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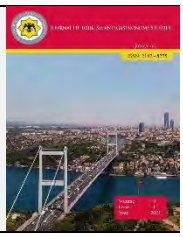

# The Impact of the COVID-19 Pandemic on the Frequency of Food Consumption

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**Abstract**

This study aimed to statistically analyze the change in the frequency of food consumption in the pre-and during the COVID-19 pandemic period in terms of the demographic characteristics of individuals. In this context, a food list consisting of 47 items and a 5-point Likert-type scale was prepared to determine the frequency of food consumption. The data were collected with an electronic questionnaire. The construct validity and reliability of the scale were examined with Confirmatory Factor Analysis, and the Cronbach Alpha (α) reliability coefficient, respectively. The data were analyzed by the Independent Sample T-Test and One-Way Analysis of Variance (ANOVA). Tukey test was used to determine the difference between groups. 3017 people with different demographic characteristics participated in the study. Compared to the pre-pandemic period, an increase was found in the frequency of dairy and breakfast products, vegetables, fruits, and nutritional supplements consumption during the pandemic. On the other hand, it was seen that there was a decrease in the frequency of bread group, meat products, and beverage consumption. There are many statistically significant findings between the frequency of food consumption according to demographic characteristics. It is estimated that lockdown, social isolation, the desire to have a strong immune system, and economic problems, which are included in our lives due to the pandemic, have led to a change in the frequency of food consumption. Besides, individuals have tended to have a healthy diet during this period. This research is one of the most comprehensive studies examining the frequency of food consumption during the COVID-19 pandemic.

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## INTRODUCTION

Throughout human history, many outbreaks have afflicted different geographies and caused the death of millions of people. The most recent one is the COVID-19-borne infection caused by SARS-CoV-2, which emerged in Wuhan/China in December 2019, and the World Health Organization (WHO) declared it a global pandemic on March 11, 2020. According to the WHO global report on 17 December 2020, the number of people infected with COVID-19 was 72 196 732, and 1 630 520 people died (WHO, 2020a).

The COVID-19 pandemic has deeply affected almost all sectors, especially the economy and health system, in an unprecedented way (Donthu & Gustafsson, 2020; Hossain, 2020). Depending on this situation, it is stated that today nothing can be like before the pandemic, and a period called the "new normal" has started. In this new order, it is not surprising that individuals experience changes in perceptions, attitudes, and behaviors, and that many new habits are acquired voluntarily or compulsively such as the use of masks, physically distant life, hygiene rules, and the change in the eating habits (Zvolensky et al., 2020; Branley-Bell & Talbot, 2020; Shen et al., 2020; Cooper et al., 2020).

Nutrition is one of the most important factors determining whether a lifestyle is healthy or unhealthy, starting from very young ages and continuing throughout life. Today, the significance of an adequate and balanced diet for a healthy life is known by all segments of society. We, who have a culture that emphasizes the importance of nutrition with the expression "Bread is the staff of life", have a new perspective that comes with the phrase "Soul leaves the body via throat" in today's world and are looking for the answer to the question. "What should we eat?". With the COVID-19 pandemic, some new factors have emerged in our lives that are thought to cause changes in nutritional habits by affecting individuals physiologically, sociologically, economically, and psychologically (Mattioli et al., 2020; Clemente-Suárez et al., 2020; Browning et al., 2021).

Although some vaccines have been developed no cure has yet been found to treat COVID-19. Therefore, preventive policies are prioritized in the management of pandemic. For example, during the pandemic period, millions of people had to live in lockdown to reduce the risk of transmission. In a lockdown, people move away from their normal life (Muscogiuri et al., 2020), which causes them to lead a sedentary life and have changes in their mood (Eskici, 2020). It has been reported that there may be problems to maintain a balanced diet as there may be restrictions in access to fresh fruits and vegetables during the lockdown, which leads to an increase in the consumption of processed products rich in macronutrients containing more carbohydrates, fats, and proteins (Moynihan et al., 2015; WHO, 2020b).

One of the policies preventing the disease is that individuals have a healthy immune system. Evidence emphasizes the significance of a strong immune system in preventing viral diseases, including COVID-19, or increasing the effectiveness of the treatment process (Zhang & Liu, 2020; Wang et al., 2020). One of the influential factors to improve immunity is undoubtedly nutrition promotion strategies (Güneş et al., 2020). Consumption of foods rich in vitamins and minerals for a strong immunity during the COVID-19 pandemic will strengthen the immune system and form a shield against viral and bacterial infections (Huang et al., 2018; Zhang & Liu, 2020; Das, 2020; Grant et al. 2020; Derbyshire & Delange, 2020). Individuals who had insufficient and unbalanced diets before the pandemic and those at risk of chronic diseases such as hypertension, obesity, cancer, and COPD were recommended to take nutritional supplements such as propolis, prebiotics, vitamins, and minerals to improve the immune system during

the pandemic (Güler et al., 2020; Caccialanza et al., 2020; Prince, 2020; Dhar & Mohanty, 2020; Barazzoni et al., 2020).

An adequate and balanced diet is crucial to be healthy before or in the presence of infectious diseases. However, during the pandemic period, various problems in food supply were encountered since many businesses, including the food sector, either closed or reduced their capacity. It has been reported that 20 thousand and 15 thousand enterprises, respectively, in Istanbul and Ankara have terminated their activities due to pandemic (BBC News, 2020). In addition, it has been stated that 55% of SMEs in the European Union may shut down if the pandemic continues (McKinsey & Company, 2020). Besides, supply-based problems have caused abnormal increases in food prices, particularly in those that strengthen immunity. These situations have made it more challenging for those with limited access to food during the lockdown and those with low income to have a healthy diet. Problems in accessing fresh foods also threaten the adequate and balanced diet required for a strong immune system.

Lockdown, which has become a part of our lives in the new normal order, obstacles to socialization and freedom, such as social isolation, financial difficulties caused by the insufficient food supply, and news in print and visual media about the significance of a strong immune system in protection from disease causes the development of both positive and negative behaviors such as anxiety and increase in psychological stress, and this situation changes individuals' perception, attitude, and behavior towards food (Van Strien et al., 2013; Rodríguez-Martín & Meule, 2015; Serin & Şanlıer, 2018; Holmes et al., 2020). This study aims to statistically examine the change in the frequency of food consumption in the pre-and during the COVID-19 pandemic in terms of demographic characteristics of individuals.

## Methodology

### Ethical considerations

Permission was obtained from the T.R. Ministry of Health COVID-19 Scientific Research Platform (Application Form Name: Hilal PEKMEZCİ PURUT-2020-09-21T12_33-00).

The study was carried out in accordance with the “Helsinki Declaration Principles”. Ethics committee approval was received from Recep Tayyip Erdogan University Rectorate Social and Human Sciences Ethics Committee with decision number 2020/34. The ethical principle was fulfilled by obtaining “Informed Consent” from the participants. Additionally, the research adhered to the principles of “Respect for Human Dignity and Confidentiality”.

### Data collection

This descriptive and cross-sectional research was conducted between March 15, 2020, and May 15, 2020, in Turkey with volunteer individuals who were not diagnosed with COVID-19, who were older than 12 years, who could understand the expressions in the form, and who had different sociodemographic characteristics.

A draft scale form was prepared to determine the change in the frequency of food consumption pre-and during the COVID-19 pandemic. The first part of the scale consists of information about the purpose of the study and the questions investigating the demographic characteristics of the individual, and the second part examines the change in the frequency of food consumption of the individuals. The nutrients in the second part were selected among food consumed in daily life identified in the report of Turkey Nutrition Guide and Turkey Nutrition and Health Survey

(TBSA in 2010; TBR, 2015). In this context, a list of 47 items has been prepared. The frequencies of food consumption are defined as 5-point Likert; "I don't consume", "Often (once a day +)", "Generally (once a week +)", "Occasionally (once a month +)" and "Rarely (once a year +)". The questionnaire was prepared electronically, and the data were collected by sharing the link (https://sites.google.com/erdogan.edu.tr/kovid19salginibeslenme/) with the public.

**Statistical analysis**

The research data were transferred to IBM SPSS Statistics 23 (*Armonk, New York U.S.A*) and IBM SPSS Amos 21 (*Meadville, PA U.S.A*), and frequency distributions and descriptive statistics (mean ± sd) were used to evaluate the data. The construct validity and reliability of the scale were examined with the confirmatory factor analysis (CFA) and the internal consistency coefficient (Cronbach's alpha), respectively. Scale and subscale scores were calculated by taking the average of the related items. The Kolmogorov Smirnov test (n>50) showed that the scale and subscale scores provided the assumption of normality. According to the test result, the scores could not provide the assumption of normality. However, when the skewness ((-2.22)-1.91) and kurtosis ((-0.26)-2.42) values were examined together with the histogram graphics, it was seen that the scores were between ± 2 - ± 3, so it provided the normality assumption. For this reason, parametric tests (Independent Sample T-Test, One-way Analysis of Variance (ANOVA)) were used to compare scores. The difference between the groups was analyzed with the Tukey Test. The difference score was calculated by subtracting the pre-pandemic scores from the during-pandemic scores to see whether there was a difference between the demographic characteristics. This difference score revealed whether there was a change in the frequency of food consumption during the pandemic based on demographic characteristics.

**Results and Discussion**

**Construct validity and reliability analysis of the scale**

A total of 3,017 people were included in the research carried out between March 15, 2020, and May 15, 2020. For the validity of the scale, CFA was applied to data of 480 participants randomly selected among 3,017 people, and the scale was finalized as 10 sub-dimensions and 36 items. Then, reliability analysis was applied for the remaining 2,537 people. As a result, it was seen that the "Change in the Frequency of Food Consumption Scale" is quite reliable (α=0.732). The results revealed that meat products (α=0.528), dairy-breakfast products (α=0.515), oils (α=0.454), vegetables and fruits (α=0.544), legumes (α=0.516), 3 white foods (α=0.561) and traditional drinks (α=0.530) sub-scales were reliable; bread group (α=0.710) and beverages (α=0.651) sub-scales were quite reliable; and nutritional supplements (α=0.845) sub-scale was highly reliable.

Kalaycı (2014) determined Cronbach (α) the reliability coefficient ranges of the scale as follows; *"0.00<α<0.40 Not Reliable", "0.40<α<0.60 Reliable", "0.60<α<0.80 Quite Reliable", and "0.80<α<1.00 Highly Reliable".* As the scale and sub-scales proved reliable, the study continued.

**Sub-scales (Items)**

1. Meat products (red meat (cattle and sheep), white meat (chicken, turkey), fish, offal, eggs)

2. Dairy-breakfast products (milk, yoghurt, cheese, ayran-kefir, honey-molasses)

3. Oils (olive oil, butter)

4. Vegetables and fruit (vegetables, fruits)

5. Bread products (whole wheat bread, rye bread, bran bread)

6. Legumes (bulgur-rice-pasta etc., legumes (chickpeas, lentils, beans, etc.))

7.3 white foods (flour, salt, sugar)

8. Traditional drinks (water, black tea, Turkish coffee)

9. Beverages (instant coffee, coke etc., commercial fruit juices)

10. Nutritional supplements (vitamin $B_6$-$B_{12}$, vitamin C, vitamin D, calcium-magnesium-zinc, etc. minerals, omega 3-6-9 unsaturated fatty acids, propolis, prebiotic-probiotic, B-glucan)

**Socio-demographic characteristics of participants**

The sociodemographic characteristics of the 2537 participants included in the study to determine the relationship between the change in food consumption frequencies pre-and during the COVID-19 pandemic were as follows; Gender; Female: 1,379 (%54.4), Male: 1,043 (%45.6). Marital status; Single: 1,494 (%58.9), Married: 1,043 (% 41,2). Age range: 12-17: 380 (%15.0), 18-30: 1,120 (% 44.1), 31-50: 795: (% 31.3), 51-65: 173 (% 6.8), 66 and over: 69 (% 2.7). Education level; Primary education: 66 (% 2,6), High school: 677 (% 26,7), Associate degree: 488 (% 19.2), Undergraduate Degree: 945 (%37.2), Post-graduate degree: 361 (% 14.2). The presence of a chronic disease; Yes: 504 (% 19.9), No: 2,033 (% 80.1).

**Evaluating the change in the frequency of food consumption with demographic characteristics**

The frequency of food consumption of individuals in the pre-and during the COVID-19 pandemic was examined considering some demographic characteristics. In this context, the results regarding the change in gender and the frequency of food consumption are shown in Table 1.

**Table 1.** Statistical analysis of the change in the frequency of food consumption by gender

| | | **Pre-Pandemic (PP)** | | **During the Pandemic (DP)** | | **Difference (DP-PP)** | |
|---|---|---|---|---|---|---|---|
| | | **Mean±SD** | **t; p** | **Mean±SD** | **t; p** | **Mean±SD** | **t; p** |
| **Gender** | **N** | **Meat Products** | | | | | |
| Female | 1,379 | 3.28±0.575 | -5.707; **0.000**$^{***}$ | 3.18±0.628 | -4.621; **0.000**$^{***}$ | -0.10±0.343 | 1.288; 0.198 |
| Male | 1,158 | 3.41±0.608 | | 3.29±0.633 | | -0.12±0.372 | |
| | | **Dairy-Breakfast Products** | | | | | |
| Female | 1,379 | 4.06±0.694 | -0.850; 0.396 | 4.10±0.691 | 0.613; 0.540 | 0.04±0.241 | 3.756; **0.000**$^{***}$ |
| Male | 1,158 | 4.09±0.656 | | 4.09±0.702 | | 0.00±0.295 | |
| | | **Oils** | | | | | |
| Female | 1,379 | 2.97±1.064 | -0.373; 0.709 | 2.94±1.065 | -0.167; 0.867 | -0.03±0.252 | 0.873; 0.383 |
| Male | 1,158 | 2.99±1.078 | | 2.95±1.092 | | -0.04±0.249 | |
| | | **Bread Products** | | | | | |
| Female | 1,379 | 2.14±1.138 | -2.261; **0.024**$^{*}$ | 2.11±1.139 | -3.211; **0.001**$^{**}$ | -0.03±0.418 | -2.647; **0.008**$^{**}$ |
| Male | 1,158 | 2.25±1.152 | | 2.26±1.162 | | 0.01±0.414 | |

**Table 1.** Statistical analysis of the change in the frequency of food consumption by gender (Continuation)

| | | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (DP-PP) | |
|---|---|---|---|---|---|---|---|
| | | Mean±SD | t; p | Mean±SD | t; p | Mean±SD | t; p |
| **Vegetables & Fruits** | | | | | | | |
| Female | 1,379 | 4.54±0.576 | 0.002; 0.998 | 4.64±0.514 | 0.544; 0.586 | 0.10±0.425 | 0.754; 0.451 |
| Male | 1,158 | 4.54±0.625 | | 4.63±0.585 | | 0.08±0.352 | |
| **Legumes** | | | | | | | |
| Female | 1,379 | 4.19±0.631 | -1.509; 0.132 | 4.23±0.594 | -0.468; 0.640 | 0.04±0.296 | 2.365; **0.018*** |
| Male | 1,158 | 4.22±0.636 | | 4.24±0.615 | | 0.02±0.270 | |
| **3 White Foods** | | | | | | | |
| Female | 1,379 | 3.39±0.876 | 0.973; 0.331 | 3.35±0.894 | 0.833; 0.405 | -0.04±0.322 | -0.395; 0.693 |
| Male | 1,158 | 3.36±1.002 | | 3.32±1 | | -0.03±0.302 | |
| **Traditional Drinks** | | | | | | | |
| Female | 1,379 | 4.00±0.635 | 3.184; **0.001**** | 4.01±0.648 | 2.728; **0.006**** | 0.02±0.309 | -0.738; 0.461 |
| Male | 1,158 | 3.92±0.612 | | 3.94±0.656 | | 0.02±0.257 | |
| **Beverages** | | | | | | | |
| Female | 1,379 | 2.67±0.865 | -2.407; **0.016*** | 2.52±0.89 | -2.137; **0.033*** | -0.15±0.495 | 0.407; 0.684 |
| Male | 1,158 | 2.76±0.928 | | 2.60±0.94 | | -0.16±0.499 | |
| **Nutritional Supplements** | | | | | | | |
| Female | 1,379 | 1.62±0.787 | -2.866; **0.004**** | 1.71±0.887 | -1.892; 0.059 | 0.10±0.373 | 2.007; **0.045*** |
| Male | 1,158 | 1.71±0.914 | | 1.78±0.958 | | 0.07±0.303 | |
| **Total Score** | | | | | | | |
| Female | 1,379 | 3.05±0.342 | -3.580; **0.000***** | 3.05±0.365 | -2.590; **0.010*** | 0.00±0.140 | 2.242; **0.025*** |
| Male | 1,158 | 3.10±0.396 | | 3.09±0.408 | | -0.01±0.145 | |

**p<0.05.**p<0.01.***p<0.001. SD=Standard Deviation. PP=Pre-pandemic. DP=During the pandemic. t=Independent Sample T-test. p=Significance level. N=Population*

As seen in Table 1, no statistically significant difference was seen between men and women in terms of the consumption of meat products (p>0.05); however, a significant difference was found between the pre-and during the pandemic mean scores (p<0.05). Accordingly, the mean meat products consumption score of women was significantly lower than that of men.

For dairy and breakfast products and legumes, there was no statistically significant difference between men and women in terms of pre-and during the pandemic mean scores (p>0.05), while a significant difference was found according to the difference mean scores (p<0.05). The difference mean score of women in the consumption of dairy-breakfast products and legumes was significantly higher than that of men.

No statistically significant difference was detected between men and women according to the pre-and during the pandemic, and the difference mean scores in the consumption of oils, vegetables and fruits, and 3 white foods (p>0.05).

In the bread products, a significant difference was determined between men and women in terms of pre-and during the pandemic, and the difference mean scores (p<0.05). The mean scores of women in the consumption of bread products were found to be significantly lower than those of men.

According to the mean scores, although there was no statistically significant difference between men and women in the consumption of traditional drinks and beverages (p>0.05), a significant difference was seen between the pre-and during the pandemic mean scores (p<0.05). The mean scores of women in the consumption of traditional drinks

were significantly higher than those of men, but their mean scores in the consumption of beverages were significantly lower than those of men.

No statistically significant difference was found between men and women in terms of nutritional supplements during the pandemic ($p>0.05$), but a significant difference was seen between pre-pandemic difference scores ($p<0.05$). According to this result, while the mean score of women in the pre-pandemic consumption of dietary supplements was significantly lower than that of men, the difference mean score of women in the consumption of nutritional supplements was significantly higher than that of men.

It was seen that there was a statistically significant difference between women and men in terms of pre-and during the pandemic total score and the difference mean score ($p <0.05$). Accordingly, while the total pre-and during pandemic consumption mean scores of women before was significantly lower than those of men, the difference mean score of women in total consumption was significantly higher than that of men.

Results regarding the change in the frequency of food consumption according to marital status are shown in Table 2.

**Table 2.** Statistical analysis of the change in the frequency of food consumption according to marital status

| | | **Pre-Pandemic (PP)** | | **During the Pandemic (DP)** | | **Difference (DP-PP)** | |
|---|---|---|---|---|---|---|---|
| | | **Mean ±SD** | **t; p** | **Mean ±SD** | **t; p** | **Mean ±SD** | **t; p** |
| **Marital Status** | **N** | | | **Meat Products** | | | |
| Single | 1,494 | 3.20±0.619 | -14.407; | 3.09±0.657 | -13.441; | -0.11±0.354 | 0.047; |
| Married | 1,043 | 3.54±0.495 | **0.000**$^{***}$ | 3.43±0.539 | **0.000**$^{***}$ | -0.11±0.360 | 0.963 |
| | | | | **Dairy-Breakfast Products** | | | |
| Single | 1,494 | 4.00±0.678 | -6.251; | 4.02±0.694 | -6.218; | 0.02±0.288 | -0.364; |
| Married | 1,043 | 4.17±0.663 | **0.000**$^{***}$ | 4.20±0.687 | **0.000**$^{***}$ | 0.02±0.234 | 0.716 |
| | | | | **Oils** | | | |
| Single | 1,494 | 3.13±1.094 | 8.815; | 3.10±1.109 | 8.660; **0.000**$^{***}$ | -0.03±0.287 | -0.385; |
| Married | 1,043 | 2.76±0.995 | **0.000**$^{***}$ | 2.73±0.991 | | -0.03±0.186 | 0.700 |
| | | | | **Bread Products** | | | |
| Single | 1,494 | 2.10±1.141 | -4.540; | 2.10±1.146 | -4.212; | -0.01±0.421 | 0.834; |
| Married | 1,043 | 2.31±1.141 | **0.000**$^{***}$ | 2.29±1.150 | **0.000**$^{***}$ | -0.02±0.411 | 0.405 |
| | | | | **Vegetables & Fruits** | | | |
| Single | 1,494 | 4.49±0.637 | -6.014; | 4.59±0.577 | -5.464; | 0.10±0.432 | 1.537; |
| Married | 1,043 | 4.63±0.528 | **0.000**$^{***}$ | 4.71±0.492 | **0.000**$^{***}$ | 0.08±0.330 | 0.125 |
| | | | | **Legumes** | | | |
| Single | 1,494 | 4.18±0.681 | -2.126; | 4.22±0.667 | -2.023; **0.043**$^{*}$ | 0.03±0.272 | 0.442; |
| Married | 1,043 | 4.24±0.558 | **0.034**$^{*}$ | 4.27±0.499 | | 0.03±0.303 | 0.658 |
| | | | | **3 White Foods** | | | |
| Single | 1,494 | 3.42±0.943 | 2.677; | 3.38±0.959 | 2.323; **0.020**$^{*}$ | -0.04±0.339 | -0.995; |
| Married | 1,043 | 3.32±0.922 | **0.007**$^{**}$ | 3.29±0.919 | | -0.03±0.273 | 0.320 |
| | | | | **Traditional Drinks** | | | |
| Single | 1,494 | 3.93±0.648 | -2.999; | 3.93±0.682 | -4.301; | 0.00±0.282 | -3.227; |
| Married | 1,043 | 4.01±0.589 | **0.003**$^{**}$ | 4.05±0.600 | **0.000**$^{***}$ | 0.04±0.292 | **0.001**$^{**}$ |
| | | | | **Beverages** | | | |
| Single | 1,494 | 2.81±0.923 | 6.616; | 2.62±0.944 | 4.399; **0.000**$^{***}$ | -0.19±0.522 | -3.775; |
| Married | 1,043 | 2.57±0.835 | **0.000**$^{***}$ | 2.46±0.860 | | -0.11±0.453 | **0.000**$^{***}$ |
| | | | | **Nutritional Supplements** | | | |
| Single | 1,494 | 1.68±0.868 | 1.556; | 1.74±0.936 | -0.318; 0.750 | 0.06±0.303 | -4.720; |
| Married | 1,043 | 1.63±0.82 | 0.120 | 1.75±0.899 | | 0.12±0.390 | **0.000**$^{***}$ |
| | | | | **Total Score** | | | |
| Single | 1,494 | 3.05±0.391 | -2.936; | 3.04±0.408 | -4.280; | -0.01±0.137 | -3.974; |
| Married | 1,043 | 3.10±0.333 | **0.003**$^{**}$ | 3.11±0.347 | **0.000**$^{***}$ | 0.01±0.149 | **0.000**$^{***}$ |

**p<0.05.**p<0.01.***p<0.001. SD=Standard Deviation. PP=Pre-Pandemic. DP=During the Pandemic. t=Independent Sample T test. p=Significance Level. N=Population*

As seen in Table 2. no statistically significant difference was found between married and single participants according to their difference mean scores in the consumption of meat products, dairy-breakfast products, oils, bread products, vegetables and fruits, legumes, and 3 white foods ($p>0.05$). However, a significant difference was determined between pre-and during the pandemic mean scores in terms of meat products, dairy-breakfast products, oils, bread products, vegetable and fruit, legumes, and 3 white foods ($p<0.05$). This result shows us that the pre-and during the pandemic mean scores of single participants in the consumption of meat products. dairy and breakfast products. bread products, vegetables and fruits, and legumes were significantly lower than those of married people. The pre-and during the pandemic mean scores of singles in the consumption of oils and 3 white foods were found to be significantly higher than those of married ones.

A statistically significant difference was revealed between married and single participants according to their pre-and during the pandemic difference means scores for traditional drinks and beverages ($p<0.05$). For traditional drinks, pre-and during the pandemic consumption difference mean scores of singles were significantly lower than those of married people. As for beverages, the pre and during the pandemic mean consumption scores of singles were found to be significantly higher than those of married people.

For nutritional supplements, no statistically significant difference was found between married and single participants in terms of the pre-and during the pandemic mean scores ($p>0.05$). However, a significant difference was observed according to the difference mean scores ($p<0.05$). That is, the difference mean score of single participants in the consumption of nutritional supplements was significantly lower than that of married ones.

Considering the total score. a statistically significant difference was detected between married and single participants according to the pre-and during the pandemic and difference mean scores ($p<0.05$). According to this result. the total pre-and during the pandemic consumption mean scores of singles were significantly lower than those of married participants; however, it was seen that the total consumption of singles decreased during the pandemic although the difference mean scores in the total consumption of singles and married participants were the same.

The analysis results of the change in the frequency of food consumption by age group are shown in Table 3.

**Table 3.** The analysis of the change in the frequency of food consumption by age group

| | | **Pre-Pandemic (PP)** | | **During the Pandemic (DP)** | | **Difference (DP-PP)** | |
|---|---|---|---|---|---|---|---|
| | | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** |
| **Age** | **N** | **Meat Products** | | | | | |
| 1) 12-17 years | 380 | 3.18±0.608 | 72.001; **0.000**** | 3.06±0.619 | 55.094; **0.000**** | -0.11±0.370 | 1.204; 0.307 |
| 2) 18-30 years | 1,120 | 3.21±0.592 | | 3.12±0.625 | | -0.10±0.332 | |
| 3) 31-50 years | 795 | 3.55±0.535 | Difference; 1.2-3.4 | 3.43±0.609 | Difference; 1.2-3.4 | -0.13±0.391 | |
| 4) 51 years and over | 242 | 3.49±0.525 | | 3.39±0.560 | | -0.10±0.321 | |
| | | **Dairy-Breakfast Products** | | | | | |
| 1) 12-17 years | 380 | 3.98±0.685 | 9.060; **0.000**** | 3.98±0.683 | 11.107; **0.000**** | 0.00±0.334 | 1.864; 0.133 |
| 2) 18-30 years | 1,120 | 4.04±0.665 | | 4.06±0.686 | | 0.02±0.270 | |
| 3) 31-50 years | 795 | 4.17±0.663 | Difference; 1-3.4 | 4.20±0.692 | Difference; 1-3.4 | 0.03±0.241 | |
| 4) 51 years and over | 242 | 4.08±0.729 | | 4.12±0.733 | | 0.05±0.217 | |

**Table 3.** The analysis of the change in the frequency of food consumption by age group (Continuation)

| | | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (DP-PP) | |
|---|---|---|---|---|---|---|---|
| | | Mean±SD | F; p | Mean±SD | F; p | Mean±SD | F; p |
| **Oils** | | | | | | | |
| 1) 12-17 years | 380 | 3.14±1.082 | 45.052; **0.000**** | 3.10±1.129 | 43.823; **0.000**** | -0.03±0.295 | 1.214; 0.303 |
| 2) 18-30 years | 1,120 | 3.19±1.027 | | 3.16±1.033 | | -0.03±0.268 | |
| 3) 31-50 years | 795 | 2.69±1.051 | Difference; 1.2-3.4 | 2.67±1.047 | Difference; 1.2-3.4 | -0.02±0.193 | |
| 4) 51 years and over | 242 | 2.69±1.029 | | 2.63±1.022 | | -0.06±0.254 | |
| **Bread Products** | | | | | | | |
| 1) 12-17 years | 380 | 2.03±1.149 | 14.397; **0.000**** | 2.01±1.152 | 13.003; **0.000**** | -0.02±0.298 | 0.321; 0.810 |
| 2) 18-30 years | 1,120 | 2.08±1.103 | | 2.08±1.108 | | -0.01±0.378 | |
| 3) 31-50 years | 795 | 2.38±1.195 | Difference; 1.2-3.4 | 2.36±1.205 | Difference; 1.2-3.4 | -0.02±0.490 | |
| 4) 51 years and over | 242 | 2.31±1.070 | | 2.29±1.078 | | -0.02±0.482 | |
| **Vegetables and Fruits** | | | | | | | |
| 1) 12-17 years | 380 | 4.55±0.545 | 7.230; **0.000**** | 4.61±0.506 | 12.386; **0.000**** | 0.06±0.356 | 1.619; 0.183 |
| 2) 18-30 years | 1,120 | 4.49±0.641 | | 4.58±0.589 | | 0.09±0.405 | |
| 3) 31-50 years | 795 | 4.62±0.535 | | 4.73±0.451 | | 0.11±0.424 | |
| 4) 51 years and over | 242 | 4.56±0.651 | Difference; 2-3 | 4.65±0.649 | Difference; 3-1.2 | 0.08±0.266 | |
| **Legumes** | | | | | | | |
| 1) 12-17 years | 380 | 4.26±0.663 | 1.350; 0.256 | 4.27±0.67 | 1.013; 0.386 | 0.01±0.262 | 1.943; 0.121 |
| 2) 18-30 years | 1,120 | 4.2±0.614 | | 4.24±0.582 | | 0.05±0.254 | |
| 3) 31-50 years | 795 | 4.18±0.657 | | 4.21±0.62 | | 0.03±0.328 | |
| 4) 51 years and over | 242 | 4.2±0.594 | | 4.21±0.534 | | 0.02±0.302 | |
| **3 White Foods** | | | | | | | |
| 1) 12-17 years | 380 | 3.65±0.880 | 20.470; **0.000**** | 3.62±0.881 | 19.461; **0.000**** | -0.04±0.323 | 0.907; 0.437 |
| 2) 18-30 years | 1,120 | 3.41±0.914 | | 3.38±0.939 | | -0.04±0.332 | |
| 3) 31-50 years | 795 | 3.23±0.959 | Difference; 1.2-3.4 1-2 | 3.21±0.959 | Difference; 1.2-3.4 1-2 | -0.02±0.260 | |
| 4) 51 years and over | 242 | 3.23±0.929 | | 3.17±0.903 | | -0.06±0.365 | |
| **Traditional Drinks** | | | | | | | |
| 1) 12-17 years | 380 | 3.90±0.588 | 6.971; **0.000**** | 3.88±0.627 | 15.464; **0.000**** | -0.02±0.263 | 10.483; **0.000**** |
| 2) 18-30 years | 1,120 | 3.92±0.638 | | 3.92±0.667 | | 0.00±0.286 | |
| 3) 31-50 years | 795 | 4.03±0.618 | Difference; | 4.08±0.628 | Difference; | 0.05±0.273 | Difference; |
| 4) 51 years and over | 242 | 4.03±0.627 | 1.2-3.4 | 4.10±0.643 | 1.2-3.4 | 0.08±0.343 | 1.2-3.4 |
| **Beverages** | | | | | | | |
| 1) 12-17 years | 380 | 2.85±0.962 | 15.871; **0.000**** | 2.64±0.927 | 9.883; **0.000**** | -0.21±0.518 | 3.610; **0.013*** |
| 2) 18-30 years | 1,120 | 2.80±0.932 | | 2.63±0.960 | | -0.17±0.530 | |
| 3) 31-50 years | 795 | 2.59±0.804 | Difference; 1.2-3.4 | 2.47±0.861 | Difference; 1.2-3.4 | -0.11±0.439 | Difference; 1-3 |
| 4) 51 years and over | 242 | 2.52±0.815 | | 2.35±0.781 | | -0.16±0.472 | |
| **Nutritional Supplements** | | | | | | | |
| 1) 12-17 years | 380 | 1.76±0.935 | 2.552; 0.054 | 1.78±0.955 | 2.779; **0.040*** | 0.02±0.239 | 12.604; **0.000**** |
| 2) 18-30 years | 1,120 | 1.63±0.836 | | 1.69±0.885 | | 0.06±0.288 | |
| 3) 31-50 years | 795 | 1.67±0.830 | | 1.81±0.961 | Difference; 2-3 | 0.14±0.434 | Difference; 1.2-3.4 |
| 4) 51 years and over | 242 | 1.61±0.817 | | 1.72±0.880 | | 0.11±0.352 | |

**Table 3.** The analysis of the change in the frequency of food consumption by age group (Continuation)

| | | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (DP-PP) | |
|---|---|---|---|---|---|---|---|
| | | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** |
| **Total Score** | | | | | | | |
| 1) 12-17 years | 380 | 3.08±0.399 | 3.799; **0.010*** | 3.05±0.398 | 6.729; **0.000**** | -0.03±0.144 | 10.467; **0.000**** |
| 2) 18-30 years | 1,120 | 3.05±0.370 | | 3.04±0.389 | | -0.01±0.131 | |
| 3) 31-50 years | 795 | 3.10±0.354 | Difference; 2-3 | 3.12±0.376 | Difference; 3-1.2 | 0.01±0.154 | Difference; 1-2.3.4 |
| 4) 51 years and over | 242 | 3.05±0.356 | | 3.06±0.365 | | 0.00±0.142 | |

**p<0.05.**p<0.01.***p<0.001. SD=Standard Deviation. PP=Pre-Pandemic. DP=During the Pandemic. F = One-way Analysis of Variance (ANOVA). Difference = Tukey test. p = Significance Level. N= Population*

Table 3 presents no significant difference between the age groups for meat products, dairy-breakfast products, oils, bread products, vegetables and fruits, and 3 white foods according to the difference mean score (p>0.05). However, a statistically significant difference was determined in terms of pre-and during pandemic consumption mean scores (p<0.05). Based on this result, it was revealed that for the meat and bread products, those between the ages of 12-17 and 18-30 had significantly lower pre-and during the pandemic mean scores than those aged 31-50 and over 51. For dairy and breakfast products, the pre-and during the pandemic consumption mean score of those aged 12-17 was significantly lower than those aged 31-50 and over 51. For oils, those between the ages of 12-17 and 18-30 had significantly higher pre-and during the pandemic consumption scores than those aged 31-50 and over 51. In terms of vegetables and fruits, the pre-and during the pandemic consumption mean scores of those aged 18-30 were significantly lower than the average score of those in the 31-50 age group, and during the pandemic consumption mean score of those aged 31-50 were significantly higher than those aged 12-17 and 18-30. For 3 white foods, while pre-and during the pandemic consumption mean scores of those aged between 12-17 and 18-30 were significantly higher than those aged 31-50 and 51 years, those between the ages of 12-17 had significantly higher pre-and during pandemic mean scores than those aged 18-30.

For legumes, no statistically significant difference was found between the age groups according to the pre-and during the pandemic and difference mean scores (p>0.05).

A significant difference was found for traditional drinks and beverages by region according to the pre-and during the pandemic and difference mean scores (p<0.05). Accordingly, the mean scores of those aged between 12-17 and 18-30 in the consumption of traditional drinks were significantly lower than those of those aged 31-50 and over 51. On the other hand, while the pre-and during the pandemic mean scores of those between the ages of 12-17 and 18-30 in the consumption of beverages were significantly higher than those aged 31-50 and over 51. the difference mean score of those aged 12-17 in the consumption of beverages was significantly higher than the mean scores of those aged 31-50.

Between age groups, pre-pandemic mean scores for nutritional supplements did not show a significant difference (p>0.05). However, a statistically significant difference was seen according to during the pandemic and difference mean scores (p<0.05). While during the pandemic mean score of those aged 18-30 in the consumption of nutritional supplements was found to be significantly higher than that of those between the ages of 31-50, the difference mean scores of those aged between 12-17 and 18-30 in the consumption of nutritional supplements was significantly lower than those of aged 31-50 and over 51.

For the total score, a significant difference was found between the age groups according to the pre-and during the pandemic and difference mean scores ($p<0.05$). Accordingly, while the pre-pandemic total consumption mean score of those aged 18-30 was significantly lower than that of those between the ages of 31-50, during the pandemic mean consumption score of those aged 31-50 was significantly higher than that of those between the ages of 12-17 and 18-30; and the total difference mean score of those aged 12-17 was significantly higher than that of those aged 18-30, 31-50 and over 51.

The results regarding the change in the frequency of food consumption according to the education levels are shown in Table 4.

**Table 4.** Statistical analysis of change in frequency of food fonsumption by education level

| | | **Pre-Pandemic (PP)** | | **During the Pandemic (DP)** | | **Difference (DP-PP)** | |
|---|---|---|---|---|---|---|---|
| | | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** |
| **Education Level** | **N** | | **Meat Products** | | | | |
| 1) Primary/ education/ high school | 743 | 3.19±0.626 | | 3.08±0.632 | | -0.11±0.352 | |
| 2) Associate degree | 488 | 3.20±0.608 | 53.989; **0.000**$^{***}$ | 3.09±0.669 | 49.227; **0.000**$^{***}$ | -0.11±0.382 | 0.096; 0.962 |
| 3) Undergraduate degree | 945 | 3.44±0.516 | Difference; 1.2-3.4 3-4 | 3.33±0.562 | Difference; 1.2-3.4 3-4 | -0.11±0.336 | |
| 4) Post graduate degree | 361 | 3.57±0.577 | | 3.47±0.636 | | -0.10±0.382 | |
| | | | | **Dairy-Breakfast Products** | | | |
| 1) Primary/ education/ high school | 743 | 3.96±0.719 | | 3.94±0.738 | | -0.02±0.291 | |
| 2) Associate degree | 488 | 4.05±0.715 | 14.923; **0.000**$^{***}$ | 4.09±0.704 | 22.976; **0.000**$^{***}$ | 0.03±0.244 | 8.123; **0.000**$^{***}$ |
| 3) Undergraduate degree | 945 | 4.11±0.663 | Difference; 4-1.2.3 | 4.15±0.685 | Difference; 1-2.3.4 | 0.04±0.254 | Difference; 1-2.3.4 |
| 4) Post graduate degree | 361 | 4.23±0.509 | | 4.28±0.550 | | 0.05±0.274 | |
| | | | | **Oils** | | | |
| 1) Primary/ education/ high school | 743 | 3.14±1.021 | | 3.11±1.05 | | -0.02±0.243 | |
| 2) Associate degree | 488 | 3.21±1.085 | | 3.16±1.107 | | -0.06±0.347 | |
| 3) Undergraduate degree | 945 | 2.90±1.044 | 35.714; **0.000**$^{***}$ | 2.87±1.020 | 33.533; **0.000**$^{***}$ | -0.03±0.192 | 1.856; 0.135 |
| 4) Post graduate degree | 361 | 2.55±1.069 | | 2.52±1.098 | | -0.03±0.244 | |

**Table 4.** Statistical analysis of change in frequency of food fonsumption by education level (Continuation)

| | | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (DP-PP) | |
|---|---|---|---|---|---|---|---|
| | | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** | **Mean±SD** | **F; p** |
| **Bread Products** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 1.98±1.070 | | 1.97±1.066 | | -0.02±0.281 | |
| 2) Associate degree | 488 | 1.96±1.065 | 36.164; **0.000**$^{***}$ | 1.98±1.070 | 31.559; **0.000**$^{***}$ | 0.02±0.325 | 1.819; 0.142 |
| 3) Undergraduate degree | 945 | 2.31±1.178 | Difference; 1.2-3.4 3-4 | 2.29±1.200 | Difference; 1.2-3.4 3-4 | -0.02±0.532 | |
| 4) Post graduate degree | 361 | 2.62±1.153 | | 2.57±1.157 | | -0.05±0.415 | |
| **Vegetables& Fruits** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 4.50±0.652 | | 4.57±0.607 | | 0.07±0.361 | |
| 2) Associate degree | 488 | 4.56±0.558 | 3.651; **0.012**$^{*}$ | 4.66±0.482 | 5.785; **0.001**$^{**}$ | 0.09±0.298 | 1.198; 0.309 |
| 3) Undergraduate degree | 945 | 4.55±0.603 | Difference; 1-4 | 4.66±0.542 | Difference; 1-2.3.4 | 0.11±0.448 | |
| 4) Post graduate degree | 361 | 4.62±0.513 | | 4.70±0.499 | | 0.08±0.415 | |
| **Legumes** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 4.25±0.675 | | 4.28±0.671 | | 0.03±0.266 | |
| 2) Associate degree | 488 | 4.23±0.623 | 4.624; **0.003**$^{**}$ | 4.27±0.579 | 5.250; **0.001**$^{**}$ | 0.05±0.250 | 0.426; 0.734 |
| 3) Undergraduate degree | 945 | 4.19±0.623 | Difference; 4-1.2 | 4.22±0.581 | Difference; 1-4 | 0.03±0.328 | |
| 4) Post graduate degree | 361 | 4.11±0.573 | | 4.14±0.533 | | 0.03±0.243 | |
| **3 White Foods** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 3.51±0.910 | | 3.49±0.897 | | -0.01±0.267 | |
| 2) Associate degree | 488 | 3.40±0.919 | 8.980; **0.000**$^{***}$ | 3.34±0.955 | 10.434; **0.000**$^{***}$ | -0.05±0.316 | 3.209; 0.052 |
| 3) Undergraduate degree | 945 | 3.32±0.938 | Difference; 1-3.4 | 3.26±0.947 | Difference; 1-2.3.4 | -0.05±0.363 | |
| 4) Post graduate degree | 361 | 3.24±0.970 | | 3.22±0.976 | | -0.01±0.250 | |
| **Traditional Drinks** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 3.83±0.635 | | 3.84±0.655 | | 0.01±0.246 | |
| 2) Associate degree | 488 | 3.88±0.612 | 28.291; **0.000**$^{***}$ | 3.89±0.613 | 31.174; **0.000**$^{***}$ | 0.00±0.218 | 1.522; 0.207 |
| 3) Undergraduate degree | 945 | 4.05±0.618 | Difference; 1.2-3.4 | 4.08±0.650 | Difference 1.2-3.4 | 0.02±0.343 | |
| 4) Post graduate degree | 361 | 4.10±0.572 | | 4.15±0.621 | | 0.04±0.282 | |

**Table 4.** Statistical analysis of change in frequency of food fonsumption by education level (Continuation)

| | | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (DP-PP) | |
|---|---|---|---|---|---|---|---|
| | | Mean±SD | F; p | Mean±SD | F; p | Mean±SD | F; p |
| **Beverages** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 2.78±0.939 | | 2.58±0.924 | | -0.20±0.528 | |
| 2) Associate degree | 488 | 2.96±0.930 | 24.461; **0.000**$^{***}$ | 2.82±1.015 | 20.525; **0.000**$^{***}$ | -0.14±0.512 | 5.706; **0.001**$^{**}$ |
| 3) Undergraduate degree | 945 | 2.60±0.838 | Difference;1.2-3.4 1-2 | 2.44±0.830 | Difference 2-1.3.4 | -0.16±0.492 | Difference 4-1.3 |
| 4) Post graduate degree | 361 | 2.54±0.812 | | 2.46±0.887 | | -0.07±0.402 | |
| **Nutritional Supplements** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 1.68±0.896 | | 1.69±0.912 | | 0.01±0.228 | |
| 2) Associate degree | 488 | 1.69±0.854 | 5.389; **0.001**$^{**}$ | 1.74±0.897 | 6.949; **0.000**$^{***}$ | 0.05±0.255 | 26.417; **0.000**$^{***}$ |
| 3) Undergraduate degree | 945 | 1.58±0.780 | Difference;3-4 | 1.71±0.885 | Difference;; 4-1.2.3 | 0.13±0.430 | Difference; 1.2-3.4 |
| 4) Post graduate degree | 361 | 1.78±0.897 | | 1.95±1.032 | | 0.16±0.351 | |
| **Total Score** | | | | | | | |
| 1) Primary/ education/ high school | 743 | 3.04±0.399 | | 3.01±0.401 | | -0.03±0.124 | |
| 2) Associate degree | 488 | 3.07±0.354 | 7.395; **0.000**$^{***}$ | 3.06±0.377 | 16.052; **0.000**$^{***}$ | -0.01±0.122 | 16.811; **0.000**$^{***}$ |
| 3) Undergraduate degree | 945 | 3.07±0.355 | Difference;4-1.2.3 | 3.08±0.373 | Difference;; 4-1.2.3 | 0.01±0.160 | Difference; 1-2.3.4 |
| 4) Post graduate degree | 361 | 3.15±0.347 | | 3.17±0.373 | | 0.03±0.145 | |

**p<0.05.**p<0.01.***p<0.001. SD=Standard Deviation. PP=Pre-Pandemic. DP=During the Pandemic. F=One-way Analysis of Variance (ANOVA). Difference=Tukey test. p=Significance Level. N=Population*

Table 4 shows no statistically significant difference between the education levels and the difference mean score in the consumption of meat products, bread products, vegetables and fruits, legumes, 3 white foods, and traditional drinks (p>0.05). A statistically significant difference was found between the pre-and during the pandemic mean scores (p<0.05). Accordingly, while the pre-and during the pandemic mean scores of those who had a primary education/high school or an associate degree in the consumption of meat products and bread products were significantly lower than the scores of those who had an undergraduate or postgraduate degree, the pre-and during the pandemic mean scores of those with an associate degree in the consumption of meat and bread products were significantly lower than those with a postgraduate degree. For vegetables and fruits, while the pre-pandemic consumption mean score of primary education/high school graduates was significantly lower than that of those with a postgraduate degree, the during pandemic mean score of primary education/high school graduates in the consumption of vegetables and fruits was significantly lower than that of those with an associate, undergraduate, or postgraduate degree, In terms of legumes, while the pre-pandemic consumption mean score of those with a postgraduate degree was significantly lower than that of primary education/high school or associate degree graduates,

during the pandemic period mean score of primary education/high school graduates was significantly higher than that of those with a postgraduate degree. As for 3 white foods, while the pre-pandemic mean consumption score of primary/secondary/high school graduates was significantly higher than that of those with an undergraduate, or a postgraduate degree, during the pandemic consumption mean score of primary education/high school graduates was significantly higher than that of those with an associate, undergraduate or postgraduate degree, For traditional drinks, the pre-and during the pandemic period consumption mean score of those with primary education/high school or an associate degree was significantly lower than that of those with an undergraduate or postgraduate degree.

A significant difference was found between the age groups for dairy/breakfast products, beverages, and nutritional supplements according to the pre-and during the pandemic and difference mean scores ($p<0.05$). Based on this result, while the pre-pandemic mean score of those with a postgraduate degree in the consumption of dairy/breakfast products was significantly lower than that of primary education/high school, associate, or undergraduate graduates, during pandemic and difference mean scores of primary education/high school graduates in the consumption of dairy-breakfast products were significantly lower than those of having an associate, undergraduate or postgraduate degree. For beverages, while the pre-pandemic consumption mean scores of those with primary education/high school or an associate degree were significantly higher than those with an undergraduate or postgraduate degree, during pandemic consumption mean score of associate degree graduates was significantly higher than that of those with primary education/high school, undergraduate or postgraduate degree; the consumption difference mean score of those with a postgraduate degree was significantly lower than that of primary education/high school or undergraduate graduates. For nutritional supplements, while the pre-pandemic consumption mean score of those with an undergraduate degree was significantly lower than that of those with a postgraduate degree, the during pandemic consumption mean score of those with a postgraduate degree was significantly higher than that of with primary/secondary/ high school, undergraduate or postgraduate degrees. Besides, the consumption difference mean scores of primary/secondary/high school or associate degree graduates were significantly lower than the scores of those with undergraduate or postgraduate degrees.

In terms of the total score, it was determined that there was a significant difference according to the pre-and during the pandemic and difference mean scores depending on the educational level ($p<0.05$). According to this result, while the total pre-and during the pandemic consumption mean scores of postgraduate graduates were significantly higher than those of having primary education/high school, undergraduate or postgraduate degree, the total consumption difference mean score of those with primary education/high school degree was significantly lower than that of those with an associate, undergraduate, or postgraduate degree.

Results about the change in the frequency of food consumption according to the presence of chronic disease are shown in Table 5.

**Table 5.** Analysis of the change in the frequency of food consumption according to the presence of chronic disease

| The presence of a chronic disease | N | Pre-Pandemic (PP) | | During the Pandemic (DP) | | Difference (SS-SÖ) | |
|---|---|---|---|---|---|---|---|
| | | Mean±SD | t; p | Mean±SD | t; p | Mean±SD | t; p |
| | | **Meat Products** | | | | | |
| No | 2,033 | 3.35±0.582 | 0.998; 0.318 | 3.24±0.635 | 0.954; 0.340 | -0.11±0.347 | 0.029; 0.977 |
| Yes | 504 | 3.32±0.64 | | 3.21±0.624 | | -0.11±0.392 | |
| | | **Diary-Breakfast Products** | | | | | |
| No | 2,033 | 4.09±0.666 | 1.962; 0.050 | 4.10±0.692 | 0.949; 0.343 | 0.02±0.262 | -2.494; **0.013*** |
| Yes | 504 | 4.02±0.717 | | 4.07±0.714 | | 0.05±0.286 | |
| | | **Oils** | | | | | |
| No | 2,033 | 3.04±1.073 | 5.389; **0.000***** | 3.01±1.077 | 5.498; **0.000***** | -0.03±0.246 | 0.617; 0.537 |
| Yes | 504 | 2.75±1.028 | | 2.71±1.049 | | -0.04±0.267 | |
| | | **Bread Products** | | | | | |
| No | 2,033 | 2.17±1.158 | -1.543; 0.123 | 2.16±1.162 | -1.173; 0.241 | -0.01±0.424 | 1.001; 0.317 |
| Yes | 504 | 2.26±1.094 | | 2.23±1.108 | | -0.03±0.388 | |
| | | **Vegetables & Fruits** | | | | | |
| No | 2,033 | 4.55±0.594 | 1.009; 0.313 | 4.63±0.558 | -0.633; 0.527 | 0.08±0.389 | -2.421; **0.016*** |
| Yes | 504 | 4.52±0.617 | | 4.65±0.500 | | 0.13±0.409 | |
| | | **Legumes** | | | | | |
| No | 2,033 | 4.22±0.597 | 2.911; **0.004**** | 4.24±0.593 | -0.165; 0.869 | 0.01±0.240 | -6.876; **0.000***** |
| Yes | 504 | 4.13±0.761 | | 4.24±0.645 | | 0.11±0.411 | |
| | | **3 White Foods** | | | | | |
| No | 2,033 | 3.39±0.929 | 2.018; **0.044*** | 3.36±0.934 | 2.120; **0.034*** | -0.03±0.303 | 0.358; 0.721 |
| Yes | 504 | 3.30±0.960 | | 3.26±0.976 | | -0.04±0.354 | |
| | | **Traditional Drinks** | | | | | |
| No | 2,033 | 3.93±0.610 | -4.676; **0.000***** | 3.95±0.646 | -4.119; **0.000***** | 0.02±0.274 | 0.823; 0.411 |
| Yes | 504 | 4.08±0.674 | | 4.09±0.666 | | 0.01±0.333 | |
| | | **Beverages** | | | | | |
| No | 2,033 | 2.75±0.902 | 3.638; **0.000***** | 2.58±0.920 | 2.838; **0.005**** | -0.16±0.495 | -1.330; 0.184 |
| Yes | 504 | 2.58±0.857 | | 2.45±0.879 | | -0.13±0.502 | |
| | | **Nutritional Supplements** | | | | | |
| No | 2,033 | 1.66±0.867 | -0.753; 0.451 | 1.74±0.925 | -0.648; 0.517 | 0.08±0.310 | 0.126; 0.900 |
| Yes | 504 | 1.69±0.769 | | 1.77±0.902 | | 0.08±0.452 | |
| | | **Total Score** | | | | | |
| No | 2,033 | 3.08±0.368 | 1.675; 0.094 | 3.07±0.385 | 1.018; 0.309 | -0.01±0.130 | -1.581; 0.114 |
| Yes | 504 | 3.05±0.37 | | 3.05±0.387 | | 0.01±0.183 | |

**p<0.05.**p<0.01.***p<0.001. SD=Standard Deviation. PP=Pre-Pandemic. DP=During the Pandemic.*
*t = Independent Sample T-Test. p=Significance Level. N= Population*

Table 5 shows that as a result of the independent sample t-test, no statistically significant difference was found between those with and without chronic diseases for meat and bread products and nutritional supplements according to the pre-and during the pandemic and difference mean scores ($p>0.05$).

For dairy and breakfast products, vegetables and fruits, there was no significant difference between those with and without chronic diseases in terms of pre-and during the pandemic mean scores ($p>0.05$), but a significant difference was found according to the difference mean score ($p<0.05$). The difference mean score of those with

chronic diseases was significantly higher than the score of those without chronic disease in the consumption of milk-breakfast products, vegetables and fruits.

For the oils, 3 white foods, traditional drinks, and beverages, no statistically significant difference was found between those with and without chronic disease according to the difference mean score ($p > 0.05$). However, it was seen that there was a statistically significant difference according to the pre-and during the pandemic mean scores ($p<0.05$). According to this result, the mean score of those with chronic diseases in the consumption of oils, bread products, and beverages was significantly lower than the mean scores of those without chronic disease. For traditional drinks, the pre-and during the pandemic mean consumption score of those with chronic diseases was significantly higher than the score of those without chronic disease.

For legumes, no statistically significant difference was determined between those with and without chronic diseases according to the during pandemic mean score ($p>0.05$), but a there was significant difference according to the pre-pandemic and difference mean score ($p<0.05$). While the pre-pandemic mean score of those with chronic diseases in the consumption of legumes was significantly lower than that of those without chronic disease, the difference mean score of those with chronic disease was significantly higher than that of those without chronic disease.

In terms of total consumption, on the other hand, no significant difference was seen between those with and without chronic diseases in terms of pre-and during the pandemic and difference mean scores ($p>0.05$).

Since no study to our knowledge has examined the demographic characteristics and the frequency of food consumption in pre-and during the COVID-19 pandemic period, this part of the study has not been compared and discussed with the literature. All the data in Tables 1, 2, 3, 4, and 5 were evaluated within the framework of food groups and during the pandemic, a partial increase was seen in the consumption of dairy-breakfast products, legumes, and traditional drinks, and a significant increase in the consumption of vegetables, fruits, and nutritional supplements. On the other hand, a partial decrease was observed in the consumption of oils, bread products, and 3 white foods, and a significant decrease in the consumption of meat products and beverages.

The World Health Organization has listed healthy eating recommendations during the COVID-19 pandemic as follows: (1) fresh and unprocessed fruits, vegetables, whole grains, legumes, and animal-based foods in main meals, (2) raw vegetables and fruits foods rather than foods high in sugar, salt, and fat in snacks, (3) oils and foods rich in unsaturated fatty acids, and (4) 8-10 glasses of water per day, WHO also recommends avoiding caffeinated beverages with calorie-increasing foods such as salt, sugar, fat, and carbohydrates, and eating out (WHO, 2020c). The main meal Healthy Eating Plate specifically prepared by Turkey Dietetic Association for the COVID-19 pandemic period consists of a quarter of the vegetables, a quarter of whole grain products, and the other half including fruits, high protein foods, and dairy products (TDD, 2020).

**Conclusion and Recommendations**

There is no vaccine and medicine to prevent the pandemic caused by COVID-19, which affects the whole world. The most effective solutions to control the pandemic are lockdown, social isolation, having a strong immune system, and following hygiene rules. All these elements and the updated information shared about the disease naturally affect individuals economically, physiologically, sociologically, and psychologically and lead to changes in their eating

habits. 3017 people were included in this research in which we examined the changes in the frequency of food consumption between pre and during pandemic across Turkey based on sociodemographic characteristics. In the research, many statistically significant results were obtained between demographic characteristics and pre-and during pandemic food consumption frequencies. It is thought that the most important factor affecting the food consumption frequency of individuals is their desire to have a strong immune system during the pandemic. Compared to the pre-pandemic period, although there has been an increase in the consumption of dairy-breakfast products, vegetables and fruits, and nutritional supplements, the reduction in the consumption of bread products, salt, sugar, flour (3 white), and high-calorie beverages like coke, etc. is thought to be directly related to a dietary trend towards boosting the immune system. It is estimated that the reduction in consumption of meat products is related to the economic dimension of the pandemic, in which both food prices increased, and individuals suffered economic losses. Lockdown and social isolation are also thought to have an impact on change, In such special situations, individuals both encounter difficulties in accessing sufficient food and stay away from physical activities such as sports. An example of this is the increase in the consumption of nutritional supplements, because, in lockdown conditions, individuals also faced problems in terms of adequate/balanced nutrition and vitamins and minerals, including vitamin D synthesized due to sunlight. It is thought that the fact that individuals with chronic diseases tend to prefer nutritional supplements more than those without chronic diseases, and the pre-pandemic period is related to having a strong immune system and lockdown conditions. When all the findings are compared with the literature in terms of a healthy diet, it can be said that individuals show a positive trend in their nutrition during this period, especially women individuals with chronic diseases, individuals aged 30 and over, and those with high education have healthier eating behavior. The first pandemic in Turkey has been confirmed as an official on 11 March 2020. The possibility that the impact of the pandemic was not felt sufficiently at that time should be taken into account in interpreting the findings. Considering the conditions of the pandemic, a special action plan should be created by the state so that all individuals, especially chronic patients, pregnant women, the elderly, and children do not experience any problems in terms of adequate and balanced nutrition. For a strong immune system, training covering all segments of the society should be organized starting from today. Also, individuals should obtain support from nutrition experts. It would be beneficial to conduct scientific studies on which foods should be consumed, and how often and in what quantity they should be consumed for a strong immune system, considering the possibility of new pandemics in the future. According to the results to be obtained, priority should be given to the production of foods needed in this framework, starting from primary production in the general food sector. Systems should be developed to ensure the sustainability of the entire supply chain to minimize food supply-related problems during this period. Measures should be taken to ensure price stability in such processes.

**Declaration**

The contribution of all the authors of the article to the article process is equal. There is no conflict of interest to be declared by the authors. Ethics committee permission document required to collect data used in this research Recep Tayyip Erdogan University Rectorate Social and Human Sciences Ethics Committee 21.05.2020 date and 2020/34 was taken with the decision number.

## REFERENCES

Barazzoni, R., Bischoff, S.C., Krznaric, Z., Pirlich, M., & Singer, P. (2020). ESPEN expert statements and practical guidance for nutritional management of individuals with SARS-CoV-2 infection. *Clinical Nutrition, 39*(2020), 1631-1638.

*BBC News* (2020). https://www.bbc.com/turkce/haberler-dunya-55258396. (Erişim Tarihi: 01.02.2021).

Branley-Bell, D., & Talbot, C.V. (2020). Exploring the impact of the COVID-19 pandemic and UK lockdown on individuals with experience of eating disorders. *Journal of Eating Disorders*, *8*(1), 1-12.

Browning, M.H., Larson, L.R., Sharaievska, I., Rigolon, A., McAnirlin, O., Mullenbach, L., Cloutier, S., Vu, M.T., Thomsen, J., Reigner, N., Metcalf, C.E., D'Antonio, A., Helbich, M., Bratman, N.G., & Alvarez, H.O. (2021). Psychological impacts from COVID-19 among university students: Risk factors across seven states in the United States. *PloS one*, *16*(1), e0245327.

Caccialanza, R., Laviano, A., Lobascio, F., Montagna, E., Bruno, R., Ludovisi, S., & Iacona, I. (2020). Early nutritional supplementation in non-critically ill patients hospitalized for the 2019 novel coronavirus disease (COVID-19): rationale and feasibility of a ahared pragmatic protocol. *Nutrition, 74*(2020), 110835.

Clemente-Suárez, V.J., Dalamitros, A.A., Beltran-Velasco, A.I., Mielgo-Ayuso, J., & Tornero-Aguilera, J.F. (2020). Social and psychophysiological consequences of the COVID-19 pandemic: An extensive literature review. *Frontiers in Psychology*, *11*, 3077.

Cooper, M., Reilly, E.E., Siegel, J.A., Coniglio, K., Sadeh-Sharvit, S., Pisetsky, E.M., & Anderson, L.M. (2020). Eating disorders during the COVID-19 pandemic and quarantine: an overview of risks and recommendations for treatment and early intervention. *Eating Disorders*, 1-23.

Das, U.N. (2020). Can bioactive lipids inactivate coronavirus (COVID-19)?. *Archives of Medical Research, 51*(2020), 282-286.

Dhar, D., & Mohanty, A. (2020). Gut microbiota and Covid-19 possible link and implications. *Virus Research, 285*(2020), 198018.

Derbyshire, E., & Delange, J. (2020). COVID-19: Is there a role for immunonutrition, particularly in the Over 65s?. *BMJ Nutrition, Prevention & Health, bmjnph-2020 (0)*, 1-6.

Donthu, N., & Gustafsson, A. (2020). Effects of COVID-19 on business and research. *Journal of Business Research*, *117*, 284-289.

Eskici, G. (2020). Covid-19 pandemisi: Karantina için beslenme önerileri. *Anadolu Kliniği Tıp Bilimleri Dergisi, 25(Special Issue on COVID 19),* 124-129.

Grant, W.B., Lahore, H., McDonnell, S.L., Baggerly, C.A., French, C.B., Aliano, J.L., & Bhattoa, H.P. (2020). Evidence that vitamin D supplementation could reduce risk of influenza and COVID-19 infections and deaths. *Nutrients, 12*(4), 988.

Güler, H.I., Tatar, G., Yildiz, O., Belduz, A.O., & Kolayli, S. (2020). An investigation of ethanolic propolis extracts: their potential inhibitor properties against ACE-II receptors for COVID-19 treatment by molecular docking study. *ScienceOpen Preprints*.

Güneş, A.G.M, Demirer, A.G.B., & Şimşek, A.G.A. (2020). *COVID-19 özelinde immün sistemi güçlendirici beslenme ve fiziksel aktivite stratejileri* (Bölüm 3). COVID-19 Tedavi Belirleyicileri (Editör (Ed): Nilgün Ulutaşdemir). Ankara: İksad Yayınevi.

Holmes, E.A., O'Connor, R.C, Perry, V.H., Tracey, I., Wessely, S., Arseneault, L., & Ford, T. (2020). Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *The Lancet Psychiatry, 7(*2020), 547-560.

Hossain, M. (2020). The effect of the Covid-19 on sharing economy activities. *Journal of Cleaner Production*, *280*, 124782.

Huang, Z., Liu, Y., Qi, G., Brand, D., & Zheng, S.G. (2018). Role of vitamin A in the immune system. *Journal of Clinical Medicine, 7*(9), 258.

Kalaycı, Ş. (2014). *SPSS uygulamalı çok değişkenli istatistik teknikleri*. Ankara: Asil Yayın Dağıtım.

Mattioli, A.V., Sciomer, S., Cocchi, C., Maffei, S., & Gallina, S. (2020). Quarantine during COVID-19 outbreak: Changes in diet and physical activity increase the risk of cardiovascular disease. *Nutrition, Metabolism and Cardiovascular Diseases*, *30*(9), 1409-1417.

McKinsey & Company, 2020. *COVID-19 and European small and medium-size enterprises: How they are weathering the storm*. https://www.mckinsey.com/industries/public-and-social-sector/our-insights/covid-19-and-european-small-and-medium-size-enterprises-how-they-are-weathering-the-storm# (Erişim Tarihi: 01.02.2021).

Moynihan, A.B., Van Tilburg, W.A., Igou, E.R., Wisman, A., Donnelly, A.E., & Mulcaire, J.B. (2015). Eaten up by boredom: Consuming food to escape awareness of the bored self. *Frontiers in Psychology, 6*, 369.

Muscogiuri, G., Barrea, L., Savastano, S., & Colao, A. (2020). Nutritional recommendations for CoVID-19 quarantine. *European Journal of Clinical Nutrition, 74*, 850-851.

Prince, C. (2020). A comprehensive review of probiotics and their uses for control of viral infections in the wafe of pandemic COVID-19. *Tropical Journal of Pharmaceutical and Life Sciences, 7*(2), 01-14.

Rodríguez-Martín, B.C., Meule. A. (2015). Food craving: new contributions on its assessment, moderators, and consequences. *Frontiers in Psychology, 6*, 21.

Serin, Y., & Şanlıer, N. (2018). Duygusal yeme, besin alımını etkileyen faktörler ve temel hemşirelik yaklaşımları. *Psikiyatri Hemşireliği Dergisi, 9*(2), 135-146.

Shen, W., Long, L.M., Shih, C.H., & Ludy, M.J. (2020). A humanities-based explanation for the effects of emotional eating and perceived stress on food choice motives during the COVID-19 pandemic. *Nutrients*, *12*(9), 2712.

*TBR (Türkiye Beslenme Rehberi)* (2015). https://dosyasb.saglik.gov.tr/Eklenti/10915,tuber-turkiye-beslenme-rehberipdf.pdf. (Erişim Tarihi: 11.12.2020).

*TBSA (Türkiye Beslenme ve Sağlık Araştırması)* (2010). https://hsgm.saglik.gov.tr/depo/birimler/saglikli-beslenme-hareketli-hayat-db/Yayinlar/kitaplar/diger-kitaplar/TBSA-Beslenme-Yayini.pdf. (Erişim Tarihi: 11.12.2020).

TDD (Türkiye Diyetisyenler Derneği) (2020). *COVID-19 beslenme önerileri*. http://www.tdd.org.tr/index.php/duyurular/69-covid-19-beslenme-onerileri. (Erişim Tarihi: 03.12.2020).

van Strien, T., Cebolla, A., Etchemendy, E., Gutierrez-Maldonado, J., Ferrer-Garcia, M., Botella, C., & Baños, R. (2013). Emotional eating and food intake after sadness and joy. *Appetite, 66*, 20-25.

Wang, L.S., Wang, Y.R., Ye, D.W., & Liu, Q.Q. (2020). A review of the 2019 novel coronavirus (COVID-19) based on current evidence. *International Journal of Antimicrobial Agents, 55*(2020), 105948.

WHO (World Health Organizasyon). (2020a). *Coronavirus disease (COVID-19) pandemic*. https://www.who.int/emergencies/diseases/novel-coronavirus-2019. (Erişim Tarihi: 17.12.2020).

WHO (World Health Organizasyon). (2020b). *Food and nutrition tips during self-quarintine.* http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/technical-guidance/food-and-nutrition-tips-during-self-quarantine. (Erişim Tarihi: 07.12.2020).

WHO (World Health Organizasyon). (2020c). *Nutrition advice for adults during the COVID-19 outbreak*. http://www.emro.who.int/nutrition/nutrition-infocus/nutrition-advice-for-adults-during-the-covid-19-outbreak.html. (Erişim Tarihi: 01.12.2020).

Zhang, L., & Liu, Y. (2020). Potential interventions for novel coronavirus in China: A systemic review. *Journal of Medical Virology, 92*(5), 479-490.

Zvolensky, M.J., Garey, L., Rogers, A.H., Schmidt, N.B., Vujanovic, A.A., Storch, E.A., Buckner, D.J., Paulus, J.D., Alfano, C., Smits, J.A., & O'Cleirigh, C. (2020). Psychological, addictive, and health behavior implications of the COVID-19 pandemic. *Behaviour Research and Therapy*, *134*, 103715.