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FOOD RESEARCH
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The Sabri Ülker Foundation was established in 2009 in honour of Sabri Ülker, a veteran of the Turkish food industry and well-known philanthropist in Türkiye and beyond.

The Sabri Ülker Foundation is a not for profit, science-based organization making a significant contribution towards improving public health in Türkiye and beyond. This publication features a compilation of our academic work.

ACADEMIC RESEARCH



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IMPLEMENTATION OF A "BALANCED NUTRITION EDUCATION PROGRAM" AMONG PRIMARY SCHOOL CHILDREN IN TURKEY

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Key nutritional concerns in Turkey include excessive salt consumption (14.5 grams per day in 2012 against a WHO recommendation of 5 g/d) [1,2], iodine deficiency (27.8% of the population in 2009) [3], low fruit intake with only 53% of females and 51% of males consuming fruit on a daily basis, low vegetable consumption with only 63% of females and 60% of males consuming vegetables on a daily basis, [4], low iron status (anemia in 21% of female and 19% of male school children in 1993) [5], and potential high energy intake (3500 Kcal/day available in the food chain against a requirement of1800-2500 Kcal/d) [5]. Sugar(s) consumption is not considered to be an issue at 35.4 g/d in 2014 compared to the WHO recommendation of 25-50 g/d [5] (Fig. 1).

According to the Turkey Demographic and Health Survey of 2013 (TDHS-2013) [6], by age five 10% of children (11% for males and 8% for females) are stunted (short for their age), whereas wasting is a less serious problem with 2% of children (no gender difference) being underweight for their age.

The Sabri Ülker Food Research Foundation was established in 2009 in Turkey with the objective of enhancing nutrition science and knowledge, with a special focus on the Turkish population and regional neighbors. The Sabri Ülker Food Research Foundation is a member of the European Nutrition Foundations Network and key areas of activities include to encourage healthy living by promoting healthy eating and a balanced diet, to support and encourage new research, education and other initiatives in the field of food and nutrition and to present the public with useful information derived from a variety of reliable sources, both nationally and internationally.

The Balanced Nutrition Education Program is a school-based nutritional intervention program developed under the direction of the Sabri Ülker Food Research Foundation and the Ministry of Education in Turkey to promote a healthy lifestyle in primary school children. The program has been implemented since 2011, so far involving 1.5 million children from 500 primary schools across Turkey. Material from the British Nutrition Foundation (BNF) has been adapted for local use [7]. The main theme of the program is "You can eat anything - as long as you keep it balanced. All you have to do is learn how to achieve a balance". Intended for children aged 7-9 years, the program focuses on the food groups, ways to establish a balanced diet, and the benefits of exercise, hygiene, and drinking water, being offered in weekly 2 hour lessons for 38 weeks throughout the academic year at selected primary schools (Fig 2).

A preliminary questionnaire survey was conducted between 2014 and 2015 among 618 primary school (2^{nd} to 4^{th} grade) students (52% females) at four provinces in Turkey, including Istanbul (n=190, 32%), Izmir (n=210, 33%) and Kayseri (n=218, 35%) to evaluate the impact of the 'Balanced Nutrition Education Program' on food intake, anthropometrics and physical activity levels of primary school children.

A food frequency questionnaire and 3-day dietary recall were applied before and after the program in order to examine the amount and frequency of food intake (dairy, meats and legumes, cereals, fruits and vegetables, fats, sugars and other foods) to estimate daily energy and nutrient intake. Weight and height were measured and weight according to age, height according to age and BMI according to age were estimated according to WHO standards (http://www.who.int/childgrowth/standards/en/). The participants of the impact evaluation were given a physical activity questionnaire covered intensity, duration, and frequency of physical activities. The physical activity levels (PAL) were calculated by dividing physical activity ratio (PAR; expressed as a multiple of basal metabolic rate as multiplied for each activity and the energy in calories spent) by duration of day in minutes (24 hour=1440 minutes). PAL values between 1.40-1.69 are classified as sedentary or light activity lifestyle; 1.70-1.99 as active or moderately active lifestyle; and 2.00-2.40 were classified as vigorous or vigorously active lifestyle. Data from questionnaires and daily forms were entered in BEBIS program (a program for

HTB conceived the original idea, designed and directed (with BM) the project. RM, ÖK, HŞ, BÇ, EG, ŞA performed the data collection. RM and HTB analysed the data. RM, BA drafted the manuscript and designed the figures in consultation with HTB. All authors have evaluated and approved the final version submitted for publication.

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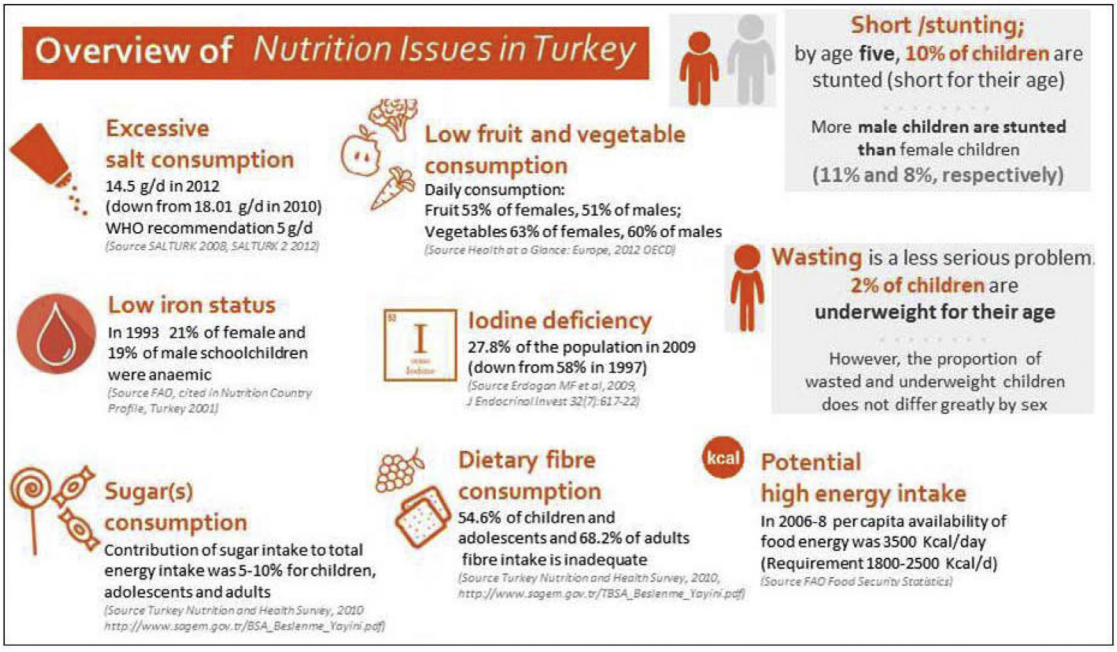


Fig 1. Overview of key nutritional parameters in Turkey

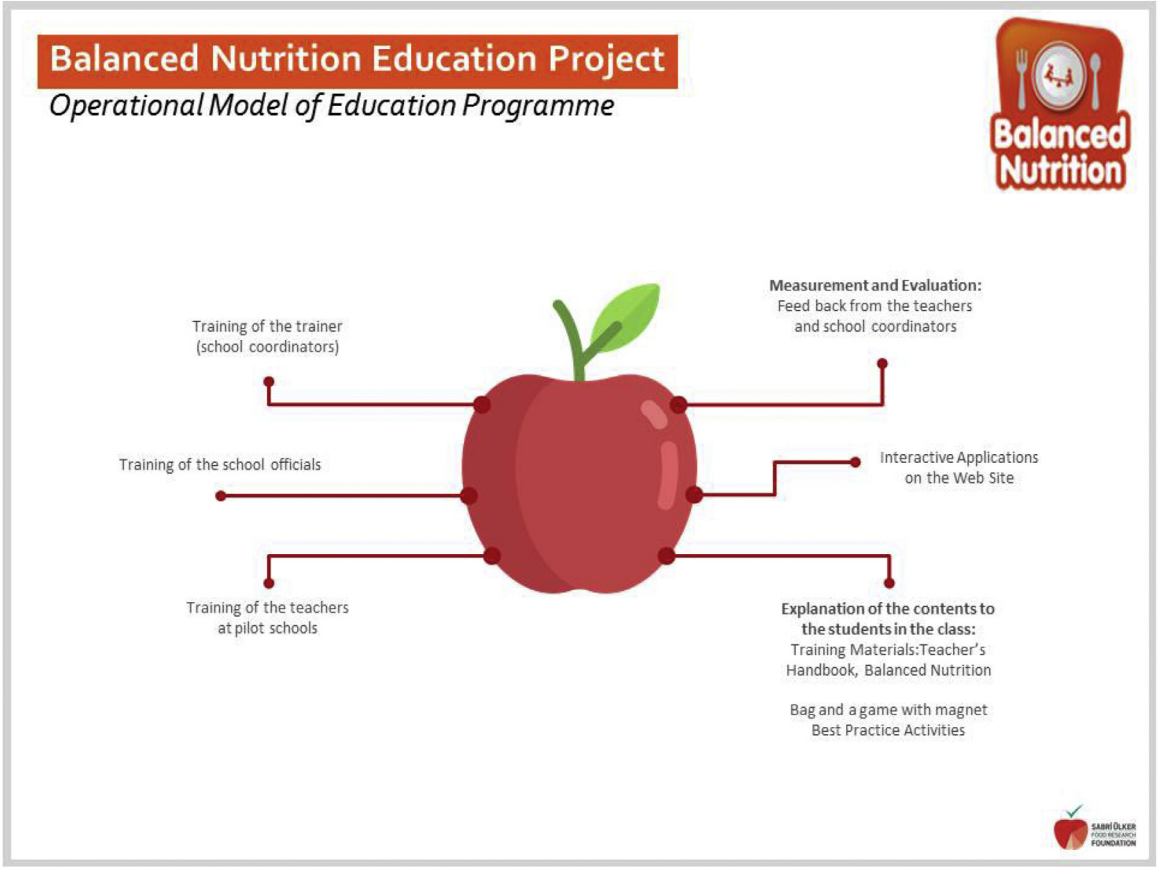


Fig 2. Operational Model of Balanced Nutrition Education Project

energy and nutrient analysis of food and beverages based on USDA database) and converted to Statistical Package for the Social Sciences (SPSS) to be coded and analyzed.

The survey results revealed that the "Balanced Nutrition Education Program" was associated with a significant decrease in total energy ($p<0.001$), carbohydrate ($p<0.001$), fat ($p=0.003$ in males,

Table 1
Nutrient intake, anthropometric and physical activity data before and after implementation of the Balanced Nutrition Education Program

		Males Before BNEP Mean ± SD	After BNEP Mean ± SD	p value	Females Before BNEP Mean ± SD	After BNEP Mean ± SD	p value
Nutrient intake							
Energy (kcal)		1928.22 ± 542.2	1761.26 ± 453.14	<**0.001**	1847.7 ± 516.59	1706.5 ± 457.56	<**0.001**
Protein (g)		65.82 ± 20.58	63.38 ± 29.25	0.183	62.76 ± 18.42	60.67 ± 19.29	**0.046**
Animal protein (g)		38.78 ± 16.03	39.39 ± 1.60	0.721	37.67 ± 14.40	37.35 ± 15.96	0.731
Vegetable protein (g)		27.04 ± 9.53	23.99 ± 7.25	<**0.001**	25.09 ± 8.50	23.32 ± 7.59	<**0.001**
Carbohydrate (g)		221.38 ± 60.11	196.70 ± 53.67	<**0.001**	208.51 ± 63.38	187.15 ± 55.18	<**0.001**
Fat (g)		83.87 ± 30.90	78.16 ± 24.61	**0.003**	82.21 ± 27.27	77.31 ± 23.76	**0.001**
Fibre (g)		20.53 ± 7.45	17.12 ± 5.93	<**0.001**	20.19 ± 7.09	16.75 ± 5.88	<**0.001**
Protein (%E)		13.81 ± 2.36	14.53 ± 5.57	**0.040**	13.77 ± 2.36	14.19 ± 2.43	**0.012**
Carbohydrate (%E)		46.38 ± 5.76	44.75 ± 5.80	<**0.001**	45.20 ± 5.82	44.03 ± 5.97	**0.001**
Fat (%E)		38.49 ± 5.40	39.70 ± 5.65	**0.002**	39.78 ± 5.25	40.65 ± 5.39	**0.013**
Anthropometrics							
Weight for age	percentile	68.16 ± 30.61	66.06 ± 31.91	0.072	62.50 ± 30.26	57.47 ± 31.95	<**0.001**
	z-score	0.90 ± 1.42	0.74 ± 1.42	**0.001**	0.50 ± 1.16	0.29 ± 1.17	<**0.001**
Height for age	percentile	58.98 ± 31.34	53.84 ± 31.46	<**0.001**	52.13 ± 31.22	48.03 ± 31.73	<**0.001**
	z-score	0.39 ± 1.25	0.18 ± 1.21	<**0.001**	-0.10 ± 4.09	-0.03 ± 1.18	0.728
BMI for age	percentile	67.48 ± 30.23	65.89 ± 31.77	0.233	62.41 ± 31.19	58.52 ± 32.04	<**0.001**
	z-score	0.81 ± 1.40	0.71 ± 1.45	0.091	0.55 ± 1.25	0.36 ± 1.27	<**0.001**
Physical activity level*		1.83±0.21	1.88±0.19	<**0.001**	1.79±0.17	1.84±0.19	<**0.001**

BNEP: Balanced Nutrition Education Program
*3-day average

p=0.001 in females) and animal protein (p<0.001) intake and a significant increase in PAL (p<0.001) among all students, whereas significant decrease in age-based BMI values (p<0.001) was noted only in females (Table 1, Fig. 3).

In a cross-sectional study of 2519 students, aged 13–14 years, from 79 schools in Spain, students were asked to report their food intake and physical activity over one week through the CAL-TAS platform from Alicia Foundation [8]. Authors noted failure to adhere the recommendations provided by the Spanish Society of Community Nutrition in adolescents in general, presence of overweight or obesity in 20% of students and the higher likelihood of poor eating habits and inactivity in those with higher body mass index [8]. Given the consideration of early adolescence to be associated with acquiring more independence and making own food choices and thus as a critical period to determine the state of health in the adult period [8], the positive impact of Balanced Nutrition Education Project on eating habits and the physical activity in Turkish in school children of 2nd to 4th grades seems notable to indicate the likelihood of early adoption of healthy dietary habits and of a correct physical activity before the critical adolescence period.

In conclusion, the Balanced Nutrition Education Project has shown significant improvements in a range of parameters in school

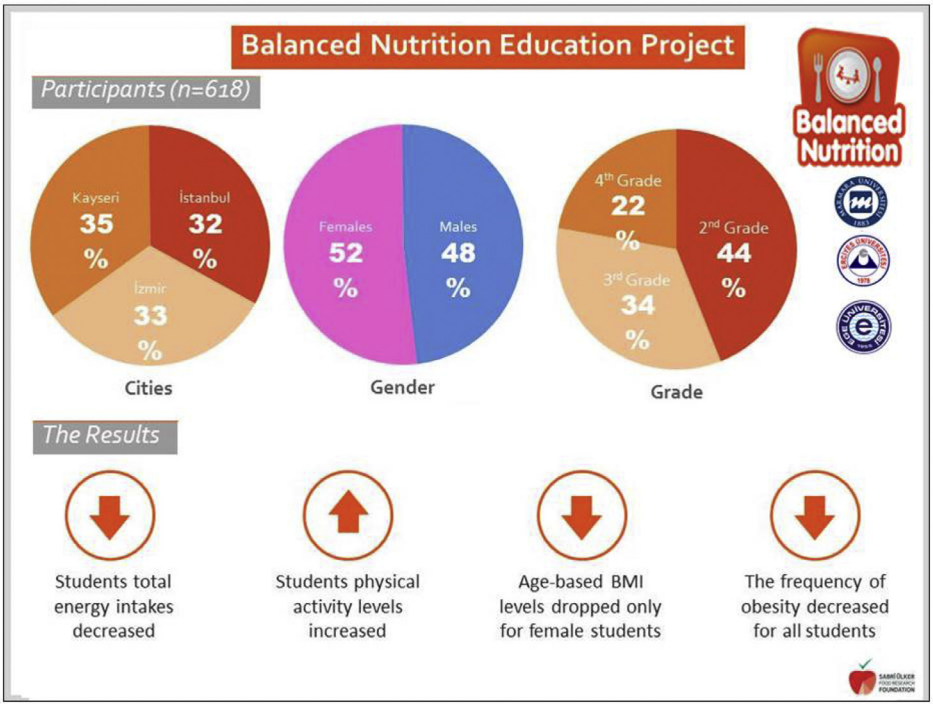


Fig 3. Balanced Nutrition Education Project

children of 2nd to 4th grades. Preschoolers and primary school 1st grade students have been included in an extension of the program from the 2016-2017 academic years onwards.

Overall, the Balanced Nutrition education project has helped students to improve their dairy product and green vegetable intakes. It has also encouraged increases in physical activity and has helped to regulate energy intake and expenditure. Future objectives include integrating the Balanced Nutrition Project into the school curriculum throughout Turkey. In addition it is intended to regularly measure students' weights and heights, and monitor their health status. Schools will be encouraged to provide nutritious food and allocate sufficient space for physical activity. The program will continue to focus on managing sugar, salt and fat intake, and increasing fruit and vegetable intake, thus enhancing dietary fibre. A certified education program will also be developed for teachers.

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THE BALANCED NUTRITION TEST: AN ONLINE DIETARY ASSESSMENT TOOL ADAPTED FROM THE SELF CHECK PROGRAM FOR USE IN TURKEY

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Novel technologies to assess dietary intake are designed to aid consumers in measuring their individual dietary intakes. Assessing their eating habits and nutritional status in this way can help researchers and policy makers to better elucidate how diet influences public health and well-being. As a novel tool, The Self Check Program is a scientifically based online questionnaire developed by the Institut für Ernaehrung und Praevention and Hohenheim University to assess nutritional status. It provides insight regarding individual's eating habits and unique requirements based on dietary consumption, food preferences and lifestyle characteristics such as smoking and physical activity status [1-3].

The Self Check Program [4] was adapted as the "Balanced Nutrition Test" for use in Turkey in accordance with cuisine and nutrition habits specific to Turkey. This involved collaboration between the Hohenheim University Department of Nutrition and Biochemistry and the Science Committee of the Sabri Ülker Food Research Foundation The first Turkish adaptation of the Self Check Program was developed in 2011. Subsequently a more user friendly version was created in 2017 with the inclusion of traditional Turkish foods in the program and this updated version was named as the Balanced Nutrition Test.

The test includes items on demographic characteristics (age, gender, height, weight), the frequency of consumption of certain foods (several times a day, 1 per day, 4-6 per week, 1-3 per week, 1-3 per month, less than 1 per month, never) and certain beverages (more than 4 glasses per day, 4 glasses per day, 3 glasses per day, 2 glasses per day, 1 glass per day, less than 1 glass per day, never), life style determinants including smoking status [non-smoker, former-smoker, active smoker (less than 20 cigarettes per day, more than 20 cigarettes per day)] and physical activity (none, 0.5-2 hours per week, 3-5 hour per week, more than 5hours per week) and generates a score and messages regarding the present nutrition status and ways to improve it. The program's score assessment is based on the results of many epidemiological studies (such as the INTERHEART Study and the Framingham Study), current score systems (such as the PROCAM Score) and the studies of national and international professional bodies. The final score ranges from 0 (the worst possible outcome) to 100 (best possible outcome) with scores of ≥80 indicating a very good condition, scores of 60-80 a relatively good condition, scores of 40-60 an average condition, scores of 20-40 a bad condition and scores <20 a very bad condition (Table 1).

Table 1
Balanced Nutrition Test Lifestyle Score Categories

Test score	Condition	Ways to improve
Score ≥80	Very good	You probably already have a very good lifestyle
Score 60<80	Relatively good	You can optimize your diet with some minor changes
Score 40<60	Average	For a healthy lifestyle you should change some habits in your diet
Score 20<40	Bad	For a healthy lifestyle you should considerably change your diet
Score <20	Very bad	You should change your diet in order not to harm your health. A conversation with your family doctor or nutrition experts would be useful

A study was undertaken to assess the nutritional status of participants who accessed the Sabri Ülker Food Research Foundation website and completed the "Balanced Nutrition Test" online between January 2015 and December 2016. Data from 1241 adults who completed the Balanced Nutrition Test within the study period were analyzed. Nutrition scores revealed an average condition in 54% of adults. Overall, 30% of adults were noted to consume fresh fruits, only 10% to drink milk regularly, only 24% to consume raw or cooked vegetables once a day and 17% to consume whole grains at least one time per day. Most adults did not adhere to recommended intake of fish as 2 times per week as well as to daily vegetable and fruit consumption recommendations. Overall, 54% of adults have physical activity less than 1 hour per week, while only 19% of participants were active more than 1-3 h per week (Table 2).

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Table 2
Balanced Nutrition Test Scores of Participants (n=1241)

Test score	n(%)					
>80: Very good condition	26(2.1)					
60-80: Relatively good condition	487(39.2)					
40-60: Average condition	670(54.0)					
20-40: Bad condition	58(4.7)					
<20: Very bad condition	0(0)					
Physical activity status	%					
Less than 1 h per week	53.5					
1-3 h per week	27.6					
More than 3 h per week	18.9					
Type of food	Frequency of consumption (%)					
	Never	< 1 times per month	4-6 times per week	1-3 times per week	1-3 times per day	Once a day
Fruits	0.3	10.8	13.6	26.2	18.9	30.2
Vegetables	0.2	6.2	21.5	27.3	21.1	23.6
Milk	9.8	36.6	8.6	26.1	5.5	13.5
Yogurt	1.0	10.2	22.4	28.2	13.9	24.3
Egg	2.5	10.6	16.1	45.4	2.8	22.5
Fish	3.8	59.1	0.9	34.4	0.7	1.0
Meats	1.5	8.5	22.6	44.2	4.6	18.5
Legumes	0.4	20.0	11.7	62.4	1.9	3.6
Whole wheat bread	9.5	32.4	10.1	17.0	13.5	17.6

The Balanced Nutrition Test scores highlight the role that this program plays in terms of providing an insight into consumer eating habits and ways in which they could improve their health and nutritional status.

In conclusion, the Balanced Nutrition Test encourages consumers to be more aware of their eating habits and health status. In this way it is hoped that it will provide the necessary incentives to encourage positive behavior changes.

The Balanced Nutrition Test findings also support the need for improvements in nutrition and health in Turkey.

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foods

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Article

Food Safety Awareness, Changes in Food Purchasing Behaviour and Attitudes towards Food Waste during COVID-19 in Türkiye

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Abstract: (1) Background: The COVID-19 pandemic brought the key issues of food security, food safety, and food waste into sharp focus. Tűrkiye is in the enviable position of being among the top ten agricultural economies worldwide, with a wide diversity of food production. This survey was undertaken in order to gain insights into consumer behaviour and attitudes in Tűrkiye with respect to these issues. The objective was to highlight strengths and weaknesses, identify areas for improvement, and present strategies for the future. (2) Methods: This survey was carried out between April and May 2022 in 12 provinces throughout Tűrkiye. Face-to-face interviews were performed with 2400 participants representing a cross-section of ages, educational attainment, and socio-economic categories. The findings were evaluated statistically. (3) Results: The results provide an insight into attitudes and behaviours, both pre-COVID-19 and during the pandemic. In several ways, the pandemic enhanced knowledge and improved behaviour, leading to improvements in diet and reductions in food waste. However, worrying concerns about food safety persist. Specific attention has been given to understanding patterns of bread consumption, particularly in consideration of waste. (4) Conclusions: It is hoped that the results of this survey will increase dialogue between the components of the food sector, encourage education initiatives, and contribute to improving food safety and security and reducing food waste in Tűrkiye and beyond.

Keywords: consumer behaviour; COVID-19; food hygiene; food waste

check for updates

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1. Introduction

Food security and sustainability are issues of global importance [1]. Seen against a backdrop of the global financial crisis of 2008, a rapid increase in world population, global warming, natural disasters, and, recently, the COVID-19 pandemic, it is vital that consumers are empowered to take individual responsibility to secure a sustainable future for our planet. Tűrkiye ranks among the top ten global agricultural economies [2] and is exceptionally well-placed to grow a wide variety of food crops. However, despite this, nutrient deficiencies and inequalities persist against a backdrop of vast amounts of food waste [3].

Foods may pose a public health risk if contaminated with physical, chemical, and/or microbial hazards from farm to fork, including production, processing, distribution, and storage [4]. According to WHO data, 600 million people get sick, 420,000 people die, and 33 million healthy life years (DALYs) are lost every year due to food-borne diseases worldwide [5]. Food-borne infections and intoxications are generally caused by foods of animal origin and fresh fruits and vegetables grown using contaminated water or

inadequately composted manure [5,6]. Although reports on food-borne disease cases and outbreaks are published mostly in developed countries, it is known that these outbreaks are more common in developing societies due to a lack of food safety infrastructure [7–9]. Factors such as globalisation, migration to cities, and shifting demographics due to refugees, as well as radical advances in food production technology, increasing incomes, and altered purchasing preferences, all contribute to changing food consumption habits around the world, and food safety concerns are evolving concomitantly [6].

Studies have highlighted that factors including cost and practical preparation are seen as more important than food safety risks, especially by low- and middle-income consumers [10]. In addition, poor hygiene concerns outweigh the nutritional content of foods in determining purchasing preferences [11,12]. These considerations may lead consumers to a diet that is cheap, accessible, and easy to prepare but that is insufficient in essential amino acids, vitamins, and minerals, as well as suboptimal in terms of salt, added sugar, and trans-fat content [13,14].

Although home-made food is considered a safer and healthier option by consumers in some studies [12], fast food and packaged foods are increasing in popularity due to their accessibility and affordability, especially in urban life [15–17]. However, inadequate food safety standards and compliance can increase the risk of food-borne diseases and epidemics, especially in developing countries [4,16].

Another important issue is food security. According to the State of Food Security and Nutrition in the World (SOFI) report, it was stated that 691 to 783 million people faced hunger in 2022. It is quite striking that the report shows that hunger increased by 122 million people compared to 2019. The report stated that this increase was caused by the COVID-19 epidemic, repeated weather shocks, and wars around the world [18], especially in Ukraine [19].

Related to food security, food waste is a growing global problem with negative effects on societies, economies, and the environment [20]. The FAO's 2019 report calculated that approximately 14% of the world's food supply was wasted, and the economic value of this was USD 400 billion [21]. The FAO's 2022 report states that if the food currently wasted annually could be provided to consumers, approximately 1.26 billion hungry people could be fed [22]. Food waste also negatively affects the environment via greenhouse gas emissions; it is responsible for 8% of total greenhouse gases [20].

Food wastage occurs as a result of bad food management practices at all stages in the food chain, including planning, purchasing, storage, cooking, eating, and subsequent leftovers [23]. Recent studies have shown that the COVID-19 pandemic was responsible for significantly changing food supply transport and usage patterns [24,25]. These changes include buying more food than needed and more regular and frequent shopping. Both reduced and increased food wastage has been observed depending on individual situations [24,26].

Globally, the 2008 financial crisis adversely impacted consumer behaviour by causing a contraction in production, resulting in increased food prices and a corresponding decrease in purchasing power. Subsequently, the situation improved until the COVID-19 pandemic, which occurred from 2020 onward [27]. The vital importance of maintaining a healthy and sustainable food supply was then brought into sharp focus. Measures taken to minimise the impact of the pandemic and consequent changes in consumer behaviour also necessitated changes in food business models and the food supply chain. The strategic importance of food security and safety achieved greater prominence. In this context, in order for food industry stakeholders to become more resilient to crises and create a vision for the future, it is necessary to have accurate information on the main issues affecting consumers' purchasing behaviour. However, in the literature review, it is noted that there are no comprehensive studies across the country in Türkiye, which is an important producer and market in Europe.

The purpose of this consumer survey is to focus on Tűrkiye, gaining insights into consumers' attitudes toward food safety, security, food waste, and purchasing behaviour

before and during the COVID-19 pandemic. It is hoped that the results obtained will help to inform stakeholders and highlight priorities for future initiatives [28].

2. Materials and Methods

2.1. Profile of Participants and Survey Design

This survey was carried out during April and May 2022 in 12 provinces representing the geographic regions of Türkiye to ensure that the survey is representative of the whole country, taking into account different cultures and food habits. Face-to-face interviews were conducted with 2400 individuals. The subjects participated in the survey voluntarily. A random sampling method was used to recruit participants, and the number in each region was based on the population in that region (Figure 1). All respondents were aged 18 and over and were responsible for food purchasing in their household. The sample size was calculated according to the rule of taking 10 times the number of scale items, and the survey was carried out with a margin of error of ±2 and a 95% confidence interval.



Figure 1. Distribution of the participants in the survey by provinces.

Within the scope of this survey conducted in the centers of the most populous provinces from the 12 NUTS-1 (Statistical Territorial Units Classification/NUTS) level regions determined by the Turkish Statistical Institute (TUIK), interviews were held with individuals who represent the household, could provide information about the entire household, and are responsible for household consumption. According to the NUTS classification system, there are 12 NUTS-1 regions, 24 NUTS-2 sub-regions, and 81 NUTS-3 provinces in Türkiye. This classification was made according to population size, taking into account social, economic, and geographical factors [29].

According to the 2022 results of the Turkish Address-Based Population Registration System (ADNKS), the population of Türkiye was 85,279,553 as of 31 December 2022. Of this number, 50.1 percent (42,704,112) were men and 49.9 percent (42,575,441) were women. Among this population, 62,701,155 people were adults [30]. The sample size, which was determined as at least 2400 to represent approximately 19,000,000 households in Türkiye with a margin of error of 2%, was distributed to 12 large cities in proportion to their populations. A total of 8400 individuals live in the visited households. Therefore, the average household size was determined as 3.5 individuals. This value is also compatible with the results of the 2011 Türkiye Family Structure Survey.

The selected cities comprise the provinces with the largest population center within the NUTS-1 level region. The research was designed with the assumption that the largest province selected within each NUTS-1 region represents the entire region. The selection of addresses within the province, which determined the households to be interviewed, was conducted randomly. Within the scope of the field study, an adult member of the household (preferably the person who brings the most income to the household or his/her spouse) was interviewed in a total of 2400 households. If there was more than one person responsible for food shopping in the household, the person with the closest birthday among the responsible persons was included in the research to ensure randomness within the

household. Therefore, purposeful sampling was applied in the selection of the sample within the household, and a simple random sampling method was applied in case there was more than one suitable individual within the household.

Before the field study of the research, a plot study was carried out on 50 households to test the functionality and understandability of the questionnaire. According to the plot study's findings, the revised forms were finalised and made ready for application, and the study was carried out with the face-to-face interview method based on the questionnaire. During the plot study, it was observed that the interviews lasted approximately 20 min. After the fieldwork, 30% of the interviews conducted by each interviewer were checked by the back check method by contacting the households again.

2.2. Key Objectives of the Survey

In order to gain insights into food purchasing habits, food safety, and attitudes toward food waste before and during the COVID-19 outbreak, a questionnaire containing the following four parts was prepared.

Part 1 involved the collection of demographic data, including age, gender, marital status, household income, socio-economic status, and education level of the participants. According to the household income and education level, the socio-economic status of the participants was classified as follows:

A: The person who brings income to the household is a manager or business owner and has a high level of education (university and/or higher degree);

B: The person who brings income to the household is a manager, business owner, or a qualified expert and has a medium–high level of education (high school or university);

C1: The person who brings income to the household is a housewife (with additional income) or a worker and has a high level of education or has a workplace and a low–medium level of education (primary or high school);

C2: The person who brings income to the household is a housewife, student (with additional income), or worker and has a low–medium level of education (primary or high school);

DE: The person who brings income to the household is a housewife, unemployed (with additional income), or worker and has a low level of education (primary school).

Part 2 set out to determine the knowledge level of food safety and food safety concerns. The following questions were devised and asked of the participants in order to address this aspect:

- The relative importance of the different elements involved in the purchase of food products;
- The knowledge level of the concept of food safety;
- The perception of food safety;
- Awareness of information resources available relating to food safety;
- Food safety status;
- Reactions to negative situations due to unsafe food consumption;
- The level of recognition of food safety systems;
- Perspectives on food control;
- Attitudes toward food hygiene;
- Actions where a lack of hygiene is observed in the production and sales of foods;
- Knowledge of the official organisation responsible for food safety;
- Follow-up on the fraudulent products or companies' disclosure list;
- Willingness to pay more to facilitate better food inspection;
- Understanding of health issues related to food consumption;
- Use of the 174 food line resource;
- Knowledge of the health aspects of foods;
- Encounters with spoiled and faulty foods;
- Occasions of notifying about broken and faulty foods;
- Reasons for not reporting defective and faulty product complaints;

- The status of receiving feedback on complaint notifications;
- Current attitudes and behaviours with regard to food waste;
- The most common reasons for wasting food;
- Information on bread consumption and bread waste.

Part 3 focused on determining the effects of the COVID-19 pandemic on food purchasing behaviour and attitudes. The questions addressed were:

- Food purchasing behaviours before and during COVID-19;
- The main sources of food purchases and food supply routes;
- Data regarding food stocks maintained at home during the pandemic compared to those in the pre-COVID-19 period.

Part 4 sought to determine the knowledge and attitudes of consumers with regard to food waste. Another objective of this part was to determine behaviours specifically relating to bread waste. Questions included:

- How decisions are made regarding whether food is spoiled;
- What happens to unused foods;
- Steps taken to minimise food waste;
- Reasons for wasting food;
- Attitudes about wasting bread;
- How the source of bread correlates with wastage;
- Types and quantities of bread consumed;
- Influence of source, packaging, and freshness on bread wastage.

The data obtained in the survey were processed together with the demographic data, and their statistical significance was determined.

2.3. Statistical Analysis

Statistical techniques were applied to identify differences between the situation prior to and during the COVID-19 pandemic [31]. Pearson correlation was applied to evaluate the differences between food purchasing habits and to measure the relative importance of the various factors involved in food purchasing before and during the pandemic. The Kruskall–Wallis test was applied to highlight differences in food safety and consumer attitudes toward food safety and to evaluate whether foods are safer than in previous years. The Shapiro–Wilk test was conducted to examine current food safety aspects in comparison with those in previous years. Tukey's post-hoc test was used to further examine the differences highlighted during the analyses. A chi-square analysis was carried out to evaluate differences in food safety and food stocks before and during the COVID-19 pandemic. A multiple regression model was used to analyse the data on food waste.

3. Results

3.1. Demographic Characteristics of the Participants

Half the participants in the survey were women, and among them, 66.0% were married. The average age of all participants was 39, and they were evenly distributed among age groups (Figure 2).

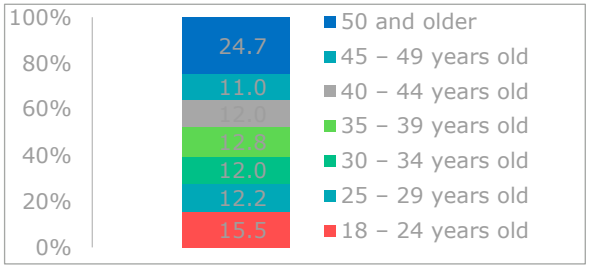


Figure 2. Age of the participants in the survey.

The distribution of participants among socio-economic groups was A-B (14.2%), C1-C2 (64.9%), and D-E (20.9%). Their education attainment level was declared as primary school (41.4%), high school (40.8%), and university and/or higher degree (17.8%).

3.2. Consumers' Knowledge of Food Safety and Food Safety Concerns

Figure 3 summarises the participants' responses regarding the importance of various factors in food purchases. It can be seen that "expiry date", "label information", and "quality and taste" headed the list.

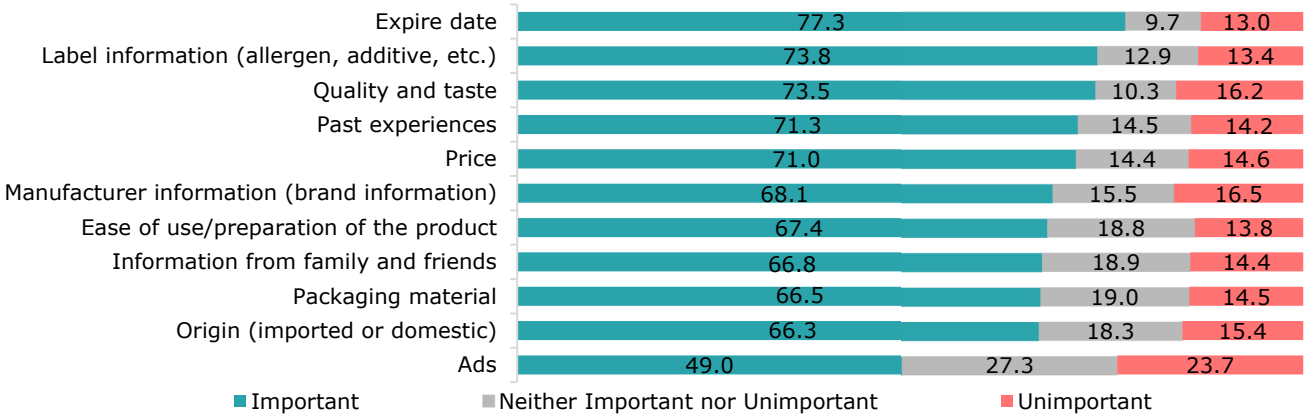


Figure 3. Importance of various factors in the purchase of food products.

Data obtained on changing attitudes towards food purchases are summarised in Figure 4. When participants compared their current thinking with that in the past, some 60.8% considered that prices were better. Surprisingly, only 19.5% of respondents found the label information to be better now than in the past. Attitudes towards packaging remained unchanged for 44.6% of participants.

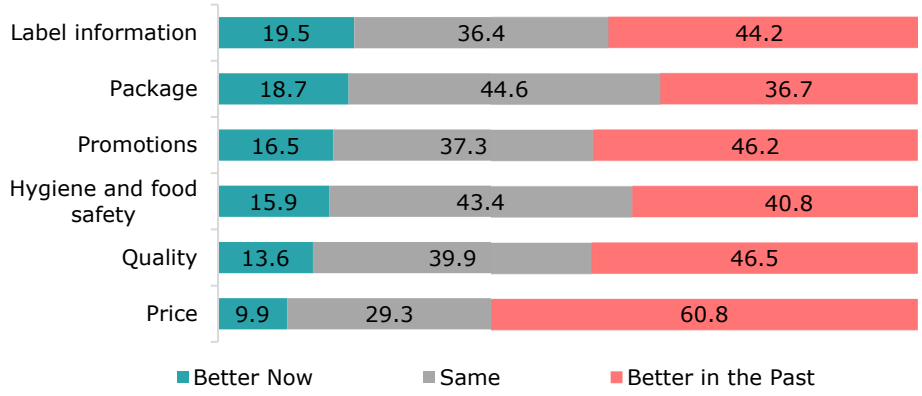


Figure 4. Changes in attitudes towards food purchases.

With regard to food safety, 33.9% of participants stated that they have heard of the concept, whilst 66.1% have not. A greater proportion of participants were aware of the concept, 37.1% versus 30.8% respectively. The 18 to 24 age group (41.2%) was most aware, and regarding socio-economic status, awareness was as follows: A-B: 39.0%, C1-C2: 43.4%, and D-E: 28.9%.

Participants were asked to identify the statement of food safety. Their responses were as follows:

- Food that is brought to the market after being controlled by legal institutions at every stage, from production to consumption: percentage of respondents (27.9%);
- To ensure the safety of food against chemical hazards (25.3%);
- To ensure that consumers have access to adequate food (22.9%);

- Food without an expiry date (17.2%);
- Microbially safe food (6.8%).

Information on food safety is derived from multiple sources. Participants who were aware of food safety identified the statement or statements that best described their main source(s) of information as follows:

- TV and radio programmes (70.1%);
- Internet or social media (48.5%);
- Family and close circle of contacts (31.8%);
- Scientific articles and books (26.4%);
- Newspapers and magazines (25.9%);
- Experts (18.6%).

Compared to previous years, 21.9% of the participants thought that food is safer now. The highest proportion of those who declared that food is safer now were in the 40–44 age group (27.7%), whilst the highest proportion of those who thought that it is less safe were in the 35–39 age group (15.9%). With regard to socio-economic status, the C1-C2 group (24.4%) were most positive about food being safer now than in the past.

The survey measured consumers' reactions to the consequences of their negative experiences due to unsafe food consumption. Respondents identified key points such as:

- Avoided consuming the unsafe foods for a while (24.1%);
- Did not do anything or did not take the situation into account (37.1%);
- Reported the situation to the authorities (11.1%).

In terms of the recognition of food safety systems (Figure 5), 87.8% of respondents recognised the Turkish Standards Institution (TSE) standards as a food safety system, and 62.0% claimed to know the International Organization for Standardization (ISO) standards.

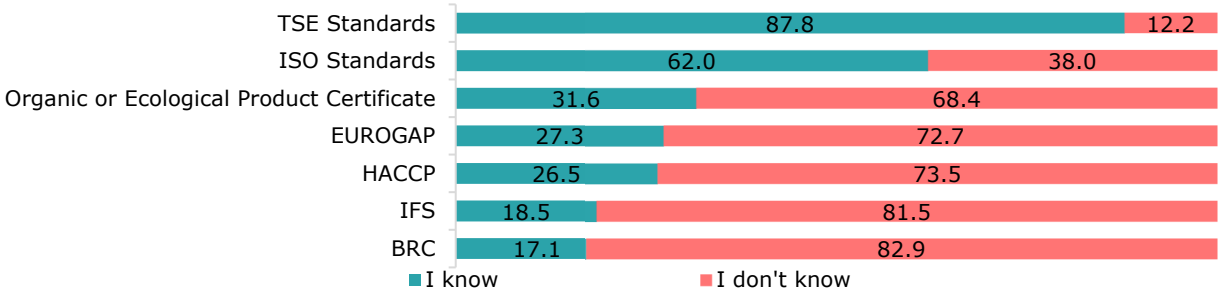


Figure 5. Recognition of food safety systems.

The main reason (62.7%) why participants thought that there was no measurable food control was that sanctions or penalties do not provide a sufficient deterrent. Some 60.3% of the participants considered that hygiene rules are not adequately taken into account in food production. The 18–24 age group (46.6%), high school graduates (40.9%), and individuals of C1-C2 socio-economic status (41.4%) were most convinced that hygiene standards are taken into account, while those over 50 (71.5%), primary school graduates (68.1%) and those of D-E socio-economic status (76.9%) were least convinced.

Participants identified the following areas where food hygiene is lacking:

- During food processing (57.4%);
- During raw material production (48.1%);
- During storage (38.1%);
- During transportation (37.4%);
- At ready meal producers, including restaurants and patisseries (22.9%);
- At wholesale and retail grocers (21.3%).

According to the findings, 39.0% of participants considered the Ministry of Health to be the official institution responsible for food safety, followed by the Ministry of Agriculture and Forestry (29.7%), TSE (19.0%), Municipalities (11.5%), and the Ministry of Industry

and Technology (0.8%). In Türkiye, companies engaged in fraudulent production are identified by way of inspections by the Ministry of Agriculture and Forestry. However, it was determined that 62% of the participants were not aware of this.

Participants in this survey were questioned as to whether they would be willing to pay more for food if it had been inspected by an independent organisation to ensure its safety. A total of 67.5% of the participants stated that they would not pay more. The 18–24 age group was most likely to be willing to pay more (40.2%), followed by the 40–44 age group with 38.8%. For other age groups, the level of acceptance was between 26.1% and 31.9%.

Of the participants, 48.8% defined "ALO 174" as the contact telephone number where all kinds of food-related complaints and consumer demands are processed. Some 31.6% of the participants stated that they had not heard of this facility, and 16.5% thought it was a number that consumers could call to learn about the quality of food.

In Türkiye, based on this survey, 45.5%, 32.7%, and 21.8% of consumers thought that the foods consumed are not healthy, partially healthy, and healthy, respectively. The highest proportion of those who considered foods to be safe were individuals between the ages of 40–44 (29.2%) and in the A-B socio-economic category (24.9%). The highest proportion of those who do not consider foods to be safe were individuals aged 50+ (56.5%) and in the D-E socio-economic category (67.5%).

In the survey, 30.0% of the participants stated that they had encountered spoiled and adulterated food products. Additionally, 77.6% of the participants said they would lodge a complaint when encountering broken and faulty food products. Among complainants, 88.9% stated that they had received positive feedback. Reasons given for not reporting a complaint included:

- Unwillingness to deal with the complaint (62.1%);
- Not getting results (51.6%);
- Not knowing to which entity the complaint should be made (14.9%).

Among the health problems associated with food, cancer ranked first with 34.4%, followed by obesity (25.0%), diabetes (19.5%), food poisoning (10.9%), and cardiovascular diseases (9.7%).

3.3. Food Purchase Behaviours before and during the COVID-19 Pandemic

In this survey, behavioural patterns toward food purchases were examined before and during COVID-19. During the pandemic period, the purchasing frequency of fresh vegetables, fruits, fresh meat, chicken, fish, and legumes increased compared to pre-COVID-19 ($p < 0.000$) (Figure 6).

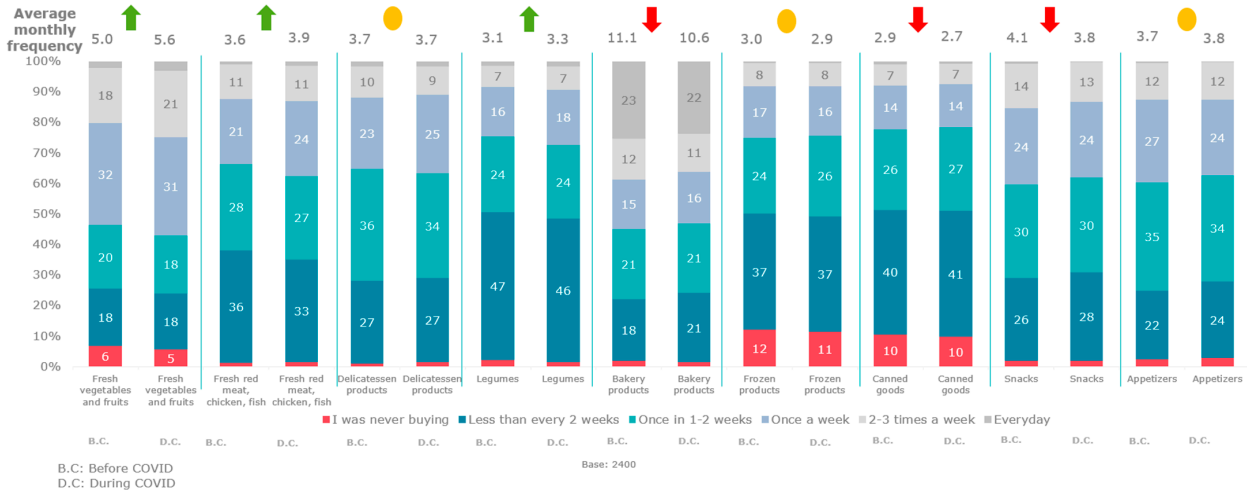


Figure 6. Purchase frequency of food types before and during COVID-19.

Figure 7 summarises the main sources of food purchases as determined by the survey. Supermarkets constituted the main source of food purchases both before and during the COVID-19 period. During COVID-19, there was an increase in food purchased from street vendors and home delivery–online channels compared to the period before COVID-19. A slight decrease in food supply via takeaway (42.7% to 41.1%) and ready-to-heat/cook meals (42.3% to 33.7%) was seen during the COVID-19 pandemic, while the rate of food preparation at home (64.9% to 65.9%) increased slightly.

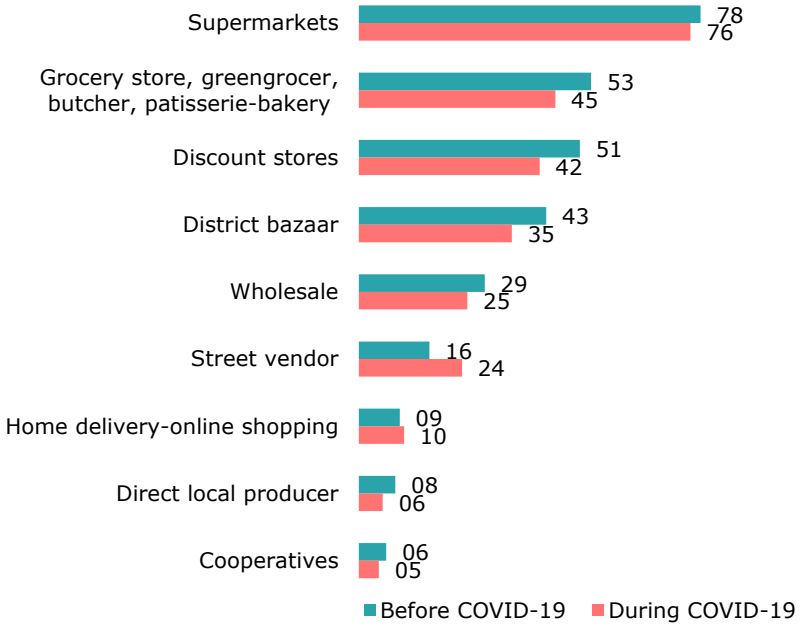


Figure 7. Main sources of food purchases before and during COVID-19.

The survey assessed food supplies in homes before and during COVID-19. A total of 55.1% of participants reported that food stocks remained the same, 28.2% said that stocks increased, and 16.8% reported lower stock during COVID-19 than before. Higher stocks during COVID-19 were reported according to socio-economic status as A-B (22.6%), C1-C2 (24.6%), and D-E (43.2%). Chi-square analysis was carried out to evaluate differences in perception of food safety and differences in food storage trends at home in the periods before and during COVID-19. A decrease in the perception of food safety was inversely related to food stocks maintained at home ($p = 0.000$).

3.4. Knowledge of Food Waste: Current Attitudes and Behaviours to Minimise Waste

The focus of the survey on food waste considered a number of parameters, including detection of spoilage, unconsumed food management, methods for minimising food waste, and the main reasons for wasting food.

In order to determine whether food was spoiled, 70% of consumers smelled the food, 58.9% carried out a visual inspection, and 34.9% tasted it.

Regarding unconsumed food, respondents stated:

- "I give it to stray animals" (56.2%);
- "I use it in a different meal" (55.1%);
- "I keep it in the deep freezer" (34.1%);
- "I distribute it to those around me" (19.0%);
- "I throw it away" (11.8%).

When measures taken to minimise household food waste were evaluated, the statement "buying as much as we need" in order to minimise food waste was the most popular, with 65.6% of respondents highlighting this option. Controlling the food stock at home and making a shopping list were preferred by 49.0% of the participants, followed by 33.3% of

respondents whose primary objective was to use foods left over at the next meal, and 14.8% of respondents preferred to keep leftover foods in a suitable condition for future use.

Among the most common reasons for wasting food, 26.1% of the participants stated that this was due to the food having passed its expiry date, 24.2% had bought more food than needed, 24.1% had food which had become mouldy, spoiled in some other way, or lost its freshness, 18.9% had failed to use appropriate storage conditions, and 6.7% of respondents were living with others but had failed to communicate appropriately regarding what foods were needed, leading to excess purchases.

3.5. The Example of Bread Waste

A particular focus of this section of the survey was to evaluate current attitudes and behaviours with respect to bread waste. A total of 84.4% of participants stated that they purchased bread outside the home, 4.4% stated that they made it at home, and 11.3% stated that they did not consume any bread. The largest percentage of those who purchase bread outside the home (91.9%) are in the 25–29 age group, while the largest percentage of responders who make bread at home are in the 30–34 age group (8.4%). Some 81.6% of respondents who stated that they purchased bread outside the home preferred unpackaged bread, specifically regular/white bread in 200 g lots. The highest proportion of those who purchased packaged bread were in the 25–29 age group (27.1%), university graduates (27.2%), and A-B socio-economic status (3.7%), while the highest proportion of those who bought unpackaged bread were individuals aged 50 over (88.0%), primary school graduates (83.8%), and from the D-E socio-economic category (90.9%).

In the survey, 70.6% of participants stated that they consumed regular/white bread, followed by bread from whole wheat (10.9%), bran (6.2%), multigrain (3.9%), rye (3.0%), sourdough (2.0%), and buckwheat (1.9%). It was determined that an average of 3.6 loaves of bread are purchased daily (per house) in Türkiye. Of these, 1.5 were purchased in the morning, 1.5 in the evening, and 0.6 in the afternoon. With regard to storing leftover bread, 42.4% of the participants preferred to use a bread cabinet, 36.9% kept it in bags, and 20.7% kept it in the refrigerator. Feedback from the questionnaire indicated that 58.1% of participants consumed stale bread, 55.8% used it in different meals or desserts, 33.0% kept it frozen, 31.7% gave it to animals, 27.6% heated it in the oven, and 7.4% stated that they throw it away. A total of 75.6% of participants stated that no bread was wasted at home, and 60.6% stated that no bread is left on the table after a meal. The participants were of the opinion that most bread wastage is in restaurants, hotels, and other public eating places (39.8%). Bread consumption and wastage are summarised in Figure 8.

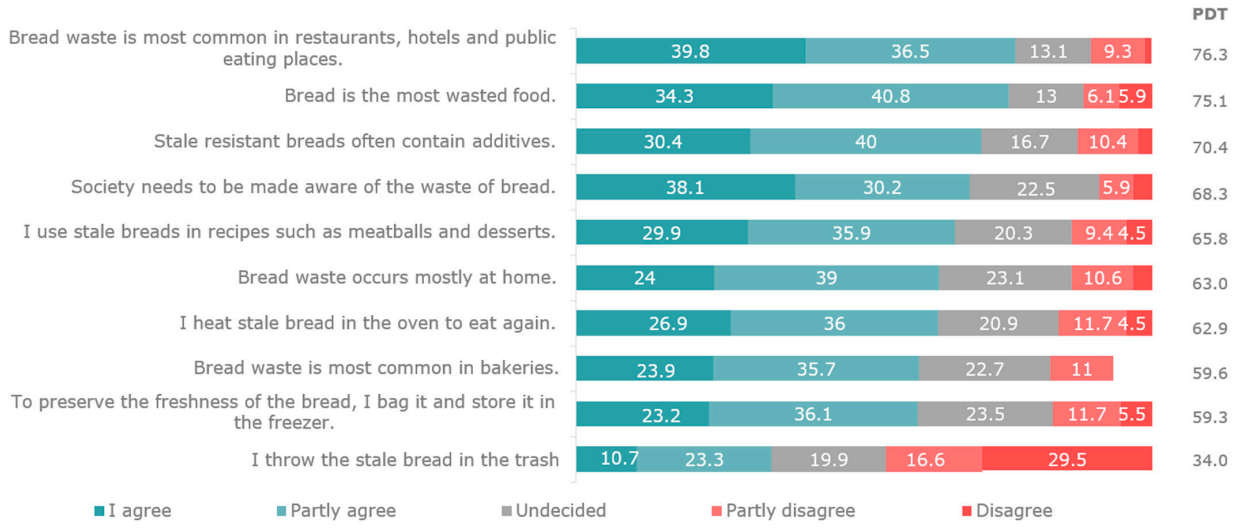


Figure 8. Evaluation of bread consumption and wastage.

In the survey, 60.1% of participants considered it important to raise awareness about food waste in basic education. The highest proportion of those advocating raising awareness about food waste were in the 18–24 age group (68.9%), university graduates (70.3%), and A-B socio-economic status (65.5%). Conversely, the highest proportion of those who do not see it as necessary were over 50 years old (45.2%), primary school graduates (47.1%), and from the D-E socio-economic status (45.1%).

4. Discussion

In this survey, only 21.9% of participants considered that the food in Tűrkiye is safer today than in previous years. This is in stark contrast to the situation in the UK, where 92% of the participants in a recent survey by the Food Standards Agency (FSA) considered that the food they purchase is safe [32]. Baker et al. [33] highlighted the concerns of low-income consumers globally regarding food safety. This ties in with the findings of the current survey whereby the highest proportion of those considering food to be safe were in the A-B socio-economic group, while those most likely to consider food unsafe were in the D-E socio-economic group. Pradeilles et al. [34] identified the high risk of poor hygienic conditions, environmental sanitation, food contamination, and food adulteration for low- and middle-income groups living in cities. This concurs with the findings in this survey.

Participants in this survey reported that television programmes were 3.8 times more effective as a source of food safety information compared to information from experts in the field. Studies conducted in several countries identified common sources of food safety information as university education, family and friends, family physicians, journal articles, social media, educational environments, governmental institutions, cooking classes at school, and television programmes, among others [35–37]. In a study conducted in Sweden, the leading source of food safety information (45%) was identified as family and friends. Some 21.1% of participants reported that they had received food safety training, and 35.6% stated that they had experienced a course in food hygiene/safety and/or microbiology [38]. In Sweden, training about hygiene and cleanliness while processing, preparing, and storing food is compulsory in primary schools [38]. A principal source of food safety information is family communication [36].

In our survey, the expiry date was determined to be the primary consideration when purchasing food products (77.3%), followed by label information, quality, and taste criteria. In their study, Armstrong et al. [32] found that 80% of participants reported that they frequently check the expiry date of foods while shopping.

In our survey, the highest proportion of participants who purchased packaged bread were in the 25–29 age group, university graduates, and individuals from the A-B socio-economic group. Conversely, the highest proportion purchasing unpackaged bread was in the 50+ age group, primary school graduates, and from the D-E socio-economic group. This is in contrast to the findings of Baker et al. [33], who determined that low-income consumers tend to avoid fresh foods due to safety concerns, preferring packaged and processed foods. In Türkiye, the reason why consumers in low-income groups tend to prefer unpackaged bread is most likely due to the lower product cost rather than food hygiene.

Although the Ministry of Agriculture and Forestry is the official authority responsible for food controls in Türkiye, only 29.7% of those who participated in the survey gave the correct answer. In a study conducted in the United Kingdom, it was determined that 91% of the participants knew about the Food Standards Agency (FSA), 75% trusted the FSA to ensure food safety, and 91% were confident that the FSA would take appropriate action if a food-related risk were detected [32].

In this survey, only 19.5% of participants stated that food label information is better today than in the past. In the FSA study referred to above, 86% of the participants stated that they trust the information on food labels to be correct [32]. Regarding consumers' perceptions of food production hygiene standards in Tűrkiye, 60.3% of participants in our survey considered that hygiene rules are not adhered to in food production. However, in the FSA study, 78% of respondents reported that they trust the food supply chain. It was

determined that consumers in England, Wales, and Northern Ireland trust farmers (90%), stores, and supermarkets (86%) more than takeaways (51%) and food delivery services (39%) [32].

Our survey determined that, in Tűrkiye, most food shopping occurred in supermarkets both before and during the COVID-19 period. In addition, during the pandemic, purchases from street vendors and home delivery–online shopping increased compared to the situation before. Similarly, supermarkets were confirmed to be the preferred food shopping sources in the UK (85%) [32].

In our survey, it was determined that the frequency of purchasing fresh meat, chicken, fish, and legumes increased during COVID-19 compared to before, and the frequency of consumers preparing food at home also increased. Similar results were obtained in other studies, both in England, Wales, and Northern Ireland [32] and in the USA [39]. In the USA, increased availability of time, the belief that eating out was riskier, and a decrease in income were cited as reasons for the increase in home consumption during the COVID-19 period. In this survey, it was also stated that increased home storage of food may negatively affect the robustness of the food supply chain [39].

Studies have shown that home consumption of food is especially prevalent in low- and middle-income groups. In addition to the economics, consumers' food safety concerns can reduce the rate of eating out. Although foods prepared and cooked at home were considered safer, healthier, and more nutritious by consumers, street foods can be preferred because they are easily accessible and affordable. These advantages can outweigh concerns about food safety in consumers' choices [8].

Measuring willingness to pay is considered an important tool in the understanding of consumers' attitudes and views toward food sustainability [26]. Price elasticity is a key parameter. In our survey, 32.5% of participants stated that they would pay more for food that was inspected by an independent organisation to ensure safety.

Food purchasing behaviour has changed in response to the stress and uncertainty caused by COVID-19. Panic buying is a feature that has led to increased food waste [38]. In Türkiye, 55.1% of participants in our survey stated that the food stock in their homes remained almost the same as pre-COVID-19. However, 28.2% of participants stated that their food stocks increased.

Many socio-demographic changes during the COVID-19 pandemic impacted food waste. These include household size, loss of income, restrictions, increased cooking skills, better meal planning, more efficient storage, and reduced eating out in restaurants, as well as factors such as stress, depression, fear, and anxiety [31]. These food waste patterns vary from country to country as well as from individual to individual [24,40–42]. Decreases in domestic food waste during the COVID-19 pandemic were reported in countries including Italy, Romania, Portugal, and the USA [19,24,25,43,44]. Conversely, studies have reported increases in food waste in Serbia and Thailand [23,45]. In our survey, multiple reasons were given for decreasing food waste, but it was not possible to quantify the overall effect. One study determined that the amount of food purchased per shopping visit increased, reducing the number of visits required and, hence, hopefully, the risk of infection [46]. Similarly, in a UK study, it was determined that consumers prepared shopping lists, decreased their shopping frequency, and purchased more food per visit. The study predicted that this changing behaviour would lead to a 34% reduction in the amount of discarded uneaten food compared to a similar study conducted in November 2019 [47]. Consumers in Italy reported that they wasted less food during the COVID-19 period. In this study, it was determined that the highest decrease in food waste occurred among young people [44].

Reusing leftover food is considered to be one of the most effective ways to prevent or reduce food waste [43]. In this survey, 33.3% of participants reported that they reduced food waste by reusing leftover food promptly during the COVID-19 pandemic. Concerning bread, 55.8% of participants reported that they reused bread in different dishes and desserts, and 27.6% reported that they reheated bread in the oven.

Studies have shown that there is a significant relationship between food waste and age, education, and socio-economic status [42,48]. Generally, it was ascertained that young people and those who work create more food waste than older people and people who do not work and/or are retired [42]. Those with higher education degrees were found to be more concerned with sustainability and reducing food waste [48].

5. Conclusions

A key finding of our survey is that awareness of the critical issues of food safety and food waste increased during the COVID-19 pandemic. This is positive. However, it is not clear that lessons learned have been sustained subsequent to COVID-19, and in fact, the converse may be true. There is still distrust of food safety and the role of the relevant authorities in Tűrkiye compared to other countries where data exist. Socio-economic status, age, and household income all have an impact on attitudes about these key issues. However, above all, it is education, or rather lack of it, that determines current practices. Best practices will only be achieved with comprehensive education beginning in the home and primary school and continuing throughout life. Reliable and trusted sources of information are essential, and only in this way can all stakeholders become empowered to make a positive contribution to an improved future for society. It is hoped that the findings from this survey can help to inform future strategies and reduce the negative impact of pandemics that may arise in the future. Moreover, this survey was conducted during the pandemic period, and it is possible that those conditions affected consumer behaviour periodically. For this reason, it is important to repeat such studies at regular intervals so that the food industry can create future visions.

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Nutrition and public health in Georgia: reviewing the current status and inspiring improvements: a joint event of the Georgian Nutrition Society, The Nutrition Society of the UK and Ireland and the Sabri Ülker Foundation, October 2023

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Abstract

Georgia lies to the northeast of Türkiye, having a western border on the Black Sea. With a population of some 3·73 million, Georgia has a tradition of gastronomic excellence dating back millennia. However, changing lifestyles and external influences have, as elsewhere, led to problems of suboptimal nutrition, and lifestyle-related diseases and disorders prevail. There is considerable scope for improving the focus on public health (PH) and nutrition in Georgia. With this in mind, the Georgian Nutrition Society teamed up with The Nutrition Society of the UK and Ireland and the Sabri Ülker Foundation, a PH charity based in Istanbul, Türkiye, to host a conference and workshops in Tbilisi, Georgia. The primary purpose was to review the current status of PH and nutrition in Georgia with reference to the situation elsewhere, to share examples of best practice and to identify opportunities for improvement. A particular highlight was the presentation of a programme of nutrition education for family physicians recently implemented in Türkiye. This summary of the proceedings is intended as a blueprint for action in Georgia and also to inspire others to consider how PH might be improved via a focus on balanced nutrition.

Keywords: **Nutrition education: Nutrition policy: Health literacy: Disease risk reduction: Physicians nutrition education**

The contribution of optimum nutrition to public health (PH) has been brought into sharp focus as the disparity between overall life expectancy and healthy life expectancy increases in many countries around the world. Georgia has a rich gastronomic tradition, and during the latter part of the 20th century, the Scientific Research Institute of Sanitation, Hygiene and Medical Ecology in Tbilisi took a lead in food hygiene research and teaching. However, circumstances have changed, and today Georgia has a lower life expectancy than that of neighbouring Türkiye and throughout Europe. The country does not currently have the infrastructure required to offer formal qualifications in dietetics or nutrition, nor does it have an accreditation procedure for practitioners. The Georgian Nutrition Society, the Nutrition Society of Great Britain and Ireland and Sabri Ülker Foundation

Abbreviations: AfN, Association for Nutrition; BDA, British Dietetic Association; DALY, disability-adjusted life year; NCD, non-communicable disease; PH, public health; SÜF, Sabri Ülker Foundation.

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(SÜF) came together in Tbilisi on 3–4 October 2023 to review opportunities to make a positive difference. Inspiration was derived from a variety of sources including the highlights of a conference held in Istanbul, Türkiye, in 2022 on the theme *'Achieving health through diet'*[1], and examples of best practice from the UK and Türkiye.

Eka Bobokhidze and Manana Stanley provided an overview of the health and nutrition status of the Georgian population and highlighted opportunities for improvement.

According to the Global Health Observatory data repository, in 2023, average life expectancy and healthy life expectancy of Georgians were 73·3 and 64·2 years, respectively[2]. Hence, almost a decade of the latter years is spent with one or more chronic diseases. The prevalence of diabetes was estimated to be 6·8 % in 2021 by the International Diabetes Federation[3].

The top five leading causes of death in 2019 were ischaemic heart disease (400·69 deaths per 100 000 population), stroke (299·47), hypertensive heart disease (109·77), cirrhosis of the liver (46·82) and Alzheimer's diseases and other dementias (45·7)[4].

The top five leading causes of disability-adjusted life years (DALY) in Georgia for both sexes were ischaemic heart disease (6982·06 DALY per 100 000 population), stroke (5429·25 DALY), diabetes mellitus (1787·08 DALY), hypertensive heart disease (1603 DALY) and cirrhosis of the liver (1420·35 DALY)[5].

According to the most recent statistical yearbook from the National Centre for Disease Control and Public Health, in Georgia between 2000 and 2018, there was an increasing trend of circulatory system diseases among the population. However, in 2019, there appeared to be a shift in this trend, and the recorded incidence rate for these diseases decreased sharply from 277·0 per 100 000 in 2018 to 92·1 in 2019[6]. This observation could be due to a change in the method of disease registration, and clarification is needed.

The Western diet has a significant influence on Georgia's current dietary pattern, reshaping traditional eating habits and introducing a variety of processed foods and convenience-oriented choices. With the increasing availability of fast-food chains, sugary beverages and pre-packaged snacks, Georgian cuisine has witnessed a shift towards a more Westernised pattern. This transition has been marked by an increased consumption of refined sugars, saturated fats and processed meats, contributing to a rise in health concerns such as obesity and related diseases. The cultural exchange facilitated by globalisation has not only altered the nutritional landscape but has also demonstrated a need for increased awareness about the potential health repercussions associated with adopting a Westernised diet.

Surveillance of non-communicable diseases (NCD) risk factors showed that majority of the adult population (92·4 %) have one or more risk factors associated with developing NCD[7]. More than a third of the population (36·1 %) have three to five risk factors[7]. Diet-related risk factors included in this study were low consumption of fruits and vegetables, high consumption of salt and being overweight.

Georgia is currently missing national food intake data, and this hinders decision-making processes in planning and implementing PH policies. The following assessment of the nation's nutritional status is a summary from various international sources that are based on modelling and may not reflect the reality.

The health status among infants and children under 5 years old has shown significant improvement during the last couple of decades. Between 2005 and 2018, rates for overweight, wasting and stunting have decreased from 20·8, 3·0 and 14·6 % to 6, 0·6 and 5·8 %, respectively[8]. Conversely, the prevalence of overweight and obesity among older children (>5 years) and adolescents is increasing. Since 2000, the prevalence of excess weight among children and adolescents has increased from 12 and 14 % to 22·9 and 20·2 % for boys and girls, respectively[9]. The prevalence of overweight and obesity among the adult population shows alarming rates with more than half of the population estimated to be overweight or obese (56·8 % male; 55·4 % female)[10]. Information about malnutrition is not available.

Nutrition research is at an early stage of development in Georgia. Hence, the opportunity exists to implement best practices from around the world.

Many Georgian health professionals and academics, in particular from the younger generation, are very keen to contribute to developing nutrition and nutrition science in Georgia.

The wide variety of foods, eating habits and lifestyles in Georgia deserve investigation with the collaboration of our international partners with a view to highlighting best practice and hopefully reducing disease risk and maintaining good health.

John Mathers introduced the global challenges for nutrition and health including the adverse effects of both under- and overnutrition and the importance of considering the wider environment when developing interventions.

In a typical year, poor diet is responsible on a worldwide basis for 11 million deaths and significant morbidity, equivalent to over 250 million DALY[11]. This diet-related burden of ill health is shared by those in higher and in lower-income countries. Although the focus has shifted recently towards diseases associated with overnutrition, undernutrition remains a significant PH issue. For example, a recent survey of eleven different countries with different levels of economic development showed that deficiency of micronutrients was common in both non-pregnant women of childbearing age and in preschool children[12] and affected a majority of individuals in several countries. There is a close relationship between nutrition and immune function and good understanding of some of the mechanisms through which undernutrition impairs immune function[13]. When combined with poverty that increases exposure to infections, undernutrition leads to more severe/prolonged infections and greater mortality[14].

For the past 3–4 decades, the prevalence of obesity has been increasing globally with particularly rapid increases in countries including China[15]and India[16] that have been undergoing rapid economic development. Importantly, this rise in adiposity has occurred in both urban and rural areas in both adults[16] and children[17]. Obesity is a driver of common NCD including CVD, type 2 diabetes, fatty liver disease, age-related dementia and multiple cancers. NCD are major causes of morbidity and mortality globally, for example, 6·7 million deaths were due to

type 2 diabetes in 2021[18]. In the absence of effective interventions, it is predicted that 1·27 billion people will be living with type 2 diabetes in 2050[19].

There are well-established healthy eating guidelines to reduce NCD risk[20], but the continuing rise in obesity prevalence cautions against reliance on individual-level actions to improve dietary choices. The global obesogenic environment is complex and is shaped by commercial actors that have major influences on food availability and food choice. For example, the Westernisation of the Chinese diet, including more meat and industrially prepared foods, has been linked with adverse effects on PH[21]. There is an urgent need for a greater understanding of the commercial determinants of health[22] and the use of this understanding to develop effective interventions nationally and, globally, to improve dietary choices and to improve health at all stages of the life course.

Diána Bánáti provided an overview of the obesity epidemic in Europe. Obesity is a complex multifactorial disease. Abnormal or excessive accumulation of fat is a serious PH challenge globally, being a major determinant of disability and death. Overweight and obesity are the fourth most common risk factors for NCD after high blood pressure, dietary risks and tobacco. The burden of NCD has increased continuously over recent years worldwide. In Europe, NCD caused 90 % of deaths in 2021 and 85 % of years lived with disabilities[23]. Numerous medical conditions are associated with obesity including CVD, diabetes mellitus, musculoskeletal complications, chronic respiratory diseases and mental health problems. Excess body weight increases the risk of thirteen types of cancer[24].

More than 50 % of adults in fifty out of fifty-three member states in the WHO European Region live with overweight or obesity. Nearly one-third of children (29 % of boys and 27 % of girls) are also affected[24].

The highest levels of overweight (including obesity) in Europe are found in Mediterranean and eastern countries. The highest rate is in Türkiye where more than 60 % of both sexes are affected, followed by Malta, Israel, UK, Andorra, Greece, Czechia, Bulgaria, Spain, Hungary and Ireland. The highest levels of obesity are also found in Mediterranean and eastern countries. More than 25 % of both sexes are obese in Türkiye, followed by Malta, UK, Hungary, Lithuania, Israel, Czechia, Andorra, Ireland, Bulgaria and Greece[24]. Obesity in Europe has risen by 138 % since 1975.

Unhealthy body weight in early life can affect the risk of obesity later in life[24]. Obesity is linked to greater morbidity and mortality from COVID-19[25,26]. Increases in the consumption of foods high in fat, sugar and salt have been observed during the pandemic[27–29]. Obesogenic (digital) food environments increase the likelihood of overconsumption of energy-dense, nutrient-poor foods.

Several policy frameworks and action plans have been designed to halt the rise in obesity in Europe[30–33]. However, PH systems are still failing to slow the increase in risk factors. The WHO European Programme of Work[30] calls for united action for better health. The three core priorities are (1) moving towards universal health coverage, (2) protecting people better against health emergencies and (3) promoting health and well-being. One of the flagship initiatives focuses on healthier behaviours, including how to incorporate behavioural and cultural insights. With this, WHO/Europe intends to invest in new insights that can help to build a culture of health in which everyone is enabled to make healthy choices. The initiative will promote the use of insights into social, behavioural and cultural factors to improve health literacy.

In 2014, the WHO launched its healthy diet guidelines, and FAO-WHO documented the concept of healthy diets[34]. Poor diet is a leading risk factor for the development of NCD and premature mortality. Poor diets impede healthy growth and development and affect many body functions. Over 8 million lives every year could be saved by the adoption of a healthy diet. There is a great diversity of healthy dietary patterns, reflecting different cultures, traditions, preferences and practices, all sharing the key characteristic of supporting the highest level of health and well-being. FAO and WHO are updating their concept of healthy diets to reflect the latest scientific evidence for the relationship between diet and human health but also recognise the intricate linkages between human and planetary health through sustainable agrifood systems[35].

In its latest report on *The State of Food Security and Nutrition in the World 2023*[36], FAO also discusses healthy diets in the light of urbanisation and food system transformation. In an urbanising world, technology and innovation are key enablers for agrifood systems transformation.

Oliver Shannon discussed the impact of a Mediterranean-like diet on cognitive function and dementia risk and the potential to adopt this healthy dietary pattern in non-Mediterranean settings such as the UK.

Dementia is a leading cause of morbidity and mortality, with considerable social and economic costs[37]. While promising pharmacological treatment options for Alzheimer's disease – the most common cause of dementia – are beginning to emerge[38,39], these drugs are expensive, have potentially severe side effects and may not be accessible to all[40]. Consequently, the identification and implementation of feasible, acceptable and effective strategies to prevent dementia remain a priority.

Modification of diet represents a potential strategy to help maintain better cognitive function in later life and to reduce dementia risk[41]. In particular, research suggests that the adoption of a Mediterranean-like diet could lead to better cognition and lower dementia incidence in older adults[42]. Hallmark features of the Mediterranean diet include high intake of plant-based foods, abundant use of olive oil, moderate intake of fish and wine and low intake of red/processed meat and sugar-rich drinks, cakes and pastries[43].

While much of the data supporting the adoption of a Mediterranean-like diet comes from studies conducted in the Mediterranean Basin[42], evidence from two recent large-scale observational studies[44,45] suggests similar beneficial associations may also be apparent in the UK. First, in an analysis of >8000 older adults from the European Prospective Investigation into Cancer-Norfolk cohort, higher adherence to the Mediterranean diet was associated with better global cognition, verbal episodic memory and simple processing speed[44]. Second, in an analysis of >60 000 older adults from the UK Biobank cohort, individuals in the highest *v.* lowest tertile of

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adherence to the Mediterranean diet had a 23 % lower risk of dementia[45]. Promisingly, recent data from a small (*n* 104) randomised controlled trial[46] – the MedEx-UK study – show that adoption of a Mediterranean-like diet for at least 6 months is feasible and acceptable in older adults in the UK and improves both general cognition and memory[47]. Therefore, consumption of a Mediterranean-like diet could represent a potential strategy to improve cognitive function/reduce dementia risk in older adults, and adoption of a Mediterranean-like diet in a UK setting appears to be both feasible and acceptable. Large-scale randomised controlled trials are now required to explore the potential to adopt a Mediterranean-like diet for dementia risk reduction on a population scale.

Julian Stowell provided an overview of the health and nutrition status of the Turkish and UK populations, highlighting a selection of initiatives designed to improve the situation.

The average life expectancy is 78 years in Türkiye and 81 years in the UK. However, the average *healthy* life expectancy is just 68·4 years in Türkiye and 70·1 years in the UK, and chronic disorders and diseases are common in later life[1,48]. The main causes of death are CVD and cancers, and cases of dementia are increasing[49]. Some 66·8 % of the adult Turkish population and 64 % of the UK population are overweight or obese[50,51]. In 2021, age-adjusted diabetes prevalence was 14·5 % in Türkiye and 6·3 % in the UK[52].

In both Türkiye and the UK, salt intake, saturated fat consumption and energy intake are excessive. Micronutrient deficiencies persist including Fe, vitamin D and iodine (27·8 % of the Turkish population). Fruit, vegetable and dietary fibre intakes are suboptimal[1]. In Türkiye, a National Obesity Action Plan encompasses food standards for school children, increased physical activity, updated National Dietary Guidelines and many initiatives to raise awareness about lifestyle-related diseases[53]. The Turkish and World Diabetes Foundations have together implemented a diabetes education programme with promising results[53]. A healthy eating and obesity prevention programme in Istanbul includes the provision of 35 000 bicycles and publicly available sports trainers[1]. The SÜF has championed nutrition education in schools.

Average life expectancy in Türkiye has increased from 41 years in 1950 to 75 years in 2015, an impressive improvement[54].

In the UK, the *Eatwell Guide* offers a clear depiction of food-based dietary guidelines[55]. A recent English Government plan to tackle obesity includes restrictions on less healthy foods, wider energy labelling and investment in school sports[56]. A soft drinks industry levy, implemented in 2018, has resulted in a 35 % reduction in sugar sold via soft drinks, but overall *per capita* consumption has remained constant[57]. On a positive note, the Diabetes Remission Clinical Trial reported a 46 % remission of Type 2 Diabetes Mellitus following a 12-week energy-restricted diet, sustained after 5 years when weight loss was maintained[58].

In conclusion, life expectancy has increased over the last 75 years in both Türkiye and the UK. However, healthy life expectancy is at best static, and there is much still to be done to reduce the burden of NCD in later life. Interventions are more likely to be successful if they adopt a multistakeholder approach.

Avril Aslett-Bentley provided an overview of the role of PH nutritionists and dietitians in the UK where there are clear paths for obtaining accredited qualifications and registration with well-developed support structures in place. It is envisaged that aspects of the UK system could be established elsewhere in order to address diet-related PH issues.

The Academy of Nutrition Sciences[59] was founded in the UK in 2019 as a joint initiative between the Association for Nutrition (AfN)[60], the British Dietetic Association (BDA)[61], the British Nutrition Foundation[62] and The Nutrition Society of Great Britain and Ireland[63]. The Academy of Nutrition Sciences works to improve PH and well-being by supporting excellence in research, education and associated activities to advance the knowledge and application of evidence-based nutrition science. Since its inception, the Academy of Nutrition Sciences produced position papers on Evidence for Dietary Recommendations and Evidence for Health Claims with a paper on Evidence for Nutrition Interventions for Individuals due later in 2023.

The BDA lists the universities in the UK offering a wide range of pre-registration degree courses in dietetics[64].

UK registrars and regulators of professional standards and conduct for PH nutritionists and dietitians, respectively, are

- The UK Voluntary Register of Nutritionists, held by the AfN. New registration competencies and standards and degree accreditation will apply to all AfN registrants and degrees by April 2024. Currently, there are about 2500 registrants, including approved PH specialists, that is, RNutr (PH)[65], and
- The Health and Care Professions Council, conferring statutory (generic registered dietitian) dietetic registration, with protection of title and currently with approximately 11 000 registrants. PH dietitians are specialists, but PH is embedded across dietetic practice[66].

The various groups representing nutritionists and dietitians in the UK offer a wide range of supporting materials, many of which are freely available to all via their individual websites.

For example, the Public Health Specialist Group, one of twenty-two BDA specialisms, spans the lifespan addressing NCD, vulnerable groups and food insecurity and embeds dietary sustainability[67,68]. The AfN also has some useful PH resources[69]. Regulation of both nutritionists and dietitians is based on evidence-based practice, as promoted by the Academy of Nutrition Sciences and featured in the AfN's comparative summary, which distinguishes between UK registered nutritionists, dietitians, associate nutritionists and nutritional therapists[70].

The BDA also offers a series of Food Fact Sheets that have been prepared by dietitians to highlight best practice. The most popular PH-focused ones cover folic acid and menopause and diet[71]. The Royal Society for Public Health launched a 5-year strategic plan in 2022 with the goal of facilitating all members of the population to lead healthier and more equal lives for longer[72]. The role of dietitians in PH is clearly summarised in a new infographic developed by the UK Government Office of Health Improvement and Disparities and Royal Society for Public Health, with a personal contribution from the BDA Public Health Specialist Group. The key headings are health protection, population healthcare, wider determinants and health improvement[73].

The AfN provides career and job information for registered nutritionists, including for PH specialists[74].

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Overall, the work of PH nutritionists and dietitians supported by the best use of resources has the potential to improve dietary habits and to create a healthier society.

F. Nur Baran Aksakal presented a summary of the programme of nutrition education for family physicians implemented in Türkiye in 2022 with follow-up ongoing.

As elsewhere, family physicians in Türkiye are generally lacking in nutrition knowledge[75–86]. This is, perhaps, to be expected as the curriculum of medical students and other healthcare professionals is already highly intensive, and nutrition education is typically not a formal part of it. However, it is important that the potential of balanced nutrition to reduce disease risk and contribute to the maintenance of good health is understood by those who have the potential to make a positive difference. With this in mind, in 2022, the SÜF teamed up with the Turkish Federation of Family Physicians Associations to implement a programme of nutrition education for family physicians.

As a first step, an online survey was conducted to identify areas where family physicians most feel the lack of knowledge. Based on the feedback of 1300 respondents, Professor Serhat Ünal of Hacettepe University and Professor F. Nur Baran Aksakal of Gazi University took the lead in developing a programme together with an expert group consisting of nutritionists, dietitians and family physicians. This has now been the subject of eight online lectures and interactive sessions of 2 h. The following subjects have been covered by experts in the various topics:

- What is included in nutrition? How is it defined?
- What are prebiotics and probiotics? What is their role?
- How can vitamin and mineral levels be monitored? How can deficiencies be identified and rectified?
- Energy content v. nutrients. The distinction and its implications
- Nutrient: Medicines interactions and their significance in the clinical setting
- What role do food supplements play in health and well-being?
- A review of popular diets
- Achieving a healthy lifestyle

The target audience was over 26 000 family physicians, all of whom were invited online. Some 8900 have now taken the course. More than 200 questions were raised by the participants, and initial feedback has been consistently excellent. However, measuring the long-term impact of this programme provides a difficult challenge. The next step is planned to include more family physicians together with specialist physicians, starting with internal medicine and paediatrics.

A lively workshop following the conference in Tbilisi fully endorsed this programme of nutrition education, and it is hoped that it might serve as an inspiration for others.

Caroline Saunders presented examples of how the food industry contributes to consumers' quest for an optimum diet and lifestyle. Many initiatives are active under the auspices of trade associations and relevant charities such as the British Nutrition Foundation, the focus being to improve the health of consumers. For example, a large number of food companies have supported the British Nutrition Foundation's Healthy Eating Week, an annual celebration aimed at encouraging the nation to eat and drink more healthily as well as getting more active[87]. Over twenty food and drink companies also pledged their support to increase the amount of fibre in consumers' diets after backing the Action on Fibre initiative launched by the Food and Drink Federation in the UK[88]. This has been an important initiative as only 9 % of UK adults currently meet the recommended intake. Dietitians working in the food industry also support many initiatives such as the BDA Food Fact Sheet on how to 'Eat well, Spend less'[89].

In addition, many companies have their own programmes and approaches to improving the healthfulness of their existing products and future innovations. These approaches are typically either based on reducing nutrients to limit intake (such as energy, saturated fat, added sugars and/or Na) or enhancing nutrients to encourage increased intake (including fibre, protein, fruits, vegetables, legumes and/or nuts). Examples of these approaches include:

- Reducing nutrients to limit intake
- Silent reduction through gradual reduction of sugar, Na and/or saturated fat reduction through the use of healthier oils
- Portion control
- Greater than 30 % reduction using new technologies such as sugar reduction through replacement with fibres
- Approaches to increasing nutrients to encourage higher intake
- Replacing nutrients on the list to be limited with nutrients to be encouraged, such as sugar replacement with fibre
- Using more nutrient-dense ingredients such as protein-rich pulse flours to replace wheat flour.

It is also common for food companies to partner with universities to advance their technical solutions or through collaborations such as that with the Biotechnology and Biological Sciences Research Council, a major funder of world-leading bioscience in the UK[90].

Begüm Mutuş, Özge Dinç and Özlem Üliç Çatar provided an overview of a programme of nutrition education implemented in Turkish schools since 2011 and, as background, summarised recent research to determine the level of health literacy in Türkiye. In addition to the urgent PH issue of obesity referred to above, a Türkiye Demographic and Health Survey highlighted that 10 % of Turkish children under 5 years old were stunted and 2 % exhibited wasting[91].

A recent review highlights the importance of optimum nutrition in childhood and adolescence on long-term health including cognitive function and the prevalence of nutrition-related diseases[92].

The Balanced Nutrition Education Programme was initially developed by the SÜF in collaboration with the British Nutrition Foundation and Hacettepe University. It has, since 2011, been implemented in schools in cooperation with the Republic of Türkiye Ministry of National Education, Directorate General for Basic Education. It is currently active in twenty-two provinces throughout Türkiye and has now reached an estimated seven million students, parents and teachers with educational and

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entertaining materials. The primary goal is to emphasise the importance of balanced healthy eating combined with physical activity.

A team of trainers provides essential input to teachers in each province, and the programme is then rolled out in individual schools. It runs for 38 weeks with 2 h of input per week. Also included is a 10-min exercise routine before classes begin. Children from pre-kindergarten to sixth grade are now included. The curriculum is constantly being upgraded based on feedback and new ideas. In an evaluation of the impact of the programme, SÜF worked with the universities of Ege, Erciyes and Marmara to evaluate 618 primary school participants in the programme. The results were encouraging in that, following intervention, students' total energy intakes decreased, physical activity levels increased, age-based BMI dropped in the case of female students and the frequency of obesity decreased for both male and female students[93].

Health literacy is an essential factor in ensuring that health and nutrition information is understood and utilised effectively. The proliferation of misinformation necessitates accessible, evidence-based resources to enhance individual health literacy. In Türkiye, 35 million out of 53 million adults lack sufficient knowledge in health literacy, which inversely correlates with disease rates. According to the Turkish Health Literacy Level and Related Factors research, 24·5 % of the adult population in Türkiye has inadequate knowledge, and 40·1 % has a problematic level of knowledge about health literacy. Unfortunately, as the level of knowledge decreases, the rate of disease increases – 22·6 % of those with problematic health literacy, 19·7 % of those with adequate health literacy and 13·5 % of those with excellent health literacy have a diagnosed disease[94].

The Balanced Nutrition Education Programme has been held up as an example of best practice, and it is hoped that it will inspire others to implement similar programmes where nutrition education in schools is lacking.

Rusudan Gvamichava and Ihab Tewfik provided an overview of the Georgian parents' nutrition education programme, highlighting the issue of malnutrition in children.

The problem of insufficient and imbalanced nutrition, and particularly malnutrition, is widely recognised as a significant challenge to children's development at a global level[96–98]. Malnutrition in children has been linked to poor mental health and academic performance as well as behaviours that increase the risk of several chronic diseases in later life[99,100].

According to the WHO, around 45 % of deaths among children under 5 years are linked to undernutrition[101]. Currently, there are no professional nutrition guidelines for children and parents in Georgia[102]. According to studies conducted in Georgia in 2018, schoolchildren experience serious problems of malnutrition with 35 % at grade 4 feeling hungry at school[96,103]. As noted previously, the incidence of overweight and obesity is also high. A nationwide survey of year 7 children found 22 % of girls and 26 % of boys were overweight or obese[104]. Thus, in Georgia, studies have highlighted the coexistence of obesity and undernutrition, exemplifying a double burden of diseases[105].

A recent study undertaken under the auspices of the University of Westminster sought to assess the efficacy of family-based nutrition interventions to address childhood malnutrition in Georgia. This study represents the first attempt in Georgia to use a family-based approach to promoting healthy eating via science-based nutrition education for parents. A total of 328 parents of schoolchildren, recruited from the capital city, Tbilisi, participated in the intervention. This sample, which included children from both the private and public sector schools, was considered to be representative of the city as a whole. Parents completed two online questionnaires both before and after intervention: knowledge, attitude and practice and a semi-qualitative FFQ. The duration of the intervention was 10 weeks, and it included a series of nutrition education webinars.

Preliminary, as yet unpublished, results demonstrated a decrease in BMI-for-age following intervention, giving a reduction in the numbers of overweight and obese children. Numbers eating a regular breakfast significantly increased as did the parents' awareness about nutrient deficiencies. The nutrition education webinars enabled parents to become acquainted with relevant information and, as a result, they started to make healthier food choices for their children. Previous studies have shown a positive correlation between the use of educational webinars and increased nutritional awareness and improved health habits and diet[106,107].

All activities within the framework of the current research have been focused on the goal of supporting sustainable, long-term improvement of children's health in Georgia.

Concluding remarks

This event in Tbilisi attracted a lively participation with a full conference room and additional delegates joining online. A wide cross-section of participants included government officials, academic scientists, healthcare professionals, medical students, media representatives and food industry specialists, among others. Most were from Georgia which was very encouraging as clearly the motivation exists to improve nutrition and PH in Georgia. A compelling overview was provided on the current global crisis in nutrition and PH, with poor diet estimated to be responsible for 11 million premature deaths annually. Delegates learnt about the current status in Georgia including the prevalence of lifestyle-related diseases and disorders. The lack of formal nutrition and dietetics training was highlighted as was the absence of food intake data. Neighbouring Türkiye, faced with similar challenges, has responded with an impressive programme of initiatives including nutrition education for healthcare professionals and school children, incentives to increase physical activity and government legislation and programmes to encourage best practice among consumers. All these have contributed to a dramatic increase in life expectancy over the last 70 years. In the UK, the government has championed sugar and salt reduction, and throughout Europe, the emphasis has been on reducing the incidence of overweight and obesity, so far without perceptible success. The potential to reverse type 2 diabetes has been clearly demonstrated, and a Mediterranean style of diet has been shown to be associated with better cognitive function in later life. But there is still much to be

done to improve the prognosis for long-term good health. Georgia has both the motivation and the wherewithal to make a positive difference. This conference and workshops provided a platform for all stakeholders to share knowledge and consider opportunities for improving PH for the benefit of all. It is hoped that it will also inspire other countries and regions to take up the challenge.

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Abstract

Preliminary Findings Regarding Nutrition Information Needs among Family Physicians in Turkey †

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Abstract: Background and objectives: Considering the information pollution in the field of nutrition and health in society, more than half of the community asks family physicians (FPs) as the closest counseling unit about healthy nutrition and related issues. However, FPs' nutritional knowledge levels are limited, and nutrition-related courses are not an integral part of their education. There is a need to organize postgraduate nutrition-based training programs for FPs. Methods: In order to determine the training needs of FPs, a needs assessment questionnaire was developed by the researchers in order to select topics in which they need to be trained before preparing a training program. There were 26.252 FPs in Turkey at the time of the study. AHEF is the federation of all seventy-six FP associations in Turkey. FPs who are members of any of these associations constituted the study population. The questionnaire was sent to all registered FPs electronically. Results: The questionnaire was replied to by 1308 FPs, of whom 46% were female and the average working period was 15 ± 3 years (1–38). Only 26.4% of the FPs declared that they felt competent while answering patients' questions on nutrition, 12.8% thought their knowledge was insufficient, 62.6% thought their knowledge was partly sufficient, and 23.2% recommend some kind of supplement to their patients. The topics that are indicated by the FPs were quantified and taken into consideration while the training program was prepared. The training program, which provided the first ever nutrition and nutrition communication online information platform for physicians in Turkey, was developed in collaboration with an NGO, the university, and AHEF. It consisted of eight online training topics starting in March 2022 and was conducted once every two weeks. Discussion: Postgraduate nutrition training programs for physicians and other health professionals who wish to improve their current knowledge of the role of nutrition and communication in the prevention and management of chronic diseases are limited worldwide. It is necessary to increase the level of nutrition knowledge of FPs with postgraduate training programs. Nutrition communication is the next step toward improvement.

Keywords: nutrition; family physician; nutrition communication

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