1	0	0	0			
Bachelor's Degree	22	1	0	0	0			
Master	2	0	0	0	0			

*Chi-square test was applied. (p<0.05: Significant)
(1: None, 2: Less than 10%, 3: 11-25%, 4: 26-50%, 5: More than 50%)

The mean scores of participants from the Sustainable and Healthy Eating Behaviors Scale ranged from 1,22 to 6,34 with an overall mean score of 4.34 ± 1,12. The mean scores by the factors in the scale are presented in Table 3 showing that the highest mean score (4.84 ±1,44) was from the healthy and balanced diet factor, and the lowest mean score was from the local food factor (2,95±1,16).

Table 3. Average Scores Received from the Sustainable Nutrition and Healthy Eating Behaviors Scale by Factors

Factors	Mean ($\bar{X}$± SS)
Quality Marks (regional and organic)	4,40 ±1,25
Seasonal Foods and Avoiding Food Waste	4,59±1,37
Healthy and Balanced Nutrition	4,84 ±1,44
Local Food	2,95±1,16
Reducing Meat Consumption	3,81 ±1,42
Animal Health	4,45±1,72
Low Fat	4,12 ±1,52

The scores of the Sustainable Diet Index ranged from 14 to 29, with a mean score of 22,54, which was considered inadequate. Spearman's correlation analysis revealed a positive and significant relationship between age and the scores of the Sustainable and Healthy Eating Behaviors Scale. With the increased age of participants, the scores obtained from the Sustainable and Healthy Eating Behaviors Scale increased. No significant correlations were found between the Sustainable Diet Index and age (Table 3).

Table 4. Age relationship with the scores obtained from the scales

Spearman's correlation test was used to examine the relationship between selected nutrients and participants' knowledge levels of sustainable nutrition (Table 5). The analysis revealed that the quantities of protein and zinc intake and the knowledge level on sustainable nutrition were positively correlated (p<0,05).

Sustainable Nutrition and Healthy Eating Behavior Scale							
Scores	Age					Correlation	
	25-34	35-44	45-54	55-64	65+	p	r
1,00-2,99	4	5	5	0	0		
3,00-4,99	7	13	16	11	0	0,040*	0,220
5,00-6,99	1	9	10	4	2		
Scores	Age					Correlation	
	25-34	35-44	45-54	55-64	65+	p	r
14,00-19,99	6	6	10	4	0		
20,00-24,99	6	15	12	7	0	0,104	0,173
25,00-29,99	3	6	9	4	2		

*Spearman correlation test was applied. (p<0,05: Significance)

Table 5. The Relationship Between Sustainable Nutrition Scale Scores and Nutrient Intake Amounts

Variables	p	r
Energy	0,335	0,103
Carbohydrate (g)	0,191	0,139
Protein (g)	**0,027***	**0,233**
Fat (g)	0,484	0,075
Cholosterol	0,857	0,019
Fiber	0,327	0,104
Saturated- fatty acids	0,098	0,176
Vitamin A	0,635	0,051
Folat	0,939	0,008
Vitamin B12	0,137	0,158
Vitamin C	0,847	0,021
Vitamin E	0,865	0,018
Zinc	**0,033***	**0,225**
Iron	0,074	0,189
Calcium	0,291	0,112
Sodium	0,761	0,032
Potassium	0,562	0,062

*Spearman correlation test was applied. (p<0,05: Significance)

DISCUSSION

Today, excess food consumption is a major problem affecting all people, especially when population increases are considered. This brings the question "what will people eat?" to minds. The prevention of food waste is of great importance in the fight against hunger in the world. Food waste occurs more commonly in developing and developed countries compared to less developed countries (Gustavsson et al., 2011)Various measures should be implemented and changes to current practices should be introduced in order to reduce wastage and achieve improvements in freedom from hunger. However, striking changes have been observed in diet patterns. Compositions of diets have changed with increasing intakes of energy. Increasing levels of income along with urbanization and globalization have increased the demand for different types of food. These all emphasize the importance of the term sustainable nutrition more than before, which has recently become widely heard. Food wastage is reported to be 72% at home and during processing. Of the 64 million tons of total food waste from households and processing stages, 47 million tons of food are wasted by households. (Tekiner et al., 2021.) Therefore, in this study, we surveyed food waste among 90 housewives, who were actively involved in kitchen management at home.

Of the study participants, 30% (n:27) were in the 35-44 age group and 34,4% (n:31) were in the 45-54 age group. Thirty percent (n:27) of participants were high school graduates, 29,8% (n:27) were university graduates, and 81,1% (n:73) were married. To the question "Do you

waste food unintentionally?", 53% (n:48) of participants answered "sometimes", 24% (n:22) answered "yes", and 22% (n:20) reported that they did not waste food at all. The examination of the relationship between the educational level and food waste revealed that, as the educational level increased, the waste of red meat, poultry meat, milk and dairy products, eggs, bread and bakery products, and pulses increased ($p<0,05$). In a study conducted by Aydın and Yıldız in 2011 with 400 randomly selected consumers from different socio-economic levels in the province of Sivas, it was observed that bread wastage increased with increased levels of education. In that study, 31% (n:22) of the participants reported that they wasted food because of storing them for too long.(Aydın &Yıldız, 2011) Because the socioeconomic income level may decrease with decreasing levels of education, the purchasing power of persons with low income levels would be less, resulting in lower amounts of food waste compared to individuals from higher income levels. On the other hand, people with a high income would not be cautious about wastage and cause high amounts of food waste because of the high purchasing power. Another study on household members included 203 people, and 30,1% (n:126) of the participants in that study reported that they wasted food because of the expiration of shelf life. This result is in line with the results of our study (Demir, 2020). Similarly, in a study conducted with 150 consumers, who were responsible for kitchen management and living in Izmir, it was found that 68% of the participants wasted food and the most common cause of food wastage was the expiration of shelf life (Daysal and Demirbaş, 2020).

The term "sustainable nutrition" has been borrowed from the term "sustainable agriculture" and aims to minimize the wastage of natural resources and ensure natural food production for seasonal consumption. There are only a few studies on sustainability and sustainable nutrition in the scientific literature from Turkey (Burlingame Dernini, 2011). In this study, we measured participants' knowledge levels of sustainable nutrition. The results show that subjects' knowledge levels of the definition of sustainable nutrition are variable ($p<0.005$). Participants were asked whether they had ever heard of the term "sustainable nutrition". Of the participants, 32,6% (n:29) answered "yes" and 67,4% (n:60) answered "no" to this question. A study reported that 24,3% of individuals, who were aged 20 and over and who were not students, had heard of the definition of sustainable nutrition before (Gülsöz,2017). In a study conducted with dietitians and dietitian candidates, it was found that subjects heard of the definition of sustainable nutrition most commonly -corresponding to a rate of 33.76%- during academic and scientific activities such as lectures and conferences during their undergraduate education (Özen, 2019) It could be considered likely that people, who are involved in the science of nutrition, would have heard of the definition of sustainable nutrition previously. We may suggest that housewives' knowledge level on this subject matter is low because they do not have that many opportunities to participate in scientific events such as conferences and congresses.

In our study, we used the Sustainable Diet Index to measure participants' knowledge levels of sustainable nutrition. The sustainable nutrition knowledge scores of the participants were evaluated over 30 points. The mean score from the scale was 22,54 + 3,80 and inadequate. In a study participants' sustainable nutrition knowledge scores were higher compared to the scores in our study (Özen, 2019) Participants were dietitians in that study and this difference between the samples of the two studies may explain different results. The study by Gülsöz et al. reported increasing knowledge levels of sustainable nutrition with increasing age (Gülsöz, 2017). We suggest that the lack of any increase in sustainable nutrition knowledge scores with increased age in our study may have resulted from differences in educational status across our study participants.

Of the subjects, who have heard of the term sustainable nutrition before, 37% reported that they heard of this term on social media. Therefore, several types of posts should be promoted through several social media tools used by people from different age groups in order to increase public awareness of sustainable nutrition. A significant correlation was found between the increase in participants' sustainable nutrition knowledge scores and the daily intake of zinc and protein based on food intake records ($p<0,05$). In the abovementioned study with dietitians and dietitian candidates, the comparison of energy and nutrient intake with the sustainable nutrition knowledge levels of participants revealed differences in the amounts of intake of carbohydrates, fiber, non-essential amino acids, and iron by sustainable nutrition knowledge levels, with high levels of intake among participants with adequate knowledge (Özen, 2019). Pelletier et al. (2013) found high levels of vegetable and fruit intake among subjects, who considered the sustainable, local, and organic alternative food production systems important, compared to subjects with moderate or low levels of keenness toward that subject matter. Furthermore, the intake of added sugar and fat was lower and the dietary fiber intake was higher in the former group compared to the latter in that study (Pelletier, 2013). In our study, the knowledge levels were inadequate among housewives and this led to different results compared to those reported in the literature. However, the intake of zinc and protein was high in our study. We think that the difference in the results may be associated with inadequate knowledge levels of sustainable nutrition, dietary habits, and high levels of consumption of animal-sourced foods.

In this study, the sustainable and healthy eating attitudes of subjects were evaluated with the 'Sustainable and Healthy Eating Behaviors Scale'. The mean scores of the

Sustainable and Healthy Eating Behaviors Scale were found to be in the range of 1.22 - 6.34 with an overall mean score of 4,34 ± 1,12. A significant correlation was found between the scale scores and age. The highest mean score (4,84 ±1,44) was obtained from the 10-item 'Healthy and Balanced Diet' factor, which included avoiding sugary drinks, limiting salt intake, and preferring additive-free and natural foods and foods with high nutritional value, containing vitamins and minerals. We suggest that this result may be explained by the adoption of healthy eating behaviors because of the health problems occurring with increased age. The lowest mean score was obtained from the local food factor (2,95±1,16). We suggest that the low score was associated with limited access of our study participants to local foods because a majority of them lived in urban areas. Similar results were obtained in the aforementioned study conducted on nutrition and dietetics students and it was reported that participants obtained the highest score from the healthy and balanced diet factor (Kıyan et al., 2020)

Sustainable nutrition refers to a concept with changes in dietary preferences to reduce excess consumption and promote the adoption of nutritious diets with lower environmental impact, reducing losses and waste in food systems (Alsaffar, 2016). Ensuring adequate nutrition through sustainable nutrition systems is critical globally (Stock et al., 2018). With increasing independence during the transition from adolescence to young adulthood, young adults experience difficulties to select healthy foods. It has been reported that old individuals are more keen and dependent on sustainable nutrition than younger individuals, males, individuals with low income or education levels, and individuals relegated to the fringe of society (Gilg et al., 2005). A study on young subjects with a median age of 21 years reported low levels of knowledge of sustainable nutrition and a serious need for training about the subject matter in this group of individuals (Yolcuoglu et. al., 2021). In our study, consistent with the results reported in the literature, the scores from the sustainable and healthy eating behaviors scale increased with the increased age of participants ($p<0,05$). We think that, with increasing age, awareness of and keenness toward social issues increase along with the increasing need for the adoption of healthy diets for the alleviation of chronic diseases, resulting in modifications in the behaviors of individuals.

Nutrition is one of the most basic needs, yet, it is inadequate or irregular for most people, presenting as a multidimensional global problem. In this study in association with this subject matter, we have observed that housewives do not adequately understand the terms food waste and sustainable nutrition, and have not adopted relevant practices yet. However, through the reports by participants during the administration of the questionnaires in this study, we have also observed that the keenness on food waste and loss of food has begun to increase due to economic concerns in the presence of increasing economic challenges.

CONCLUSION

In this study, it was found that the term sustainable nutrition is not adequately known among housewives. It was found that the majority of participants wasted food. When people, who reported wasting food, were asked about the causes of wastage, the majority reported that they wasted foods because of storing them for too long. A positive correlation was found between the educational level of participants and the wastage of red meat and meat products, milk and dairy products, eggs, poultry meat and products, bread and bakery products, and pulses ($p<0,05$). The overall mean score obtained by participants from the sustainable and healthy eating behaviors scale was low. The mean score from the sustainable diet index was inadequate. A positive and significant correlation was found between the sustainable and healthy eating behaviors scale scores and age. The limitation of the study is that the study included exclusively women, who were not employed and who spent most of the time at home.

Although the term sustainable nutrition is not a newly introduced concept, its importance has just begun to be understood. It is known that there are developments in the subject matters of sustainable nutrition, solid waste disposal, and food waste in Turkey but they are inadequate. It is of great importance for future generations to increase society's level of knowledge and awareness of food waste and sustainable nutrition. Improvements in housewives' knowledge levels of such subject matters shall be especially important for the benefit of society because housewives are a group of individuals, who allocate the majority of time to household work. For this purpose, in addition to the importance of the concept of adequate and balanced nutrition, the importance of sustainable nutrition should also be communicated. Sustainable nutrition should be included in national nutritional guidelines of countries. Articles about food waste and sustainable nutrition should be published in newspapers, magazines, and journals, and relevant advertisements and visual aids should be prepared and delivered. Courses relevant to sustainable nutrition and food waste should be included in the curricula of universities. In order to increase housewives' attentiveness and awareness of sustainable nutrition and food waste, scheduled home visiting courses of training need to be developed. Cooking courses aiming to ensure sustainable nutrition and reduce food waste should be developed and included in the list of free courses provided by municipalities in Turkey.

COMPLIANCE WITH ETHICAL STANDARDS

Conflict of interest

The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

Author contribution

The contribution of the authors to the present study is equal.

All the authors read and approved the final manuscript. All the authors verify that the Text, Figures, and Tables are original and that they have not been published before.

Ethical approval

Ethics committee approval was obtained from the Non-Interventional Clinical Research Ethics Committee of Istanbul Medipol University (Decision No. 03/02/2022 /127).

Funding

No financial support was received for this study.

Data availability

Not applicable.

Consent for publication

Not applicable.

Acknowledgements

I would like to thank all voluenteers that take a part in this study.

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