

Analysis of Factors Affecting Food Waste: The Case of Istanbul Province

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Abstract: In the waste reports prepared by the Ministry of Agriculture and Forestry in Türkiye and in many studies conducted in this field, consumer waste amounts have been determined, and precautions and strategies have been developed to reduce waste. This study aimed to determine the factors affecting the food waste amount of consumers residing in the province and districts of Istanbul during the COVID-19 pandemic process. For this purpose, a face-to-face questionnaire study was conducted with a total of 225 consumers in the province and districts of Istanbul in June and July 2021. As a result of the study, it was determined that the COVID-19 pandemic process caused a change in consumers' food preferences and management. As a result of the factor analysis findings conducted to determine the attitudes and behaviors effective in consumer food waste, it was revealed that consumers' food waste behaviors during the pandemic process cannot be reduced to a single cause and can be explained by 10 different dimensions, primarily 'evaluating the leftovers', 'emotion', 'intention', and 'planning'. By determining that female consumers are the individuals with an active role in food waste, developing training activities on food management, evaluating leftovers, and waste-reducing factors for female consumers can be effective in reducing waste, as they are traditionally seen as responsible for cooking activities and dominate the kitchen. Visuals expressing the importance of reducing food waste, which has become a multifaceted global risk, can be added to the common areas of consumers. The state, family, and individuals must play an active role to ensure sustainability in all holistic policies to be implemented.

Keywords food waste, behavior, sustainable, attitude

Gıda İsrafını Etkileyen Faktörlerin Analizi: İstanbul İli Örneği

Öz: Türkiye’de Tarım ve Orman Bakanlığı tarafından hazırlanan israf raporlarında ve bu alanda yapılan birçok çalışmada tüketicilerin israf miktarlarının belirlenerek israfı azaltmaya yönelik önlem ve stratejiler geliştirilmiştir. Bu çalışmada Covid-19 pandemi sürecinde İstanbul il ve ilçelerinde ikamet eden tüketicilerin gıda israf miktarını etkileyen faktörlerin belirlenmesi amaçlanmıştır. Bu amaçla, 2021 yılı Haziran ve Temmuz aylarında İstanbul il ve ilçelerinde toplam 225 tüketici ile yüz yüze anket çalışması yapılmıştır. Çalışma sonucunda, COVID-19 pandemi sürecinin tüketicilerin gıda tercih ve yönetiminde değişikliğe neden olduğu belirlenmiştir. Tüketici gıda israfında etkili olan tutum ve davranışların belirlenmesi amacıyla yapılan faktör analizi bulguları sonucunda, pandemi sürecinde tüketicilerin gıda israfı davranışlarının tek bir nedene indirgenemeyip ‘arta kalanı değerlendirme’, ‘duygu’, ‘niyet’ ve ‘planlama’ başta olmak üzere 10 farklı boyut ile açıklanabileceği ortaya konmuştur. Gıda israfı konusunda etkin role sahip bireylerin kadın tüketiciler olduğu belirlenerek, geleneksel olarak yemek faaliyetinden sorumlu görülmesi ve mutfağa hakim olmaları sebebiyle kadın tüketicilere, gıda yönetimi artı kalanı değerlendirme ve israfı azaltıcı faktörlere yönelik eğitimler faaliyetlerinin geliştirilmesi israfın azaltılmasında etkinlik gösterebilir. Tüketicilerin ortak kullanım alanlarına, çok yönlü küresel bir risk haline gelen gıda israfının azaltılmasının önemini ifade eden görseller eklenebilir. Bütüncül gerçekleştirilecek tüm politikalarda sürdürülebilirliğin sağlanması için devlet, aile ve bireyler etkin rol üstlenmelidir.

Anahtar kelimeler: gıda israfı, davranış, sürdürülebilir, tutum

INTRODUCTION

In the globalizing world, the ability of scarce resources to meet the needs of an increasing population is decreasing day by day. While the global population is expected to reach approximately 9.8 billion in the mid-2080s and Türkiye's population is expected to reach 95 million, it is becoming increasingly difficult to meet the rising food demand with scarce resources and to ensure food security (İkikat Tümer and Akbay, 2019; UN, 2024). In this context, it is necessary to minimize the product loss that occurs along the supply chain to ensure the sustainability of food. The decrease in quantity that occurs along the supply chain before reaching the final consumer is defined as "food loss" (Yash Kumar et al., 2016; Yıldırım et al., 2016; FAO, 2016; Yalçinkaya, 2025),

whereas discarding food without consuming it due to certain reasons after it reaches the consumer is defined as "food waste" (Schanes et al., 2018). Reducing these losses, which pose a global threat in terms of the climate crisis, sustainability, and food security (Gustavsson et al., 2011; Kummu et al., 2012; Stancu et al., 2016; Yalçinkaya, 2025;

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Erol and Siriken, 2024), provides a great contribution to the economies of countries (Beretta et al., 2013; Schanes et al., 2018).

FAO reports that while 735 million people struggle with hunger, one-third of the food produced for human consumption annually on a global basis (worth approximately 990 billion dollars) is lost and wasted for various reasons (FAO, 2023; İkiat Tümer and Güneş 2022; UN, 2024). The 2024 UN Food Waste Index Report revealed that the largest share of the 1.05 billion tons of food wasted globally is generated by households (631 million tons). In Türkiye, 102 kg of food is wasted per capita every year, and it is known that 61% of this waste originates from households (TISVA, 2024). Considering the vision of halving food loss and waste by 2030 within the scope of the Sustainable Development Goals (12.3), examining household waste dynamics is of utmost importance (Everitt et al., 2023).

While on the way to achieving this goal, the COVID-19 pandemic, which emerged as a global problem, brought many radical transformations to human life and directed individuals to change their consumption behaviors (Baltacı and Akaydin, 2020; Özbük et al., 2021; Borghesi and Morone, 2022). It has been determined in many studies that during crisis periods, consumers tend to buy and stockpile surplus products due to concerns about access to food and the expectation of supply shortages (Yoon et al., 2018; Prentice et al., 2020; Iranmanesh et al., 2022). Changed daily routines, the socio-economic situations of individuals, and environmental perceptions and perspectives during the pandemic process are determining factors regarding the amounts of waste (Özbük et al., 2021; Scacchi et al., 2021). When the literature on the effect of the pandemic on household food waste is examined, it is observed that geographical and cultural differences exist. While it is emphasized that the pandemic caused radical changes in food management perception and shopping habits in Italy (Amicarelli and Bux, 2022; Scacchi et al., 2021), it was reported that consumers reduced food waste as a result of acting more planned in the samples of Serbia (Berjan et al., 2022) and Romania (Burlea-Schiopoiu et al., 2021). On the other hand, a study conducted in Bangkok pointed out that waste increased (Liu et al., 2021).

These contradictions and behavioral changes observed on a global scale make the examination of local dynamics mandatory. In this context, the main purpose of the study is to determine the factors affecting the food waste of consumers during the pandemic process in Istanbul, a metropolitan city, to contribute to this global debate in the literature from Türkiye's perspective, and to develop sustainable solution proposals to prevent waste.

MATERIALS AND METHODS

The reason for choosing the province of Istanbul, which has the characteristics of a metropolitan city, as the material in this study is that it represents the most intense and accessible areas reflecting the spatial, economic, and social dynamics of the population in cities with these characteristics. Due to the literature requiring more comprehensive, systematic, and comparable data sets in quantitative and qualitative terms, a total of 225 surveys determined by the 'Proportional Sampling Method' (Newbold, 1995) were conducted in the selected province and districts of Istanbul.

$$n = \frac{N * P * (1-p)}{(N-1) * \sigma_p^2 + P * (1-P)} \cong 272 \quad (1)$$

Where; n: Sample size, N: Number of individuals in the population (25 034 570),

σ_p^2 : Variance of the proportion, r: Deviation from the mean (5%), Z/2: z table value (1.645), p: Proportion of consumers who do not waste food.

According to the proportional sampling method, a total of 272 surveys were conducted with 90% confidence and a 5% margin of error. However, as a result of the surveys conducted, 47 missing survey data points were removed, and 225 survey data points were analyzed. The main population of the research consisted of a survey study conducted with consumers residing in the province and districts of Istanbul between June and July 2021.

Factor Analysis

Factor analysis, one of the multivariate analysis methods, was used in the study. Factor analysis is a technique applied to explain the relationship between original variables and a group of variables called factors, which are obtained as a result of grouping variables with high correlation among them (Kalaycı, 2009). Since factor analysis aims to express a large number of observed variables with a small number of factors, the priority is the correlation between these variables (Johnson and Wichern, 1992). The aim of the analysis is to reduce the number of variables and to identify and classify the structure of the relationship between the variables.

Factor analysis has four stages. These are determining whether the data are suitable for analysis, obtaining the factors, rotating the factors, and determining the names of the factors. Three methods are used to determine the suitability of the data set. These are the Bartlett test, Kaiser-Meyer-Olkin (KMO), and the creation of a correlation matrix (Akgül and Çevik, 2003). Cronbach's alpha is the most appropriate and widely used reliability measure in studies using Likert-type scales. In calculating the correlation matrix,

a high correlation relationship is sought between the variables in question. Variables with a very strong correlation relationship will generally be included in the same factor (Nakip, 2003). In the study, the Kaiser-Meyer-Olkin (KMO) and Bartlett tests were applied to determine the suitability of the data set for factor analysis.

The variables to which factor analysis will be applied in accordance with the purpose of the study were determined by considering previous studies on the subject and consist of statements regarding the consumer's tastes, preferences, pre- and post-shopping attitudes and behaviors, nutritional habits, and perspectives on waste. To determine consumer attitudes and behaviors towards food waste, data were obtained according to a 5-point Likert scale (1: Strongly Disagree, 2: Disagree, 3: Moderately Agree, 4: Agree, 5: Strongly Agree) and subjected to factor analysis. In order to determine the consumer attitudes and behaviors effective in consumers' food waste, 30 statements were determined by considering previous studies on this subject. A 5-point Likert scale was used to determine the effectiveness of these statements regarding food waste.

RESULTS AND DISCUSSION

Food waste, which is a global problem and poses a threat to a sustainable world, varies depending on socio-demographic characteristics such as age, gender, marital status, education

Table 1. Socio-demographic and economic characteristics of consumers

	Mean	Std. Deviation
Age (years)	36.16	11.319
Number of household members (people)	3.78	1.656
Number of children aged 0-6 (people)	0.27	0.567
Number of children aged 7-12 (people)	0.31	0.558
Number of children aged ≥ 13 (people)	1.17	1.430
Total number of children in the household (people)	1.75	1.530
Number of working individuals in the household (people)	1.83	0.895
Household income (month/TL)	7 197.24	4 752.297
Household food expenditure (month/TL)	2 367.56	1 323.092

According to TURKSTAT data, it was determined that women constitute 49.98% of the total population and men 50.02% (TURKSTAT, 2025). Of the consumers participating in the research, 51.11% were female and 56.44% were married (Table 2). In a study on food waste in Türkiye, Özdal (2019) determined that 59.8% of the consumers were women, and Berjan et al. (2019) found that 70.1% of the sample in Montenegro were women. It was determined that 33.78% of the consumers had a high school education, and 41.78% had an associate-bachelor's degree (Table 2). In studies related to food waste in Türkiye, it was determined that 64.7% of the

level, number of household members, and socio-economic characteristics such as the number of working individuals in the household, income, and food expenditure. There are studies in the literature aiming to determine the factors causing food waste (Pekcan, 2005; TMO, 2012, 2013; Dölekoğlu Özçiçek et al., 2018; Daysal and Demirbaş, 2020; Kaya & Dilek, 2024; Yalçınkaya, 2025).

The average age of the consumers participating in the survey was determined as 36.16 years, and the average number of household members was 3.78 people. The average total number of children in the household was 1.75, with an average of 0.27 children aged 0-6, 0.31 children aged 7-12, and 1.17 children aged ≥ 13 . The average number of working individuals in the household was determined as 1.83. The average household income of the consumers was 7 197.24 TL, and the average food expenditure was 2 367.56 TL (Table 1). In a study conducted to determine household food waste in the province of Izmir, the average age of consumers was determined as 36.46 years (Daysal and Demirbaş, 2020). In a study aiming to obtain information about consumers' attitudes toward food safety, food waste, and purchasing behaviors before and during the COVID-19 pandemic in Türkiye, the average age of consumers was determined as 39 years (Erol et al., 2023).

consumers in Izmir province had a bachelor's degree (Daysal and Demirbaş, 2020), and 46.4% in Adana, Mersin, and Antalya provinces were primary school graduates (Dölekoğlu Özçiçek et al., 2014). It was determined that 88.89% of the consumers had social security belonging to the Social Security Institution (SGK). It was found that 34.66% of the consumers had chronic diseases in their households, and 22.77% had obese individuals in their households (Table 2). According to the TURKSTAT (2019) Türkiye Health Survey, the rate of obese individuals is 21.1%. This is also consistent with the result obtained in this research.

Table 2. Some characteristics of the consumers

		N	%			N	%
Gender	Female	115	51.11	Chronic disease	No	147	65.33
	Male	110	48.89		Yes	77	34.66
	Total	225	100.00		Total	225	100.00
Marital status	Single	98	43.56	Obese individual	No	174	77.33
	Married	127	56.44		Yes	51	22.77
	Total	225	100.00		Total	225	100.00
Education status	Literate	3	1.33	Social security	Without social security	11	4.89
	Primary school	22	9.78		Green card	2	0.89
	Middle school	23	10.22		SGK	200	88.89
	High school	76	33.78		Private	9	4.00
	Associate-Bachelor's	94	41.78		Other	3	1.33
	Postgraduate	7	3.11		Total	225	100.00
	Total	225	100.00				

The rate of consumers whose family members caught the COVID-19 disease, which affected the whole world and was declared a pandemic by the World Health Organization, was determined as 36.40%, and the rate of those whose close circle caught it was 74.70 % (Table 3). During the pandemic process, consumers preferred to prepare many products at home, especially because they are hygienic, in order to protect themselves from the epidemic disease. Bread comes

first among these products. 54.20% of the consumers stated that they tried baking bread at home during the pandemic process. 33.50% of the consumers who baked bread at home during this process stated that the bread they bought from outside was wasted more compared to the bread baked at home (Table 3). Consumers stated that this situation was frequently caused by buying more than needed, quick staling, molding, and the portion size of the bread bought from outside.

Table 3. Consumers' information regarding COVID-19 disease

		N	%
Family catching COVID-19 disease status	No	143	63.6
	Yes	82	36.4
	Total	225	100
Close circle catching COVID-19 disease status	No	57	25.3
	Yes	168	74.7
	Total	225	100
Baking bread at home status during the pandemic	No	103	45.8
	Yes	122	54.2
	Total	225	100
Bread waste status of consumers who baked bread during the pandemic*	Outside bread	84	33.5
	Homemade	11	4.4
	Both equally	7	2.8
	Not wasted	20	8
	Total	122	48.6

*This question was directed only to consumers who baked bread at home.

Within the scope of the study, the three most important statements effective in consumers' food waste were determined respectively as "When I throw leftover food in the trash, I feel bad, my conscience hurts", "When I waste food, I think about the people fighting the hunger problem in the world and I feel bad", and "From now on, I will reduce my food waste amount". The three least important factors in consumers' food waste were determined respectively as

"We do not buy food close to its expiration date", "We prefer appropriately sized packaged foods", and "I make soup from the stems and stalks of vegetables" (Table 4). In the province of Tokat, it was determined that consumers strongly agreed with the statements "I don't want to waste food, I feel uncomfortable" (4.69), "I make an effort not to waste food" (4.62), and "I know that fertilizer can be obtained from food waste" (4.37) (Gönültaş et al., 2020).

Table 4. Variables affecting consumers' attitudes and behaviors effective in food waste

	Mean	Std. Deviation
When I throw leftover food in the trash, I feel bad, my conscience hurts	4.57	0.843
When I waste food, I think about the people fighting the hunger problem in the world and I feel bad	4.48	0.882
From now on, I will reduce my food waste amount	4.48	0.768
According to my beliefs and philosophy of life, when food is thrown in the trash by others, I feel bad, my conscience hurts	4.47	0.892
We always check product prices	4.37	0.898
I intend not to waste food	4.35	0.895
We pay attention to the sale of food under appropriate conditions	4.28	0.871
I take care not to waste food	4.19	0.928
We take care to buy fruits and vegetables in their season	4.19	0.892
I consume the food left over from the previous day/meal as soon as possible	4.16	0.964
I eat the same meal a second time	4.09	1.029
We compare the places to shop in terms of price and prefer the places that sell at affordable prices	4.04	1.054
When I waste food, I think about the pollution of the environment I live in and I feel bad	4.04	1.189
Nature is polluted by wasting food	4.01	1.118
We prepare as much food as we need at home	3.94	1.025
Before going grocery shopping, we check the foods I keep in the refrigerator	3.84	1.083
I use leftover vegetables in cooking	3.76	1.160
When I waste food, I feel uncomfortable thinking that the resources used in all stages of food from production to consumption are wasted	3.73	1.204
I think food waste harms the environment	3.70	1.381
We do grocery shopping on certain days of the week	3.67	1.077
Before going grocery shopping, we usually prepare a shopping list	3.42	1.400
We prefer packaged foods less	3.28	1.224
I try to create a different meal from leftover food	3.12	1.116
We plan the meals to be made at home the day before	3.10	1.433
I put leftover food in the deep freezer and consume it later	3.07	1.464

* 1: Strongly disagree, 2: Disagree, 3: Moderately agree, 4: Agree, 5: Strongly agree

Table 4. Variables affecting consumers' attitudes and behaviors effective in food waste(continued)

	Mean	Std. Deviation
I make marmalade, compote, or dry leftover fruits	2.64	1.448
We do not buy more food than the household needs	2.51	1.196
I make soup from the stems and stalks of vegetables	2.49	1.415
We prefer appropriately sized packaged foods	2.37	1.099
We do not buy food close to its expiration date	1.65	1.160

* 1: Strongly disagree, 2: Disagree, 3: Moderately agree, 4: Agree, 5: Strongly agree

In this part of the study, where a 5-point Likert scale was used to determine consumer attitudes and behaviors towards food waste, the Cronbach's alpha value was

calculated as 0.842, and the scale was found to have high reliability. As a result of the analysis, since the KMO test was $0.823 > 0.80$, it was determined that the relationship

between the data was very good. The Bartlett test result Chi-Square =2,169 ($p < 0.01$) indicates statistical significance and expresses the presence of high correlation among the variables (Table 5). As a result of the factor analysis, the 30 statements directed to the consumers as attitudes and behaviors effective in food waste were grouped under 10

factors. The shares of these factors obtained as a result of the analysis within the total variance were determined as 10.607%, 10.117%, 9.244%, 5.966%, 5.533%, 5.419%, 5.187%, 5.045%, 4.480%, and 4.111%, respectively. As a result of the analysis, it was determined that the obtained factors explained 65.710% of the total variance (Table 5).

Table 5. Number of factors and variances based on eigenvalue statistics, Cronbach's Alpha, KMO, and Bartlett test

Variable	Eigenvalue Statistics			Rotation		
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)	Cumulative (%)
1	6.823	22.745	22.745	3.182	10.607	10.607
2	2.060	6.866	29.611	3.035	10.117	20.725
3	1.905	6.351	35.962	2.773	9.244	29.969
4	1.634	5.446	41.408	1.790	5.966	35.935
5	1.537	5.122	46.530	1.660	5.533	41.468
6	1.330	4.433	50.963	1.626	5.419	46.887
7	1.241	4.135	55.098	1.556	5.187	52.074
8	1.110	3.699	58.797	1.514	5.045	57.119
9	1.070	3.566	62.363	1.344	4.480	61.599
10	1.004	3.348	65.710	1.233	4.111	65.710

Factor 1 was determined as 'I put leftover food in the deep freezer and consume it later', 'I try to create a different meal from leftover food', 'I use leftover vegetables in cooking', 'I eat the same meal a second time', 'I make marmalade, compote, or dry leftover fruits', 'I make soup from the stems and stalks of vegetables', and 'I consume the food left over from the previous day/meal as soon as possible'. Therefore, the Factor 1 group was named 'Evaluating the leftovers' (Table 6).

Factor 2 was determined as 'When I waste food, I think about the people fighting the hunger problem in the world and I feel bad', 'When I waste food, I think about the pollution of the environment I live in and I feel bad', 'When I throw leftover food in the trash, I feel bad, my conscience hurts', 'According to my beliefs and philosophy of life, when food is thrown in the trash by others, I feel bad, my conscience hurts', and 'When I waste food, I feel uncomfortable thinking that the resources used in all stages of food from production to consumption are wasted'. Therefore, the Factor 2 group was named 'Emotion' (Table 6).

Factor 3 was determined as 'I intend not to waste food', 'I take care not to waste food', and 'From now on, I will reduce my food waste amount'. Therefore, the Factor 3 group was named 'Intention' (Table 6).

Factor 4 was determined as 'Before going grocery shopping, we usually prepare a shopping list', 'We do grocery shopping

on certain days of the week', and 'We plan the meals to be made at home the day before'. Therefore, the Factor 4 group was named 'Planning' (Table 6).

Factor 5 was determined as 'Nature is polluted by wasting food' and 'I think food waste harms the environment'. Therefore, the Factor 5 group was named 'Environmental Sensitivity' (Table 6).

Factor 6 was determined as 'We always check product prices' and 'We compare the places to shop in terms of price and prefer the places that sell at affordable prices'. Therefore, the Factor 6 group was named 'Price Control' (Table 6).

Factor 7 was determined as 'We pay attention to the sale of food under appropriate conditions' and 'Before going grocery shopping, we check the foods I keep in the refrigerator'. Therefore, the Factor 7 group was named 'Hygiene and Needs Assessment' (Table 6).

Factor 8 was determined as 'We prefer appropriately sized packaged foods' and 'We do not buy more food than the household needs'. Therefore, the Factor 8 group was named 'Purchase Amount' (Table 6).

Factor 9 was determined as 'We prefer packaged foods less' and 'We take care to buy fruits and vegetables in their season'. Therefore, the Factor 9 group was named 'Preference' (Table 6).

Factor 10 was determined as 'We do not buy food close to its expiration date' and 'We prepare as much food as we

need at home'. Therefore, the Factor 10 group was named 'Consciousness' (Table 6).

In a factor analysis conducted to determine the factors affecting waste behaviors in Corum province, they named the explanatory factors respectively as "norms, intention, outcome awareness, purchasing behavior, and planning" (Karakaş, 2019). He calculated the variance rates explained by these obtained factors as 25.129% for the norms factor, 15.777% for intention, 14.893% for outcome awareness,

11.120% for purchasing behavior, and 9.693% for planning. In a study conducted to determine the factors effective in food waste behavior in Tokat province, they gathered the factors under three headings. They determined that the factor named "Awareness and attention against food waste" explained 49.048% of the total variance, the factor named "Prevention of food waste" explained 20.520%, and the factor named "Consciousness towards food waste" explained 16.341% of the variance (Gönültaş et al., 2020).

Table 6. Rotation matrix of factors

	Component									
	1	2	3	4	5	6	7	8	9	10
Evaluating the leftovers										
I put leftover food in the deep freezer and consume it later	0.659	0.016	0.078	0.077	0.055	0.033	-0.166	-0.004	-0.076	0.138
I try to create a different meal from leftover food	0.653	0.100	0.122	0.150	0.057	0.230	0.001	-0.045	0.006	0.020
I use leftover vegetables in cooking	0.648	0.158	0.330	-0.003	-0.062	0.105	0.184	0.025	-0.029	-0.042
I eat the same meal a second time	0.618	0.005	0.454	0.019	-0.072	0.159	0.115	-0.056	0.095	-0.091
I make marmalade, compote, or dry leftover fruits	0.604	0.301	0.075	0.146	0.102	-0.131	0.250	-0.068	0.236	-0.168
I make soup from the stems and stalks of vegetables	0.575	0.361	0.013	0.048	0.204	-0.034	0.022	-0.170	0.181	0.040
I consume the food left over from the previous day/meal as soon as possible	0.553	0.183	0.359	0.089	-0.089	-0.102	0.223	-0.012	0.140	0.277
Intention										
I intend not to waste food	0.225	0.189	0.808	0.028	0.172	0.022	-0.036	-0.105	-0.002	0.151
I take care not to waste food	0.262	0.157	0.794	0.120	0.088	0.016	0.081	-0.076	-0.004	0.184
From now on, I will reduce my food waste amount	0.206	0.209	0.741	0.084	0.181	0.014	0.081	0.086	0.019	-0.147

Table 6. Rotation matrix of factors(continued)

	Component									
	1	2	3	4	5	6	7	8	9	10
Emotion										
When I waste food, I think about the people fighting the hunger problem in the world and I feel bad	0.213	0.828	0.020	0.087	-0.056	0.061	0.085	0.080	0.066	-0.028
When I waste food, I think about the pollution of the environment I live in and I feel bad	0.226	0.767	0.009	0.205	0.093	0.010	0.064	0.038	-0.081	0.122
When I throw leftover food in the trash, I feel bad, my conscience hurts	-0.080	0.663	0.325	0.133	-0.028	0.119	0.063	-0.015	-0.077	-0.052
According to my beliefs and philosophy of life, when food is thrown in the trash by others, I feel bad, my conscience hurts	0.126	0.659	0.146	-0.102	0.031	0.119	0.073	-0.079	0.092	0.057

When I waste food, I feel uncomfortable thinking that the resources used in all stages of food from production to consumption are wasted	0.119	0.576	0.352	0.013	0.242	-0.038	0.103	-0.089	0.165	0.060
Planning										
Before going grocery shopping, we usually prepare a shopping list	0.165	0.111	0.017	0.756	-0.032	-0.003	-0.016	-0.044	-0.113	0.121
We do grocery shopping on certain days of the week	-0.022	0.071	0.050	0.722	0.038	0.137	0.112	-0.049	0.125	-0.050
We plan the meals to be made at home the day before	0.191	0.033	0.152	0.600	0.084	-0.002	0.222	0.064	0.165	-0.046
Environmental Sensitivity										
Nature is polluted by wasting food	0.058	-0.009	0.158	0.160	0.808	0.001	0.009	-0.094	0.046	0.123
I think food waste harms the environment	0.049	0.138	0.136	-0.079	0.802	-0.023	0.146	0.067	-0.080	0.003
Price Control										
We always check product prices	0.053	0.015	0.083	0.039	-0.014	0.829	0.039	0.077	0.125	-0.105
We compare the places to shop in terms of price and prefer the places that sell at affordable prices	0.164	0.199	-0.036	0.091	-0.009	0.812	0.045	-0.003	0.053	0.055
Hygiene and Needs Assessment										
We pay attention to the sale of food under appropriate conditions	-0.052	0.232	.222	0.101	0.124	-0.008	0.765	0.095	0.033	-0.061
Before going grocery shopping, we check the foods I keep in the refrigerator	0.231	0.068	-.068	0.213	0.068	0.127	0.701	-0.165	-0.040	0.142
Purchase Amount										
We prefer appropriately sized packaged foods	-0.081	0.012	-.009	0.066	-0.110	-0.075	-0.119	0.800	0.010	-0.003
We do not buy more food than the household needs	-0.039	-0.038	-.067	-0.107	0.083	0.152	0.081	0.743	0.061	0.114
Preference										
We prefer packaged foods less	0.126	0.020	-.007	0.010	0.010	0.055	-0.154	0.179	0.810	-0.013
We take care to buy fruits and vegetables in their season	-0.009	0.103	.055	0.196	-0.069	0.236	0.295	-0.161	0.620	0.067

CONCLUSION

Along with the increasing population worldwide, food waste constitutes a critical obstacle in meeting basic nutritional needs sustainably. According to FAO data, the loss or waste of approximately one-fifth of the food produced for human consumption every year for various reasons leads to an economic loss of 990 billion dollars globally and serious environmental risks. The study conducted in this framework aimed to reveal the current situation and solutions with a scientific approach by analyzing the effects of the COVID-19 pandemic on consumers' food management through the example of Istanbul province.

The research findings indicate that women are in a central position in household food management due to their traditional roles and are the primary decision-makers in preventing waste. The concern about access to food experienced during the pandemic period led consumers to stock surplus products, and as a result of this tendency, it

was determined that approximately 13% of the extra food purchased was wasted without being consumed. However, it has been observed that the anxiety brought about by the epidemic process has increased social awareness on issues of food safety and waste. The results of the factor analysis prove that ten basic dimensions gathered under the headings of evaluating the leftovers, emotion, intention, planning, environmental sensitivity, price control, hygiene and needs assessment, purchase amount, preference, and consciousness directly shape consumers' waste behaviors. In light of the obtained results, in order to reduce food waste, it is recommended to primarily organize information and training activities for female consumers who are active in kitchen management, and to encourage participation by supporting these trainings with certificate programs. In addition, creative recipes that allow the re-evaluation of leftover products should be disseminated through mass media, and consumers should be given the habit of planned

shopping and preparing lists. In order to make waste awareness permanent, foundations should be laid in the family with special training for parents, and then it should be ensured that children grow up with this awareness by adding food waste lessons to school curricula. As a result, the urgent awareness of consumers and their adoption of sustainable consumption patterns will make a positive contribution to both the national and global economy and will allow the effective use of limited natural resources in accordance with their purpose.

REFERENCES

Akgül A, Çevik O (2003) İstatistiksel Analiz Teknikleri. Emek Ofset.

Amicarelli V, Lagioia G, Sampietro S, Bux C (2022) Did tThe COVID-19 Pandemic Change Food Waste Perception aAnd Behavior? Evidence from Italian consumers. *Socio-Economic Planning Sciences*, 82: 101095.

Baltacı A, Akaydın H (2020) COVID-19 Pandemi Sürecinin Tüketicilerin Gıda Ürünlerini Satın Alma Davranışları Üzerindeki Etkisi: Bir Literatür Taraması. *YIU Sağlık Bilimleri Dergisi*, 1: 57-64.

Beretta C, Stoessel F, Baier U, Hellweg S (2013) Quantifying Food Losses and the Potential For Reduction in Switzerland. *Waste Management*, 33: 764-773.

Berjan S, Mrdalj V, El Bilali H, Velimirovic A, Blagojevic Z, Bottalico F, Debs P, Capone R (2019) Household Food Waste in Montenegro. *Italian Journal of Food Science*, 31: 274-286.

Berjan S, Vaško Ž, Ben Hassen T, El Bilali H, Allahyari MS, Tomić V, Radosavac A (2022) Assessment of Household Food Waste Management During the COVID-19 Pandemic in Serbia: a Cross-Sectional Online Survey. *Environmental Science and Pollution Research*, 29(8): 11130-11141.

Borghesi G, Morone P (2022) A Rreview of the Eeffects of COVID-19 on Ffood Wwaste. *Food Security*, 1-20.

Burlea-Schiopoiu A, Florin Ogarca R, Mihail Barbu C, Craciun L, Cosmin Baloi I, Stelian Mihai, L (2021) The İmpact of COVID-19 Pandemic on Food Waste Behaviour of Young People. *Journal of Cleaner Production*, 20;294:126333.

Daysal H, Demirbaş N (2020) Hanehalkı Gıda İsrafının Nedenleri Ve Azaltılması İçin Öneriler: İzmir İli Örneği. *Balkan ve Yakın Doğu Sosyal Bilimler Dergisi*, 6(3): 40-47.

Dölekoğlu Özçipek C, Giray FH, Şahin A (2014) Mutfaktan Çöpe Ekmek: Tüketim Vve Değerlendirme. *Akademik Bakış Dergisi*, 44: 448-489.

Dölekoğlu Özçipek C, Gün S, Giray FH, Şengül S, Var I (2018) Türkiye’de Hanehalkı Gıda İsrafının Boyutları. *Proje Sonuç Raporu*, 1-60.

Erol I, Mutuş B, Ayaz ND, Stowell JD, Sırıken B (2023) Food Safety Awareness, Changes İin Food Purchasing

Behaviour aAnd Attitudes Towards Food Waste During COVID-19 İin Türkiye. *Foods*, 12(24): 4396. <https://doi.org/10.3390/foods12244396>

Erol İ, Sırıken B (2024) Gıda Kayıp ve İsrafının Küresel Boyutları ve Eetkileri. In: *Gıda, Su Kaybı ve İsrafı. Türkiye Bilimler Akademisi Yayınları.*

Everitt H, van der Werf P, Gilliland JA (2023) A Rreview of the Generation of Household Food Waste During the COVID-19 Pandemic. *Sustainability*, 15(7): 5760. <https://doi.org/10.3390/su15075760>

FAO (2016) Food Loss and Waste Facts. <http://www.fao.org/save-food/resources/infographic/en/> (Access date: 18.10.2019).

FAO (2023) Tracking Progress oOn Food aAnd Agriculture-Related SDG indicators 2023. <https://openknowledge.fao.org/server/api/core/bitstreams/3a8baf8c-960d-4105-9538-e4bd9b1d4503/content/index.html> (Access date: 20.12.2025).

Gönültaş H, Kızılaslan H, Kızılaslan N (2020) Gıda İsrafının Davranışsal Belirleyicileri; Tokat İli Örneği. *Gaziosmanpaşa Bilimsel Araştırma Dergisi*, 9(3): 14-24.

Gustavsson J, Cederberg C, Sonesson U, Van Otterdijk R, Meybeck A (2011) Global Food Losses aAnd Food Waste. *Food aAnd Agriculture Organization oOf tThe United Nations*. <http://www.fao.org/docrep/014/mb060e/mb060e00.pdf> (Access date: 10.06.2019).

HLPE (2014) Food losses and waste in the context of sustainable food systems. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome.

Iranmanesh M, Ghobakhloo M, Nilsashi M, Tseng ML, Senali MG, Abbasi GA (2022) Impacts of the COVID-19 Pandemic oOn Household Food Waste Behaviour: A Systematic Review. *Appetite*, 106127.

İkikat Tümer E, Akbay C (2019) Kahramanmaraş'taki Hanelerde Ekmek İsrafını Etkileyen Faktörler. *Journal of Gaziosmanpaşa Scientific Research*, 36(3):230-235.

İkikat Tümer E, Güneş N (2022) Kahramanmaraş İlinde Ekmek Tüketimi ve İsrafı. *Journal of Gaziosmanpaşa Scientific Research*, 11(3):30-38.

Johnson RA, Wichern DW (1992) *Applied Multivariate Statistical Analysis*. Prentice-Hall Inc.

Kalaycı Ş (2009) SPSS Uygulamalı Çok Değişkenli İstatistiksel Teknikleri. Asil Yayın Dağıtım.

Karakaş G (2019) Gıda İsrafının Davranışsal Belirleyicileri; Çorum İli Örneği. *Turkish Journal of Agriculture - Food Science and Technology*, 7(3): 467-474. <https://doi.org/10.24925/turjaf.v7i3.467-474.2415>

Kaya D, Dilek S (2024) Determination of the Stages oOf Household Food Waste. *Gümrük vVe Ticaret Dergisi*,

- 11(36).
<https://doi.org/10.70490/gumrukticaretdergisi.1522151>
- Kummu M, De Moel H, Porkka M, Siebert S, Varis O, Ward PJ (2012) Lost Food, Wasted Resources: Global Food Supply Chain Losses and Their Impacts on Freshwater, Cropland, and Fertiliser Use. *Science of the Total Environment*, 438: 477-489.
- Liu C, Bunditsakulchai P, Zhuo Q (2021) Impact of COVID-19 on Food and Plastic Waste Generated by Consumers in Bangkok. *Sustainability*, 13(16): 8988.
- Martin-Rios C, Demen-Meier C, Gössling S, Cornuz C (2018) Food waste management innovations in the foodservice industry. *Waste Management*, 79: 196-206.
- Nakip M (2003) Pazarlama Araştırmaları Teknikler ve (SPSS Destekli) Uygulamalar. Seçkin Yayıncılık.
- Newbold CJ, Lassalas B, Jouany JP (1995) The importance of Methanogens Associated With Ciliate Protozoa in Ruminant Methane Production in Vitro. *Letters in Applied Microbiology*, 21(4): 230-234.
- Özbük RMY, Coşkun A, Filimonau V (2021) The Impact of COVID-19 on Food Management in Households of an Emerging Economy. *Socio-Economic Planning Sciences*.
- Özdemir ZN (2019) Türkiye’de Tüketicilerin Gıda İsrafını Engellemeye Yönelik Tutumlarının Analizi ve Mobil Uygulama Tasarımı. Master's Thesis, Çukurova University.
- Pekcan G, Köksal E, Küçükerdönmez Ö, Özel H (2005) Household Food Wastage in Turkey. https://www.researchgate.net/publication/284695951_Household_food_wastage_in_Turkey (Access date: 20.07.2019).
- Prentice C, Chen J, Stantic B (2020) Timed Intervention in COVID-19 and Panic Buying. *Journal of Retailing and Consumer Services*, 57: 102203.
- Salihoglu G, Salihoglu NK, Ucaroglu S, Banar M (2018) Food loss and waste management in Turkey. *Bioresource Technology*, 248: 88-99.
- Scacchi A, Catozzi D, Boietti E, Bert F, Siliquini R (2021) COVID-19 Lockdown and Self-Perceived Changes of Food Choice, Waste, Impulse Buying and Their Determinants in Italy: Quarantine, A Cross-Sectional Study. *Foods*, 10(2): 306. <https://doi.org/10.3390/foods10020306>
- Schanes K, Dobernig K, Gözet B (2018) Food Waste Matters - A Systematic Review of Household Food Waste Practices and Their Policy Implications. *Journal of Cleaner Production*, 182: 978-991.
- Stancu V, Haugaard P, Lähteenmäki L (2016) Determinants of Consumer Food Waste Behaviour: Two Routes to Food Waste. *Appetite*, 96: 7-17.
- TISVA (2024) Gıda İsrafı. https://www.tgmp.net/eyayin/israf_raporu_2024.html (Access date: 20.12.2025).
- TMO (2012) Ekmek İsrafı ve Tüketici Alışkanlıkları. <https://www.tmo.gov.tr/Upload/Document/Kampanya/17012014BasinBulteniEkmekIsrafi.pdf> (Access date: 19.07.2019).
- TMO (2013) Ekmek Tüketimiyle İlgili Tutum ve Davranışlar ile Ekmek İsrafı ve İsraf Üzerinde Etkili Olan Faktörlerin Araştırması. <http://www.anarastirma.com.tr/dosyalar/arastirmalar/1205/dosya-1205-6253.pdf> (Access date: 18.07.2019).
- TURKSTAT (2019) Türkiye Sağlık Araştırması. <https://data.tuik.gov.tr/Bulten/Index?p=Turkey-Health-Survey-2019-33661> (Access date: 25.08.2021).
- TURKSTAT (2025) İstatistiklerle Kadın, 2024. <https://data.tuik.gov.tr/Bulten/Index?p=Istatistiklerle-Kadin-2024-54076> (Access date: 09.02.2026).
- UN (2024) 2024 World Population Prospects Revision. https://population.un.org/wpp/?_gl=11cjgnl6_gaNDQ0OTM4NjQ2LjE3Njk0NjI0OTE_ga_TK9BQL5X7Z*czE3Njk0NjI0OTAkbzEkZzEkdDE3Njk0NjI3NjEkajQyJGwwJGgw (Access date: 20.01.2026).
- UN (2024) Climate and Environment 2024. <https://news.un.org/en/story/2024/03/1148036> (Access date: 21.01.2026).
- Yalçınkaya M (2025) Türkiye’de Gıda İsrafı: Değer Regimleri ve Müdahale Sorunları. *Avrasya Uluslararası Araştırmalar Dergisi*, Özel Sayı: 287-303.
- Yash Kumar L, Bharathi K, Lakshya M (2016) Food Wastage in Hostel Messes. *ASIO Journal of Microbiology, Food Science & Biotechnological Innovations*, 2(1): 06-08.
- Yıldırım H, Capone R, Karanlık A, Bottalico F, Debs P, El Bilali H (2016) Food Wastage in Turkey: An Exploratory Survey on Household Food Waste. *Journal of Food and Nutrition Research*, 4(8): 483-489.
- Yoon J, Narasimhan R, Kim MK (2018) Retailer's Sourcing Strategy Under Consumer Stockpiling and Anticipation of Supply Disruptions. *International Journal of Production Research*, 56(10): 3615-3635.