



SAKARYA ÜNİVERSİTESİ

FEN BİLİMLERİ ENSTİTÜSÜ DERGİSİ

Sakarya University Journal of Science
SAUJS

ISSN 1301-4048 e-ISSN 2147-835X Period Bimonthly Founded 1997 Publisher Sakarya University
<http://www.saujs.sakarya.edu.tr/>

Title: Determination of Nutrition Habits and Food Supply Changes During Covid-19
Pandemic

Authors: Nilgün BUDAK

Received: 2022-01-17 00:00:00

Accepted: 2022-04-25 00:00:00

Article Type: Research Article

Volume: 26

Issue: 3

Month: June

Year: 2022

Pages: 510-522

How to cite

Nilgün BUDAK; (2022), Determination of Nutrition Habits and Food Supply Changes
During Covid-19 Pandemic . Sakarya University Journal of Science, 26(3),
510-522, DOI: 10.16984/saufenbilder.1059231

Access link

<http://www.saujs.sakarya.edu.tr/tr/pub/issue/70993/1059231>

New submission to SAUJS

<http://dergipark.gov.tr/journal/1115/submission/start>

Determination of Nutrition Habits and Food Supply Changes During Covid-19 Pandemic

Havva Nilgün BUDAK*¹

Abstract

The research aims to determine the changes that took place in the lifestyles and dietary and food purchasing habits of the Turkish population during the Covid-19 pandemic by considering regional distribution and age factors. A survey was applied in this study. The survey evaluated the participants' sociodemographic and anthropometric characteristics, dietary habits, food purchasing habits, and their daily, weekly, and monthly consumption of 22 different food items in terms of both the pre- and during-pandemic periods. The study enrolled 725 participants' between the ages 15-80, living in Turkey. The answers to the online questionnaire showed that there was an increase in their frequency of taking vitamin C and D, zinc, complex vitamins, fish oil, food supplements, buying packaged products, dairy products, probiotic supplements, fruits, seafood. While there was a decrease in the participants' smoking and alcohol consumption frequency, an increase in their daily sleep duration and gaining weight. Also, it was determined that online shopping increased by 166%, while local food market decreased by 41.12%. It has been determined that people should eat healthy and strengthen their immune system in epidemics. For this reason, it has been determined that the infrastructures of producers, carriers and sellers in the food supply chain should be improved in order to meet the needs of people.

Keywords: Covid-19 pandemic, nutritional habits, food supply, lifestyle, physical activity.

1. INTRODUCTION

Coronaviruses (CoV), discovered in the 21st century and understood to cause mild respiratory diseases in humans, were common viruses all over the world [1]. The severe acute respiratory syndrome Covid-19 (coronavirus) was defined as a virus. The World Health Organization (WHO)

declared the Covid-19 pandemic to be a rapidly spreading epidemic worldwide [2]. Most people infected with coronavirus experience mild to moderate respiratory illness and recover without requiring special treatment. However, it had been reported that elderly people or those with medical problems such as diabetes, cardiovascular diseases, chronic respiratory disease, and cancer

* Corresponding author: nilgunbudak@isparta.edu.tr

¹ Isparta University of Applied Sciences, Egirdir Vocational School, Department of Food Processing
ORCID: <https://orcid.org/0000-0003-2494-6370>

are more likely to experience more severe symptoms [3].

According to WHO data, 5.518.343 people died and 318.648.834 infected from this disease [4] while according to the data of the Ministry of Health of the Republic of Turkey, 82.361 people died and 9.482.550 cases detected in Turkey as of 14 January 2022. On January 10, 2020, the Coronavirus Scientific Advisory Board was set up by the Ministry of Health to develop measures in the fight against the Covid-19 pandemic in Turkey. Wearing masks, maintaining social distance, and maintaining personal hygiene were suggested to the whole country and these suggestions became mandatory in the following days. With the advisory decision of the Scientific Board, all flights to and from Wuhan were suspended on January 23, 2020, all flights between China and Turkey were suspended on February 05, and all flights between Turkey and Italy, South Korea, and Iraq were suspended on February 29, 2020. On March 1, 2020, people from abroad were allowed to enter the country in a controlled manner, in line with Covid-19 measures and the recommendations of the Scientific Board. The first case in Turkey was detected on March 11, 2020, and all education (high school, undergraduate, postgraduate) / training activities (pilates/yoga, volleyball, basketball, running, swimming, walking) were suspended on March 12, 2020. Certain restrictions were applied in certain periods from March to November, 2020 [5].

Physical/social isolation and self-quarantine due to the pandemic strongly affected people's lives, especially their eating habits and other daily behaviors. The need for stocking up on food increased due to the changes in our living conditions such as online education, limitation of physical activity in closed areas, and restrictions on grocery shopping. In addition, interruption of work routine due to quarantines and lockdowns caused boredom and monotony at home, which caused an increase in individuals' food consumption and energy intake [6, 7]. Additionally, continuous exposure to news about Covid-19 on social media and other press channels caused a significant increase in people's

stress levels. Stress urged people to overeat and have "food cravings," especially for "comfort food," which rich in sugar [8]. Food rich in simple carbohydrates reduced stress, as they stimulated the production of serotonin, which positively affect mood [9]. Fewer visited by people to grocery stores or supermarkets to avoid the Covid-19 led to an increase in the consumption of highly processed foods such as convenience foods, snacks, and ready-to-eat cereals. Psychological effects of compulsory quarantine and restrictions predicted to cause some changes in people's lifestyles such as physical activity, sleep patterns, smoking or alcohol consumption, as well as in their eating habits. The decline in income for many people during the Covid-19 pandemic caused people to limit their kitchen shopping [10].

In the present study, it was aimed to determine the changes that took place in lifestyles and dietary and food purchasing habits of the Turkish population during the Covid-19 pandemic by considering age factors and changes observed in different regions of the country

2. MATERIALS AND METHODS

2.1. Survey methodology

The population of the study consisted of people between the ages of 15-80 living with internet access in Turkey. The reason for choosing this age range was that they were thought to be able to respond to the online survey to be sent to them. The web-based survey form was sent to Turkish residents selected by snowball sampling via social media accounts and e-mails between October 7, 2020, and October 30, 2020. According to the formula given by Adam [11], it was calculated that if the size of the population was 45 million, the sample size ($\alpha=0.05$, sampling error $H=\pm 0.05$, and the ratios $p=0.5$; $q=0.5$) should be at least 384. The survey results of 725 participants were evaluated in the study. Accordingly, the sample size was considered to be large enough. The questionnaire consisted of a total of 45 questions, consisting of a set of verified questions [12]. Since the online survey did not allow multiple answers to the questions or skipping any questions, all the obtained data were included in

the study. It is estimated that the participants take 8-10 minutes to answer the questionnaire questions.

2.2. Data collection on Covid-19

The survey developed within the scope of the research consisted of three parts. The first part included questions about some socio demographic and anthropometric characteristics (height, weight before and during Covid-19) of the participants. The second part included questions about their habits (working conditions, smoking, alcohol consumption, use of supplements such as vitamins and minerals that strengthen the immune system, whether they were following a special diet, the number of meals per day, daily sleep duration, whether they do any exercises) and about the changes that took place in their habits after the pandemic (their demands for packaged products, food products stocked up at home in case of staying home for a long time, whether they have had a Covid-19 or antibody test). Finally, the third part included questions about their daily, weekly, and monthly consumption frequencies of 22 different food products in the pre- and post-pandemic periods [5, 12, 13]. The survey was web-based, so it did not allow multiple answers to the questions or skipping any questions.

For the survey, the permission was obtained from the Ministry of Health, General Directorate of
Table 1 Demographic characteristics of the participants'

Demographic characteristics	Gender	Age/Education level/ Occupation	Metropolitan		Other cities	
			n	%	n	%
Gender	Female		273	38	214	30
	Male		106	14	132	18
Age	Female	<18	15	6	5	2
		18-30	72	26	61	29
		31-45	109	40	92	43
		45-65	63	23	46	21
		>65	14	5	10	5
		Male	<18	5	5	7

Health Services, and Isparta University of Applied Sciences Scientific Research Publication Ethics Committee (Decision Date: 07.10.2020 and Decision No: 31/1).

2.3. Statistical analyses

In the study, the data collected by the survey method were analyzed. The data were analyzed with the SPSS 23 software. The "One-Sample Kolmogorov Smirnov" test was used to check the normality of the data. It was observed that the data was not normally distributed. A chi-square test was used to evaluate the relationship between categorical variables, and McNemar-Bowker analysis was used to investigate the relationship between categorical variables in the pre- and post-pandemic periods. Wilcoxon, Kruskal-Wallis, and Post-hoc/Tamhane tests were performed for intergroup comparisons of continuous variables. Statistical significance was set at $p < 0.05$. It was examined whether any changes took place in the habits of the respondents after the pandemic broke out. The information about the sample and the scales used in the study were given below.

3. RESULT AND DISCUSSION

The data were represented as the number of respondents (n) and percentage (%) for categorical variables (Table 1).

		18-30	22	21	17	13
		31-45	36	34	62	47
		45-65	41	40	40	30
		>65	1	1	6	5
Education level	Female	High school	36	13	29	14
		Undergraduate	172	63	134	63
		Postgraduate	65	24	51	24
	Male	High school	18	17	15	11
		Undergraduate	64	60	83	63
		Postgraduate	24	23	34	26
Occupation	Female	Government wage personnel	94	34	84	39
		Academician	23	9	11	5
		Self-employment	26	10	26	12
		Unemployed (student. retired. housewife)	129	47	93	44
	Male	Government wage personnel	54	51	52	40
		Academician	3	3	12	9
		Self-employment	21	20	41	31
		Unemployed (student. retired. housewife)	28	26	27	20

Values are expressed as n (participants' number) and % (percentage) for categorical variables. Government wage personnel (1000\$ or less). Academician (1000-1500 \$) are monthly income group of Turkey.

Proportion of the participants, 68 % were female and 32% were male, 52% lived in metropolitan cities (cities with more than 750.000 inhabitants), and 48% lived in other cities (cities with less than 750.000 inhabitants). Different restrictions was applied depending on the density of population at pandemic in Turkey. The Covid-19 epidemic, which affects the whole world, poses a significant threat not only to our health but also to our economic well-being. In addition, changes in income levels caused changes in people's consumption habits during the pandemic process [14].

The participants were 39% (284) government wage personnel, 8% (49) academics, 14% (100) self-employed, and 39% (277) students/housewives/retired. Government wage

personnel (1000\$ or less), Academician (1000-1500 \$) are monthly income group of Turkey.

As regards the participants body mass index (BMI) values in both the pre- and post-pandemic periods, there was no statistically significant difference between big cities (cities with more than 750.000 inhabitants) and smaller cities while there was a statistically significant difference between males and females ($p < 0.05$).

On the other hand, there was a decrease in the participants smoking and alcohol consumption frequency ($p < 0.05$) but an increase in their daily sleep duration ($p < 0.05$) in the during pandemic period. The increase rate of those who give up smoking during the pandemic was 80.76%. The rate of those who slept 9-12 hours in a day increased by 124% (Table 2).

According to the results of the survey research, an increase was observed in those who quit smoking and in their daily sleep hours during the pandemic. This high rate of those who give up smoking during the pandemic can be explained by the fear of respiratory distress and death risk in smokers [15]. The increase in the duration people stay at home was associated with increased daily sleep duration.

Table 2 Smoking and sleep times of the participants'

	Pre Covid-19		During Covid-19	
	n	%	n	%
Smoking				
No	418	58	418	58
<5 cigarettes/week	46	6	40	5
<5 cigarettes/day	132	18	114	17
1 package/day	103	14	106	14
Give up smoking	26	4	47	6
Sleeping				
<3 hours	2	1	4	1
3-6 hours	139	19	111	15
7-8 hours	527	72	479	67
9-12 hours	50	7	112	16
>12 hours	5	1	7	1

Values are expressed as n (participant's number) and % (percentage) for categorical variables.

Among the parameters investigated, those that showed significant changes after the pandemic are described in the results section. Considering vitamin and mineral use before and during the Covid-19 pandemic, an increase was observed in the use of vitamin C (82%), vitamin D (17%), vitamin C and vitamin D combined (120%), zinc (300%), mineral complex (113%) and fish oil (32%) ($p < 0.05$). In addition, it had also been observed that people increased their daily intake of vitamins and mineral. It was stated that vitamins and minerals play an active role in the formation of a healthy immune system, protect the body against infections and increase body resistance [16]. In order to protect people from the Covid-19 virus during the pandemic process,

explanations had made on different social media channels. One of these explanations was taken vitamins and minerals [17]. In this research, 20% of the respondents reported having started to use food supplements ($p < 0.05$) 342 of the participants (47%) gained weight, while 207 (29%) individuals' weight remained the same. The rate of those who diet to lose weight increased by 29% during pandemic. According to the results of survey data applied in this research, while there was no statistically significant difference between cities ($p > 0.05$) and gender in presence of chronic diseases in Turkey; there was a statistically significant difference at the ages. There was a statistically significant difference in the rate of chronic disease among different age groups. The age range with the highest rate of chronic disease presence was 31-45 (299 people; 41%), and a statistically significant difference was found ($p < 0.05$). The change in the participants working conditions before and during the Covid-19 pandemic was found to be significant ($p < 0.05$) (Table 3).

Table 3 Change in the working conditions of the participants'

	Pre Covid -19		During Covid -19	
	n	%	n	%
Work from Office	468	65	274	37
Work from home	32	4	186	26
Short-Term Employment Allowance	0	0	32	5
Quit work	9	1	11	2
Not working	216	30	222	30

Values are expressed as n (participant's number) and % (percentage) for categorical variables.

38% (274 people) reported that they were still working in the workplace, whereas the percentage of those working from home increased from 4% to 26%. Also, 4% (32 individuals) began to benefit from the short-term employment allowance. The respondents were asked. "Will diet have an effect on recovery from Covid -19 with mild symptoms?" Individuals between the ages of 31-45 and 45-65 who participated in the

questionnaire thought that the diet had a significant effect on overcoming the disease ($p < 0.05$). While compared to individuals living in big cities and other cities, it was stated that the diet would not affect the disease ($p > 0.05$).

Demand for packaged products due to the Covid-19 pandemic was significantly higher in females (67%; 486 person) than in males (33%; 238 person), and in the 31-45 and 45-65 age ranges than in the other age ranges ($p < 0.05$). Regarding the question about stocking up for the risk of staying home for a long time due to the Covid-19 pandemic, they stated stocked up 59% on food, 4% on cleaning materials, 1% on masks and gloves. 35% of individuals stated that they thought stocking up was unnecessary. At the end of the research, it was determined that different substances were stocked. However, a group of people did not feel the need to stock up. The reason why they think that there was no need to stock up on food may be the food storage traditions of Turkish food and cuisine culture [18]. The reduction of frequency of takeaway was observed during the Covid-19 pandemic in Turkey. Since the risk of catching Covid-19 from eating out or from food packaging causes anxiety in people, the frequency of consuming food cooked outside has decreased [19]. There was no significant change in exercise habits of the respondents in both the pre- and post-pandemic periods ($p > 0.05$). As regards the physical exercises performed during the pandemic, 45% reported walking outdoors, 9-10% reported doing pilates, yoga, etc. while 18-20% reported engagement in both outdoor walking and doing yoga, pilates, etc. (Figure 1).

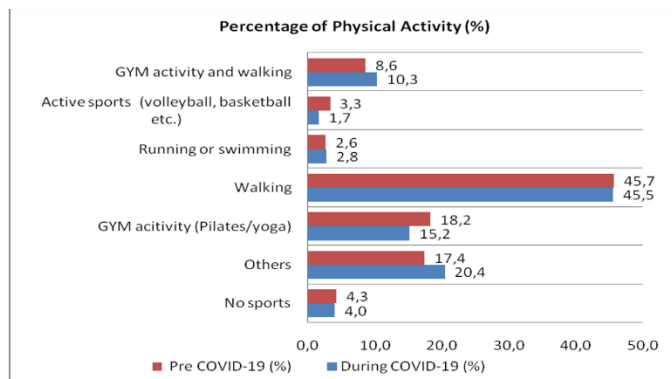


Figure 1 Physical activity changes of the participants before and during the pandemic

The physical activity most frequently stated by the respondents was outdoor walking: 35% reported going for a walk several times a week, 13% once a week, and 12% several times a month during the pandemic (Figure 2).

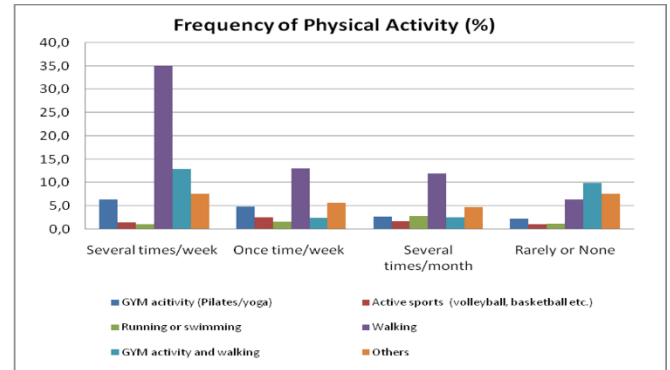


Figure 2 Physical activity frequency of the participants during the pandemic

The participant food purchasing habits and shopping frequencies before and during the pandemic were also evaluated (Figure 3, Figure 4).

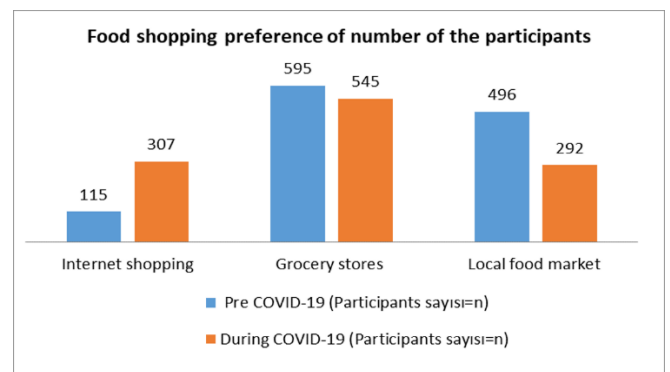


Figure 3 Food shopping preference of the participants before and during the pandemic

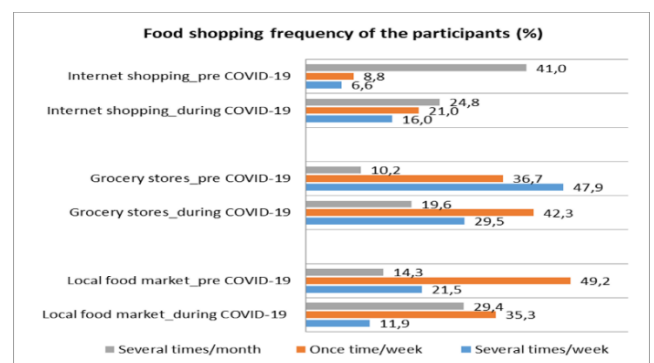


Figure 4 Food shopping frequencies of the participants before and during the pandemic

While online shopping increased by 166%, local food market shopping decreased by 41% ($p < 0.05$). Shopping from grocery stores decreased by 8%, which was not statistically significant ($p > 0.05$).

The percentage of those who did online shopping once to three times a week increased from 7% to 16% and once a week increased from 9% to 21%, while the percentage of those who did online shopping once to three times a month decreased from 41% to 25% ($p < 0.05$). In general, the number of people who did online shopping at least once a week increased. While the frequency of local food market and grocery shopping decreased in participants with undergraduate and graduate education, the frequency of internet shopping increased in the Covid-19 pandemic process ($p < 0.05$). On the other hand, the percentage of those who visited grocery stores once to three times a week decreased from 48% to 30%, the percentage of those who visited grocery stores once a week increased from 37% to 42%, and the percentage of those who visited grocery stores once to three times a month increased from 10% to 20%. These data show that people visit grocery stores less often. The habit of visiting local food market was quite common in Turkish society. The percentage of those who visited local food markets once to three times a week decreased from 22% to 12% and once a week decreased from 49% to 35% whereas the percentage of those who visited local food markets once to three times a month increased from 14% to 29%. The participant frequency of visiting local food markets was determined as once a week or several times a month. Especially, the academicians showed a decrease in the local food market shopping frequency during the Covid-19 pandemic process ($p < 0.05$). In other words, it was found that individuals visited local food markets as few times as possible.

3.1. Changes in eating and consumption habits during the pandemic

As regards the frequency of takeaway in both the before and during pandemic periods there was no significant difference between big cities and other cities in terms of both periods ($p > 0.05$). While

there was no significant difference between men and women in terms of the frequency of takeaway food before the pandemic ($p > 0.05$), a statistically significant difference was observed between women and men during the pandemic process ($p < 0.05$). It has been determined that women order take-away meals more frequently than men, since women are more organized in meeting their family food needs (Figure 5).

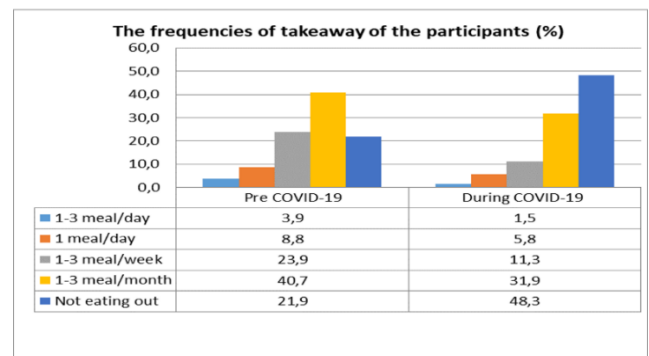


Figure 5 The frequencies of takeaway of the participants during

Furthermore, it was determined that there was a difference between <18, 18-30, 31-45 age ranges and 45-65 and >65 age ranges in terms of the frequency of takeaway food ($p < 0.05$): Individuals over the age of 45 did not prefer takeaway food.

In fact, the overall frequency of takeaway decreased in Turkey after the Covid-19 pandemic. The percentage of those who not preferred takeaway increased by 120% in total from 22% to 48%. In addition, the frequency of eating out has decreased significantly.

The frequency of purchasing unpackaged food products decreased during the pandemic ($p < 0.05$). Moreover, the demand for packaged products increased by 43% during the pandemic. This is because the risk of catching Covid-19 from unpackaged food products creates fear and anxiety in people.

The consumption of dairy products, probiotic product and supplements, vitamin C source foods such as oranges, other fruits, and seafood increased during the pandemic ($p < 0.05$) (Table 4).

Table 4 Foods consumption frequency (n=725) and percentages (%) of the participants pre and during pandemic (Covid-19)

	3 portion/day		1 portion/day		3-4 portion/week		Never consume	
	n	%	n	%	n	%	n	%
Milk and milk products_pre Covid-19	124	17.1	412	56.8	173	23.9	16	2.2
Milk and milk products_during Covid-19	163	22.5	405	55.9	147	20.3	10	1.4
Probiotic products_pre Covid-19	35	4.8	242	33.4	228	31.4	220	30.3
Probiotic products_during Covid-19	52	7.2	283	39.0	188	25.9	202	27.9
Orange etc._pre Covid-19	68	9.4	295	40.7	314	43.3	48	6.6
Orange etc._during Covid-19	112	15.4	298	41.1	280	38.6	48	6.6
Other fruits_pre Covid-19	69	9.5	349	48.1	283	39.0	24	3.3
Other fruits_during Covid-19	102	14.1	370	51.0	234	32.3	19	2.6
Carbonated beverage_pre Covid-19	30	4.1	93	12.8	266	36.7	334	46.1
Carbonated beverage_during Covid-19	32	4.4	87	12.0	260	35.9	342	47.2

On the other hand, no change was observed in the frequency of consumption of fizzy drinks. Probiotic product consumption increased significantly in participants at all education levels

during the pandemic process ($p < 0.05$) (Table 4). The participants daily consumption of legumes, vegetables, and pastries increased, but the increase was not significant ($p > 0.05$) (Table 5).

Table 5 Some foods consumption frequency (n=725) and percentages (%) of the participants pre and during pandemic (Covid-19)

	1 portion/day		1-3portion/week		1-3portion/month		Never consume	
	n	%	n	%	n	%	n	%
Red meat_pre Covid-19	121	16.7	465	64.1	127	17.5	12	1.7
Red meat_during Covid-19	118	16.3	474	65.4	116	16.0	17	2.3
White meat_pre Covid-19	83	11.4	413	57.0	179	24.7	50	6.9
White meat_during Covid-19	81	11.2	418	57.7	167	23.0	59	8.1
Sea food_pre Covid-19	46	6.3	245	33.8	381	52.6	53	7.3
Sea food_during Covid-19	44	6.1	276	38.1	349	48.1	56	7.7

Legumes_pre Covid-19	68	9.4	429	59.2	217	29.9	11	1.5
Legumes_during Covid-19	76	10.5	440	60.7	197	27.2	12	1.7
Dessert_pre Covid-19	100	13.8	314	43.3	249	34.3	62	8.6
Dessert_during Covid-19	89	12.3	319	44.0	250	34.5	67	9.2
Dried nuts_pre Covid-19	169	23.3	353	48.7	185	25.5	18	2.5
Dried nuts_during Covid-19	217	29.9	348	48.0	142	19.6	18	2.5
Vegetables_pre Covid-19	161	22.2	418	57.7	120	16.6	20	2.8
Vegetables_during Covid-19	177	24.4	417	57.5	113	15.6	10	1.4
Pasta_pre Covid-19	110	15.2	435	60.0	158	21.8	22	3.0
Pasta_during Covid-19	114	15.7	439	60.6	145	20.0	27	3.7
Pastries_pre Covid-19	66	9.1	340	46.9	282	38.9	34	4.7
Pastries_during Covid-19	71	9.8	351	48.4	248	34.2	46	6.3
Junk food_pre Covid-19	43	5.9	118	16.3	338	46.6	222	30.6
Junk food_during Covid-19	49	6.8	125	17.2	310	42.8	239	33.0

Daily consumption of dried nuts (28%) and junk food (14%) increased ($p < 0.05$). Junk food is unhealthy food that is high in calories from sugar or fat, with little dietary fiber, protein, vitamins, minerals, or other important forms of nutritional value [9]. While no change was observed in the consumption of sweets, pasta, and bread, the consumption of red meat and white meat decreased during the pandemic ($p > 0.05$). The daily water consumption of individuals during the pandemic was 2L and over 2L. As experts often advise people to strengthen their immune systems [20], the daily consumption of fermented products

such as probiotic yogurt, vinegar, pickles, and kefir has increased. According to the findings of our survey research, consumption of dairy products, probiotic supplements, seafood, other fruits, and vitamin C-based foods such as oranges, increased during the pandemic. During the pandemic, milk, canned fruit, and flour sales increased by 3.5 times, 3 times, and 6 times, respectively, in the UK. In another study conducted with 2.933 people in England, America, Germany, and China, it was determined that the food and beverage expenditures of consumers increased by 43% in China, 22% in

Germany, 27% in the UK, and 27% in the USA [21, 22]. It was stated that sixty-five percent of the consumers have tried to consume more food that boosts the immune system since the COVID-19 pandemic started in Turkey [23].

Furthermore, they have had a proper eating habit regarding fruit and vegetable consumption. The increase in working from home and the length of staying home led to an increase particularly in the consumption of snacks such as nuts and junk food. In a survey study conducted in Spain, they stated that people increased their consumption of snacks such as chocolate, coffee, tea and nuts for combat stress during the Covid-19 pandemic [24]. In the studies conducted in different countries (including Turkey) during the Covid-19 process, it has been determined that people prefer chocolate, nuts, and snack foods to reduce boredom. In a study conducted in Spain, it was observed that while the consumption of vegetables, fruits, legumes, vegetables and fish changed towards healthier habits, there was an increase in the consumption of alcoholic and sugary drinks and processed products with high fat and salt or sugar content [25].

Studies were examined the effects of natural disasters such as storms, tornadoes, hurricanes, and earthquakes, and health crises such as pandemics on consumers' shopping and spending behaviors. According to a study by Elmore [26], both fuel spending and market spending a week before Hurricane Irma struck Florida increased by 63% and 41%, respectively, compared to the previous year. Also, it is seen that online purchases of durable consumer goods have increased significantly in the USA. Sales of rice, flour, canned vegetables, and canned legumes increased (+ 433%) in March compared to January 2020 in the USA [27]. A study carried out in Vietnam reported that the tendency to stock up on food during the pandemic increased by 45%, online shopping increased by 25%, and the frequency of visiting supermarkets/grocery stores and fresh food markets decreased by 50% [21]. Turkish restaurants, cafes and etc. catering businesses were adversely affected due to reduced frequency of eating out and restrictions on leaving the street in Turkey.

The working systems of people have also changed in the during Covid-19 pandemic. The percentage of those working from home increased while 4% began to benefit from the short-term employment allowance. Short-term employment can be defined as a compulsory reduction in working time or complete or partial cessation of work in case of compelling reasons such as general economic crisis, or sectoral and regional crisis in Turkey. On the other hand, the short-time employment allowance is payment support provided by the government to employees during short-term employment [28].

The habit of visiting the local food market is quite common in Turkish society. However, a significant decrease in local food market habits was observed during the pandemic process. Because the spread rate of the disease is stated to be more in places where there is collective communication.

The change in people's food purchasing habits has affected many industries and distribution channels. The Covid-19 pandemic has increased the need for reliable supply chains, demonstrating the vital importance of supply chains and logistics, as well as the disadvantages of international trade. During the pandemic, the necessity to ensure the smooth functioning of all supply chain and logistics operations from supply to production, from warehouse operations to shipping, from e-commerce to cargo and courier services was strongly felt [29].

The workload of the courier or distribution personnel required for the delivery of products purchased online has increased. In addition, restructuring and updating of the requirements of the market or the online sales channel of supermarkets in Turkey has emerged once again. In the event of a health crisis that may require people to use only online channels for shopping, the online shopping infrastructure should be strengthened to make shopping faster and safer in the future.

4. CONCLUSION

This study was attempt to provide data related to the changes that took place in Turkish consumers'

lifestyles, eating habits, and food purchasing habits during the Covid-19 pandemic. Compared to the pre-pandemic period, in the post-pandemic period, an increase was observed in the participants daily sleeping duration (especially 9-12 hours, 124%) in vitamin C consumption (82%), vitamin D consumption (17%), weight gain (47%), working from home (481%), and food supplement consumption (150%), but there was no change in their preferences for physical activity. As regards the BMI values of participants there was a statistically significant difference between males and females in terms of pre-pandemic and post-pandemic BMI values.

Also, it was determined that online shopping increased by 166%, while street market shopping decreased by 41%. Therefore, the necessity of restructuring or updating the online sales channels of markets or supermarkets in Turkey has emerged once more. The preference for ordering food delivery was found to be quite common in individuals under 45 years of age. It has been stated that the rate of those who do not prefer takeaway meals in all age groups has increased by 120 percent. Since the risk of catching Covid-19 from eating out or from food packaging causes anxiety in people, the frequency of consuming food cooked outside has decreased. The consumption of dairy products, probiotic supplements, vitamin C source foods such as oranges, other fruits, and seafood increased during the pandemic. Another promising data was the reduction in smoking and alcohol addiction during the Covid-19 pandemic.

4.1. Implications for Research and Practice

Experience with Covid-19 has shown that a pandemic requires an emergency plan with unique challenge. This study was the first attempt to provide data related to the changes that took place in Turkish consumers' lifestyles, eating habits, and food purchasing habits after the Covid-19 pandemic. The current study identified changes in people's diet and habits and behaviors during the pandemic period. Emergency plans should be made in countries to investigate the long-term effects and to prepare for the "new normality". During the Covid-19 pandemic, awareness has been raised for detecting the

changes in nutrition in unexpected conditions, evaluating the production rate of food companies in this process, government officials to create appropriate resources and guidelines while preparing for the current pandemic conditions and other future emergencies.

An emergency plan should be created for those working in infectious disease outbreaks. Changes in diet patterns of individuals living in Turkey during the outbreak was identified by this research. However, this trend should be determined for all countries and emergency plans should be created in the future. Given that the Covid-19 pandemic is still ongoing, the obtained data should be investigated in larger population groups in the future. In addition, if the pandemic continues further, it will be important to focus on organizing, planning and improving the infrastructures of manufacturers, carriers, and sellers in the food supply chain.

Acknowledgements

I also thanks Assoc. Prof. Fikriye Yılmaz and Prof. İsmail Tokmak.

The Declaration of Conflict of Interest/Common Interest

No conflict of interest or common interest has been declared by the authors.

The Declaration of Ethics Committee Approval

For the survey, the permission was obtained from the Ministry of Health, General Directorate of Health Services, and Isparta University of Applied Sciences Scientific Research Publication Ethics Committee (Decision Date: 07.10.2020 and Decision, Count: 96714346-044-E, No: 31/1).

The Declaration of Research and Publication Ethics

During the writing process of my study, international scientific, ethical and citation rules have been followed, no falsification has been made on the data collected, and Sakarya University Journal of Science and its editorial

board have no responsibility for any ethical violations that may be encountered. I undertake that I have full responsibility and that this study has not been evaluated in any academic environment other than Sakarya University Journal of Science.

REFERENCES

- [1] K. McIntosh and S. Perlman, “Coronaviruses, including Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) In: Bennett JE, Dolin R, Blaser MJ (eds). Principles and Practice of Infectious Diseases”, 8th edition, Philadelphia: Elsevier-Saunders, 1928-1936, 2015.
- [2] WHO (World Health Organization), “Rolling update on coronavirus (COVID-19)”, <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>, (11.03.2020).
- [3] WHO (World Health Organization), “Coronavirus disease (COVID-19)”, https://www.who.int/health-topics/coronavirus#tab=tab_1, (9.12.2020).
- [4] WHO (World Health Organization), “WHO Coronavirus Disease (COVID-19) Dashboard. <https://covid19.who.int/> (29.12.2020).
- [5] Anonymous, Republic of Turkey, Ministry of Health. “Covid-19 Information Page”. <https://covid19.saglik.gov.tr/> 01.01.2022.
- [6] L. Di Renzo, P. Gualtieri, F. Pivari, L. Soldati, A. Attinà, G. Cinelli, C. Leggeri, G. Caparello, L. Barrea, F. Scerbo, E. Esposito and A. De Lorenzo, “Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey”, *Journal of Translational Medicine*, vol: 18, no,229. Pp. 1-15, 2020.
- [7] A. B. Moynihan, W. A. P. Van Tilburg, E. R. Igou, A. Wisman, A. E. Donnelly and J. B. Mulcaire, “Eaten up by boredom: consuming food to escape awareness of the bored self”. *Frontiers in Physiology*, vol:6, pp.369, 2015.
- [8] C. Yılmaz and V. Gökmen, “Neuroactive compounds in foods: occurrence. mechanism and potential health effects”, *Food Research International*, vol:128, pp.108744-108748, 2020.
- [9] Y. Ma, R. Ratnasabapathy and J. Gardiner, “Carbohydrate craving: not everything is sweet”, *Current Opinion in Clinical Nutrition & Metabolic Care*, vol:20 pp.261–265, 2017.
- [10] M. Adıgüzel, “Macro Economic Analysis of The Effect of The Covid-19 Pandemic in Turkey”. *Istanbul Commerce University, Journal of Social Sciences, Covid-19 Social Sciences Special Issue*, vol:19, no:37, pp.191-221, 2020.
- [11] A. M. Adam, “Sample Size Determination in Survey Research”. *Journal of Scientific Research & Reports*, vol:26 no:5 pp.90-97, 2020.
- [12] A. Uncu-Soykan, “Reliability and Validity of Food-Frequency Questionnaires”. *Cukurova University, Health Sciences Institute, Biostatistics Department. Adana. Turkey. 101s*, 2007.
- [13] S. Sood, “Impact of COVID-19 on Consumer Behavior in India”. *Conference: Sustainable Management Practices and Economic Slowdown in India At: Delhi, India. Project: Marketing and Consumer Behavior. https://www.researchgate.net/publication/343153169_Impact_of_COVID_19_on_Consumer_Behavior_in_India. Conference paper, 2020.*
- [14] B. K. Tetik, I. G. Tekinemre and S. Taş. “The Effect of the COVID-19 Pandemic on Smoking Cessation Success”. *Journal of Community Health*, vol:8, pp.1–5, 2020.
- [15] Y. Karağaç and E. B. Koyu. “Vitamins and Minerals in Viral Infections: A Review Focusing on COVID-19”. *İzmir Kâtip Celebi*

- University, Journal of Health Sciences Faculty. vol:5, no:2 pp.165-173, 2020.
- [16] U. S. Pharmacist, "Impact of Vitamins on Immune Function in COVID-19 Patients". <https://www.uspharmacist.com/article/impact-of-vitamins-on-immune-function-in-covid19-patients>, (09.01.2021).
- [17] M. Güllü and Ş. Karagöz, "Traditional food storage methods in Turkish culinary culture". ISBN: 978-605-254-175-3. Page:181. Turkey, 2019.
- [18] T. B. Hassen, H. E. Bilali and M. S. Allahyari, "Impact of COVID-19 on Food Behavior and Consumption in Qatar". Sustainability, vol:12, no:6973, pp.1-18, 2020.
- [19] M. Alagawany, Y.A. Attia, M. R. Farag, S. S. Elsner, S. A. Nagadi, M. E. Shafi, A. F. Khafaga, H. Ohran, A. A. Alaqil, and M. E. Abd El-Hack, "The Strategy of Boosting the Immune System Under the COVID-19 Pandemic". Frontiers in Veterinary Science, vol:7, no:570748, pp.1-17, 2021.
- [20] Statista, "Impact on consumer behavior due to COVID-19 among urban citizens in Vietnam 2020". <https://www.statista.com/statistics/1102863/vietnam-impact-on-shoppingafter-covid-19-outbreak/>, 30.03.2020.
- [21] Statista, "Perishable Food Consumption Report", <https://www.statista.com/chart/21109/sales-growth-of-non-perishablefood-items-in-the-us/>, 28.03.2020.
- [22] Bolek, S. "Food purchasing, preservation, and eating behavior during COVID-19 pandemic: A consumer analysis". Italian Journal of Food Science, vol:33 no:3 pp: 14–24, 2021.
- [23] L. Laguna, S. Fiszman, P. Puerta, C. Chaya and A. Tárrega, "The impact of COVID-19 lockdown on food priorities. Results from a preliminary study using social media and an online survey with Spanish consumers". Food Quality and Preference. Vol:86, no:104028, pp.1-9, 2020.
- [24] C. Pérez-Rodrigo, M. G. Citores, G. H. Bárbara, F. Ruiz-Litago, L. C. Sáenz, V. Arijá, A. M. López-Sobaler E. M. Victori, R. M. Ortega, T. Partearroyo, J. Quiles-Izquierdo, L. Ribas-Barba, A. Rodríguez-Martín, G. S. Castell, J. A. Tur, G. Varela-Moreiras, L. Serra-Majem, and J. Aranceta-Bartrina. "Patterns of Change in Dietary Habits and Physical Activity during Lockdown in Spain Due to the COVID-19 Pandemic". Nutrients, vol:13, no:300, pp:1-16, 2021.
- [25] C. Elmore, "Irma: Frenzied buying in Palm Beach. St. Lucie regions led state". Palm Beach Post. Retrieved from <http://www.palmbeachpost.com/business/irma-frenzied-buying-palm-beach-lucie-regions-led-state/LIDVXIL3qlqJGLlaosfSiL/>, 2017.
- [26] Criteo, "5 ways the coronavirus is affecting consumer behavior". <https://www.criteo.com/blog/coronavirus-consumer-behavior/>, 19.12.2020.
- [27] M. A. Ozdemir, "What are the Economic, Psychological and Social Consequences of the Covid-19 Crisis on Tourism Employees?" International Journal of Social, Political and Economic Research, vol:7, no:4, pp.1137-1163, 2020.
- [28] G. Senir and A. Büyükkelik. "Effects of the COVID-19 Outbreak on Supply Chains and Logistics Activities. In: Anatomy of the Global Epidemic Future of Man and Society". Ed: Şeker. M.. Özer. A.. Korkut. C.. First Edition. Turkey Academy of Sciences. TDV Publication Printing Facilities. Ankara. Turkey. Page:628-643, 2020.