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Effects of Covid-19 Pandemic on Food Consumption Habits of Consumers (Example of the central district of Tokat province)

Esra Kaplan[1,a,*], Kaan Kaplan[1,b], Bilge Gözener[1,c]

[1]Department of Agricultural Economics, Faculty of Agriculture, Tokat Gaziosmanpasa University 60250 Tokat, Türkiye
*Corresponding author

A R T I C L E I N F O	A B S T R A C T
	Taking long-term threats on food supply and safety, effects of Covid-19 pandemic on nutritional habits of consumers were investigated in this study. Consumers living in Yeşilyurt district of Tokat province in 2021 constituted the primary material of the present study. Simple random sampling method was used in selection of the sample size and 162 people participated into face-to-face interviews. Changes in food consumption habits of consumers before and after the pandemic were investigated. Present findings revealed an increase in monthly food expenditures of consumers during the pandemic period. About 45% of the participating consumers stated that their nutrition levels were affected during the pandemic period. The variables that had the highest positive correlation with the nutritional effects after Covid-19 pandemic were identified as consumption of dietary supplements (vitamins, etc.) and medicinal-aromatic plants after the pandemic. Path analysis was applied to survey findings and the variables with the greatest direct effects on nutritional level of the consumers after Covid-19 pandemic were identified as change in winter preparations (88.88%), monthly fruit consumption (84.59%) and monthly meat consumption (83.44%).

[a] esra.gurel@gop.edu.tr   http://orcid.org/0000-0002-4423-7291   [b] kaan.kaplan@gop.edu.tr   https://orcid.org/0000-0002-5579-5707
[c] bilge.gozener@gop.edu.tr   http://orcid.org/0000-0001-9988-7120

Introduction

The Covid-19 pandemic, emerged in Wuhan, China in December 2019 and later spread to entire world and declared as a pandemic by the World Health Organization (WHO), affected the entire world in various aspects including health, employment, education, food, etc. Countries took various measures to overcome the pandemic and experienced various difficulties in health systems and economy. Besides such difficulties, a great effort has been spent on sustainability of food production and supply chain (Cappelli and Cini, 2020).

People need adequate and balanced nutrition to sustain their lives (Demircioğlu and Foreign, 2003). Nutrition is defined as the use of nutrients in the body by consuming nutrients that provide bioactive compounds and the nutrients required for growth and development, improvement and protection of health and improvement of life quality (TUBER, 2015).

It is possible to increase economic and social welfare in a healthy and productive society. From this point of view, it could be stated that adequate and balanced nutrition is quite a significant issue not only for development of the individual but also for development of the society. Therefore, nutrition has recently been the subject of several research (Özmen, 2007).

Nutrition is essential in preserving health before treating diseases. Importance of nutrition in prevention of many chronic diseases has recently been emphasized (Yılmaz and Özkan, 2007). Nutrition, which is always desired to be adequate and balanced (Saner, 2002), should also ensure the sustainability of growth and development (Erkan, 2011).

Number of meals, number of meals, meal preparation methods and techniques, cool and hot consumption of meals, nutrient consumption preferences in case of sadness or tiredness all designate nutritional or dietary habits of humans (Sürücüoğlu, 1999).

In a study conducted during the Covid-19 pandemic, it was determined that consumers preferred long-life foodstuffs (frozen, canned, etc.) to fresh foods, as well as more interested in healthy foods (Richards TJ, 2020) and

paid greater attention to nutritional values of foods (Shaikh, 2020). It is noteworthy that during the course of pandemic, consumers arranged their nutrition in an immune-boosting fashion (Shahidi, 2020).

This study was conducted to put forth consumptive preferences of consumers in Yeşilyurt district of Tokat province during the on-going pandemic and to determine socio-economic characteristics of the individuals participating in the survey. Path analysis was used to test the relationships between consumer nutritional behaviors and some consumptive habits.

Material and Method

Material

The data on food consumption habits during the Covid-19 pandemic, obtained through a face-to-face interview with consumers residing in Yeşilyurt central district of Tokat province, constituted the primary material of the present study. Number of consumers in the research region was taken into account while determining the number of interviews to be made. According to TUIK 2020 population data, Yeşilyurt central district has a population of 5649. Simple Random Sampling method was used at 99% confidence level and 10% margin of error and sample volume was calculated as

Method

Path analysis method developed by Sewall Wright in 1920 was used to put forth the direct and indirect effects of dependent and independent variables. The case of whether or not nutrition was affected during the Covid-19 Pandemic was selected as the dependent variable; gender, post-pandemic change in monthly meat consumption, monthly fish consumption, monthly milk consumption, monthly fruit consumption, winter preparation, first features sought in products for healthy nutrition, consumption of medicinal aromatic plants during the pandemic and nutritional supplement consumption during the pandemic were determined as independent variables. Each variable was coded in the study and according to this coding; did the Covid-19 pandemic affect nutrition (PEN), gender (G), post-pandemic change in monthly meat consumption (MEAT), post-pandemic change in monthly fish consumption (FISH), post-pandemic change in monthly milk (MILK), post-pandemic change in monthly fruit consumption (FRUIT), post-pandemic change in winter preparations (WINTER), first features sought in products for healthy nutrition (FEATURE), consumption of medicinal aromatic plants during the pandemic (PLANT) and nutritional supplement consumption during the pandemic (SUPPLE).

In regression analysis generated according to the least squares method, PEN was considered as the dependent variable and G, MEAT, FISH, MILK, FRUIT, WINTER, FEATURE, PLANT and SUPPLE were considered as independent variables. In path analysis, direct effect coefficients are expressed with standardized regression coefficients. The path coefficient (Pyxk) expressing the effect of an independent variable on the dependent variable is calculated with the use of Equation 1 (Mendes et al., 2015).

$$Pyx_k = b \frac{Sx_k}{S_y} \qquad (1)$$

Where;

Pxy; Is direct effect of independent variable on dependent variable, b is partial regression coefficient

Sx; Is standard deviation for trait X

Sy; Is standard deviation for trait Y.

$$x_k = \sqrt{\left[\sum (x_{kj} - \bar{x}_k)^2\right] \cdot \frac{1}{n}} = \left(\sqrt{\sum X_{kj^2} - \frac{(\sum x_{kj})^2}{n}}\right) \cdot \frac{1}{n} = \sqrt{S_{xx_k}} \qquad (2)$$

$$S_y = \sqrt{\sum (Y - \bar{Y})^2 \cdot \frac{1}{n}} = \sqrt{\left(\sum Y^2 - \frac{(\sum Y)^2}{n}\right) \cdot \frac{1}{n}} = \sqrt{S_{yy}} \qquad (3)$$

Excel software was used for frequency distribution and path analysis of the variables and SPSS software was used to calculate correlation coefficients between dependent and independent variables.

The equality of correlation coefficients between the path coefficient, indicating direct impact coefficient, (P_{21}) and two-variable coefficient could be explained by the following equation:

$$R_{12} = P_{21} \qquad (4)$$

According to Figure 2, for the direct impact of the first variable on the third variable (P_{31}), it was seen that the correlation between the variables was not equal as can be seen in Equation (4).

Such an inequality was attributed to indirect impacts between the variables besides direct impacts as can be seen in Figure 1. Therefore, the correlations coefficient between the first and third variables is obtained by adding direct and indirect impacts and explained in the following equation:

$$r_{13} = DE + IE = P_{31} + P_{21} \cdot P_{32} \qquad (5)$$

With the aid of the diagrams, the following series of equation composed of path and correlations coefficients is obtained. With the solution of these equations, direct and indirect impacts are estimated.

$$
\begin{aligned}
r_{y1} &= P_{y1} + r_{12}P_{y2} + r_{13}P_{y3} + r_{14}P_{y4} \\
r_{y2} &= P_{y2} + r_{12}P_{y1} + r_{23}P_{y3} + r_{24}P_{y4} \\
r_{y3} &= P_{y3} + r_{13}P_{y1} + r_{23}P_{y2} + r_{34}P_{y4} \\
r_{y4} &= P_{y4} + r_{14}P_{y1} + r_{24}P_{y2} + r_{34}P_{y4}
\end{aligned} \qquad (6)
$$

As can be seen in the equation, total correlation was split into direct and indirect impacts; P_{yi} indicates the path coefficient between i^{th} independent variable and Y dependent variable (direct impact), $r_{ij}P_{yi}$ indicates the impact of ith independent variable on Y dependent variable via j^{th} independent variable (indirect impact).

r_{yi} indicates the correlation coefficient between Y and i^{th} independent variable; r_{ij} indicates the correlation coefficient between the independent variables. Summation of direct and indirect impacts yields the correlation coefficient between Y and X_i. In each linear equation, there is only one direct impact and one-less of number of independent variables indirect impacts. Impact ratios are

the ratios of direct and indirect impacts between Y and X_i in total correlation. Initially simple correlation coefficients were determined, they were put into relevant places in Equation (6), equation system with four unknowns were solved and then path coefficients were obtained with the use of Equation (7).

$$
\begin{vmatrix} r & (X_1Y) \\ r & (X_2Y) \\ r & (X_3Y) \\ r & (X_4Y) \end{vmatrix} = \begin{vmatrix} 1 & r_{12} & r_{13} & r_{14} \\ r_{21} & 1 & r_{23} & r_{24} \\ r_{31} & r_{32} & 1 & r_{34} \\ r_{41} & r_{42} & r_{43} & 1 \end{vmatrix} \cdot \begin{vmatrix} P_{Y1} \\ P_{Y2} \\ P_{Y3} \\ P_{Y4} \end{vmatrix} \quad C = A * B^{-1}
$$
(7)

In Equation (7), the column vector composed of correlations between cause-and-effect variables (A) is multiplied by the inverse of correlation matrix between cause variables (B) yielding path coefficient vector (C) indicating direct impact quantities of cause variables. To get the matrix composed of direct and indirect impacts, matrix C is multiplied by matrix B.

Results and Discussion

Socio-Demographic Findings

Data on socio-demographic characteristics of consumers are provided in Table 1. In terms of age groups, majority of the consumers was in 17 – 30 years age group (56.17%) and ratio of consumers over the age of 61 was very low (3.09%). Of the participant consumers, 41.98% were university graduates. In terms of occupation, consumers were mostly homemaker, student, civil servants and private sector employees. About 62.92% of the families consist of 4-7 individuals and 57.41% of families had a monthly household income of 4 501 TL and above.

Pre-pandemic monthly food expenditures of the survey participants are provided in Table 2. Of the participant consumers, 62.35% had monthly food expenditures of between 501 - 1500 TL. The average monthly food expenditure of the consumers before the pandemic was 1042.46 TL. Post-pandemic monthly food expenditures of the survey participants are given in Table 3.3. Accordingly, while the ratio of consumers with monthly food expenditures of between 501 -1500 TL was 56.17%, the ratio of consumers with monthly food expenditures of between 1501 - 2500 TL increased to 25.31%. The average monthly food expenditure of consumers after the pandemic was 1357.28 TL. It can be stated that the pandemic process has resulted in an increase in the monthly food expenditures of the consumers.

The distribution of products that consumers have increased their consumption during the Covid-19 pandemic is given in Table 4. Accordingly, consumers mainly increased their consumption of fruit, vegetables, meat and bakery. While fruit consumption increased by 20.09%, vegetable consumption increased by 17.57% and meat consumption increased by 13.24%.

Meat preference of the participant consumers is provided in Table 5. Accordingly, while 40.30% of the consumers preferred to consume red meat more, 50.74% preferred poultry meat and 8.95% preferred fish more.

Meat consumption preference of the participant consumers during Covid-19 pandemic is provided in Table 6. Accordingly, while 66.67% of the participant consumers preferred to consume fresh meat, 33.33% preferred to consume frozen meat.
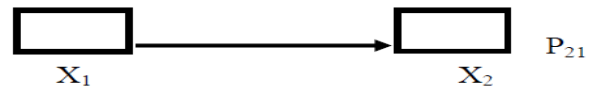

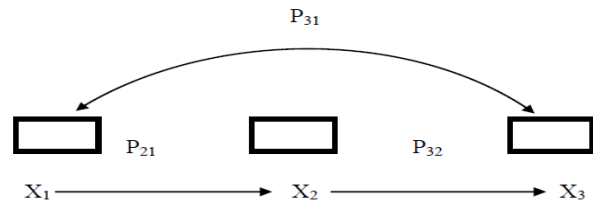Figure 1. Path diagram for variables of direct effect

Figure 2. Path diagram for variables of indirect effect

Monthly meat expenditure of participant consumers was mostly between 151-300 TL (41.98%). Of the participant consumers, 41.98% had monthly meat expenditures of between 151-300 TL and 32.10% had monthly meat expenditures of between 0-150 TL. The average monthly meat expenditure was calculated as 260.40 TL.

Consumer preference of dairy products is provided in Table 8. Participant consumers predominantly preferred to consume yoghurt. While preference ratios for milk, cheese and butter were close to each other, preference ratio of kefir was quite low (1.89%).

Change in dairy product consumption of the participant consumers after Covid-19 pandemic is provided in Table 9. There was no significant change in dairy product consumption and consumers mainly continued their pre-pandemic milk consumption. Of the participant consumers, 17.28% stated that their milk consumption changed and increased by 11.75 kg on average; 7.41% stated that their cheese consumption changes and increased by 1.81 kg on average; 8.64% stated that their butter consumption changed and increased by 1.94 kg on average; 5.56% stated that their kefir consumption changed and increased by 5.5 kg on average. The highest change occurred in yoghurt consumption, 21.60% stated that their yoğurt consumption changed and increased by 10.45 kg on average.

As can be inferred from Table 10, during the pandemic period, 90.74% of the consumers preferred to consume fresh dairy products and 9.26% preferred frozen products.

Monthly dairy product expenditures of the consumers are provided in Table 11. Accordingly, 50.00% of consumers had monthly dairy product expenditures of between 0 - 150 TL and 37.65% had between 151 - 300 TL. Monthly average dairy product expenditure was calculated as 189.80 TL. In addition, 3.09% of consumers supplied dairy products from their villages.

Fruit and vegetable consumption preference of the consumers during the pandemic period is provided in Table 12. Accordingly, 98.15% of the consumers preferred to consume fresh products and only 1.85% preferred frozen products.

As can be inferred from Table 13, 58.64% of the consumers paid attention to organic nature of the foodstuffs and 41.6% stated that they didn't pay attention to organic nature of the foodstuffs.

Increase in consumption of season-fruit and vegetables during the pandemic is provided in Table 14. Of the participant consumers, 70.37% increased their season-fruit and vegetable consumptions and 29.63% did not.

Table 1. Socio–Demographic Characteristics of Participant Consumers

		Frequency	Percentage (%)
Age Groups	17-30	91	56.17
	31-45	46	28.40
	46-60	20	12.35
	61+	5	3.09
Educational Level	Primary School	16	9.88
	Secondary School	26	16.05
	High School	43	26.54
	University	68	41.98
	Graduate	4	2.47
	Literate	4	2.47
	Illiterate	1	0.62
Occupation	Artisan	16	9.90
	Civil Servant	24	14.80
	Private Sector	21	13.00
	Worker	13	8.00
	Retired	4	2.50
	Homemaker	43	26.50
	Self-Employed	7	4.30
	Student	21	13.00
	Other	13	8.00
Number of household members	1-3 people	59	36.42
	4-7 people	102	62.96
	≥ 8 people	1	0.62
Number of employed household members	1-2 people	138	85.20
	3-4 people	13	8.00
	None	11	6.80
Monthly household income	501-1500 TL	2	1.23
	1501-2500 TL	11	6.79
	2501-3500 TL	29	17.90
	3501-4500 TL	27	16.67
	≥ 4501 TL	93	57.41

Table 2. Pre-Pandemic Food Expenditures (TL)

Pre-Pandemic Monthly Food Expenditures	Frequency	%
100-500 TL	37	22.84
501-1500 TL	101	62.35
1501-2500 TL	22	13.58
2501-3500 TL	2	1.23
Total	162	100.00

Table 3. Post-Pandemic Food Expenditures (TL)

Post-Pandemic Monthly Food Expenditures	Frequency	%
100-500 TL	20	12.35
501-1500 TL	91	56.17
1501-2500 TL	41	25.31
2501-3500 TL	6	3.70
≥ 3501 TL	4	2.47
Total	162	100.00

Table 4. Foodstuffs with Inreased Consumption during Covid-19 Pandemic

Foods	Frequency	%
Meat	58	13.24
Milk	39	8.90
Vegetable	77	17.57
Fruit	88	20.09
Bakery	63	14.38
Sweet	43	9.81
Spice	6	1.36
Appetizers	64	14.61
Total	438	100.00

Table 5. Consumer preference of meat products

Meats	Frequency	%
Red meat	81	40.30
Poultry	102	50.74
Fish	18	8.95
Total	201	100.00

More than one option was selected.

Table 6. Meat consumption preference of the consumers during Covid-19 pandemic

Consumption Preference	Frequency	%
Fresh	108	66.67
Frozen	54	33.33
Total	162	100.00

Table 7. Monthly meat expenditure of participant consumers (TL)

Monthly meat expenditures (TL)	Frequency	%
0-150 TL	52	32.10
151-300 TL	68	41.98
301-450 TL	21	12.96
451-600 TL	16	9.88
≥ 601 TL	5	3.09
Total	162	100.00

Table 8. Consumer preference of dairy products

Dairy Products	Frequency	%
Milk	47	17.80
Cheese	56	21.21
Yogurt	116	43.94
Butter	40	15.15
Kefir	5	1.89
Total	264	100.00

More than one option was selected.

Table 9. Change in monthly dairy product consumptions

		Frequency	%
Change in monthly milk consumption	Yes	28	17.28
	No	134	82.72
If yes, the quantity	5 kg	8	28.60
	6-7 kg	6	21.40
	10-15 kg	8	28.60
	≥ 20 kg	6	21.40
		Frequency	%
Change in monthly cheese consumption	Yes	12	7.41
	No	150	92.59
If yes, the quantity	500 gr	1	8.30
	1-1,5 kg	2	16.70
	2 kg	9	75.00
		Frequency	%
Change in monthly yoghurt consumption	Yes	35	21.60
	No	127	78.40
If yes, the quantity	1-5 kg	17	48.60
	6-10 kg	5	14.30
	≥ 11 kg	13	37.10
		Frequency	%
Change in monthly butter consumption	Yes	14	8.64
	No	148	91.36
If yes, the quantity	500 gr	2	14.30
	1-2 kg	10	71.40
	≥ 3 kg	2	14.30
		Frequency	%
Change in monthly kefir consumption	Yes	9	5.56
	No	153	94.44
If yes, the quantity	1-5 kg	6	66.70
	≥ 6 kg	3	33.30

Table 10. Dairy product consumption preference of the consumers during Covid-19 pandemic

Consumption Preference	Frequency	%
Fresh	147	90.74
Frozen	15	9.26
Total	162	100.00

Table 11 Monthly dairy product expenditures of the consumers (TL)

Monthly dairy product expenditures	Frequency	%
0-150 TL	81	50.00
151-300 TL	61	37.65
301-450 TL	10	6.17
451-600 TL	4	2.47
$\geq$ 601 TL	1	0.62
Supplied from village	5	3.09
Total	162	100.00

Table 12 Fruit and vegetable consumption preference of the consumers during Covid-19 pandemic

Consumption Preference	Frequency	%
Fresh	159	98.15
Frozen	3	1.85
Total	162	100.00

Table 13. Consumer attention paid to organic nature of foodstuffs during Covid-19 pandemic

Pay attention to organic nature of foodstuffs	Frequency	%
Yes	95	58.64
No	67	41.36
Total	162	100.00

Table 14. Increase in consumption of season-fruit and vegetables during Covid-19 pandemic

Preference of season-fruit and vegetables	Frequency	%
Yes	114	70.37
No	48	29.63
Total	162	100.00

Table 15. Change in monthly fruit-vegetable consumption during the pandemic

		Frequency	%
Change in monthly fruit-vegetable consumption	Yes	48	29.63
	No	114	70.37
If yes, the quantity	1-5 kg	16	33.30
	6-10 kg	13	27.10
	$\geq$ 11 kg	19	39.60

Table 16. Monthly expenditures for fruit and vegetables (TL)

Monthly expenditures for fruit and vegetables	Frequency	%
0-150 TL	20	12.35
151-300 TL	64	39.51
301-450 TL	43	26.54
451-600 TL	30	18.52
$\geq$ 601 TL	5	3.08
Total	162	100.00

Table 17. Change in monthly sweet and dessert consumption of the consumers

		Frequency	%
Change in monthly sweet and dessert consumption	Yes	43	26.54
	No	119	73.46
If yes, the quantity	500 gr	8	18.60
	1-3 kg	22	51.20
	$\geq$ 4 kg	11	25.60
	Decreased 1 kg	2	4.70

Table 18. Change in monthly spice and seasoning consumption of the consumers

Change in monthly spice and seasoning consumption		Frequency	%
	Yes	7	4.32
	No	155	95.68
If yes, the quantity	250-500 gr	3	42.90
	1 kg	4	57.10

Table 19. Change in monthly snack and appetizer consumptions

Change in monthly snack and appetizer consumption		Frequency	%
	Yes	55	33.95
	No	107	66.05
If yes, the quantity	500 gr	4	7.30
	1-5 kg	33	60.00
	≥ 6 kg	18	32.70

Table 20. Consumer preference of frozen-canned food consumption

Preference of frozen-canned food consumption	Frequency	%
Yes	30	18.50
No	132	81.50
Total	162	100.00

Table 21. Consumer preference of making their breads at home

	Frequency	%
Yes	49	30.25
Sometimes	49	30.25
No	64	39.51
Total	162	100,00

Table 22. Economical effects of nutritional expenditures on expenditure capacity of the consumers during Covid-19 pandemic

	Frequency	%
Yes	87	53.70
Sometimes	46	28.40
No	29	17.90
Total	162	100.00

Table 23. Pre-pandemic food purchase preference of the consumers

Pre-pandemic food purchase preference	Frequency	%
Supermarkets	55	25.58
Local markets	88	40.93
Convenience stores	20	9.30
Public bazaars	52	24.19
Total	215	100.00

More than one option was selected.

Table 24. Post-pandemic food purchase preference of the consumers

Post-pandemic food purchase preference	Frequency	%
Supermarkets	56	26.42
Local markets	85	40.09
Convenience stores	25	11.79
Public bazaars	46	21.70
Total	212	100.00

Table 25. Consumer attitudes toward the nutritional recommendations mentioned in media/social media

	Frequency	%
Yes	69	42.59
No	93	57.41
Total	162	100.00

Table 26. Purpose of using nutritional supplements

Purpose of using nutrient supplements	Frequency	%
Boost the immune system	30	48.39
Protection from Covid-19 pandemic and diseases	14	22.58
Better health	13	20.97
Since not benefited from sunlight	2	3.23
Other	3	4.84
Total	62	100.00

Table 27. Descriptive statistics of the variables

	Female	Male	Yes	No	Sometimes	Increased	Not changed	Decreased
Pen			45.06	22.84	32.10			
G	66.67	33.33						
Meat			18.52	81.48				
Fish			19.75	80.25				
Milk			17.28	82.72				
Fruit			40.12	59.88				
Winter						37.04	60.49	2.47
Feature			41.98					
Plant			34.00	39.50	26.50			
Supple			38.27	61.73				

Table 28. Standardized regression analysis results

Parameters	G	Meat	Fish	Milk	Fruit	Winter	Feature	Plant	Supple
Coefficients (b_1)	0.140	0.241	-0.032	-0.126	0.182	0.152	0.166	0.110	0.134
Significance Levels (P)	0.075	0.003	0.677	0.128	0.026	0.042	0.027	0.204	0.109
VIF	1.191	1.230	1.136	1.324	1.281	1.087	1.071	1.455	1.348

Table 29. Pearson correlation coefficient between the variables

Variables	Pen	G	Meat	Fish	Milk	Fruit	Winter	Feature	Plant
G	0.198*								
Meat	0.207**	-0.034							
Fish	0.096	0.088	0.282**						
Milk	0.078	0.046	0.328**	0.101					
Fruit	0.215**	-0.062	0.128	0.132	0.392**				
Winter	0.171*	0.042	0.019	-0.002	0.103	0.181*			
Feature	0.215**	0.146	0.022	0.026	0.073	-0.001	-0.067		
Plant	0.218**	0.352**	-0.062	0.105	0.068	0.083	-0.108	0.174*	
Supple	0.260**	0.126	-0.016	0.152	0.110	0.210**	0.086	0.189*	0.437**

Table 30. Direct and indirect effect coefficients of the variables

Variables	Indirect Effects									TIE	Direct Effect	CC
	G	Meat	Fish	Milk	Fruit	Winter	Feature	Plant	Supple			
G		-0.0082	-0.0028	-0.0058	-0.0113	0.0064	0.0242	0.0387	0.0169	0.058	0.140	0.198
Meat	-0.0048		-0.0090	-0.0413	0.0233	0.0029	0.0037	-0.0068	-0.0021	-0.034	0.241	0.207
Fish	0.0123	0.0680		-0.0127	0.0240	-0.0003	0.0043	0.0116	0.0204	0.128	-0.032	0.096
Milk	0.0064	0.0790	-0.0032		0.0713	0.0157	0.0121	0.0075	0.0147	0.204	-0.126	0.078
Fruit	-0.0087	0.0308	-0.0042	-0.0494		0.0275	-0.0002	0.0091	0.0281	0.033	0.182	0.215
Winter	0.0059	0.0046	0.0001	-0.0130	0.0329		-0.0111	-0.0119	0.0115	0.019	0.152	0.171
Feature	0.0204	0.0053	-0.0008	-0.0092	-0.0002	-0.0102		0.0191	0.0253	0.050	0.166	0.216
Plant	0.0493	-0.0149	-0.0034	-0.0086	0.0151	-0.0164	0.0289		0.0586	0.109	0.110	0.219
Supple	0.0176	-0.0039	-0.0049	-0.0139	0.0382	0.0131	0.0314	0.0481		0.126	0.134	0.260

TIE: Total Indirect Effect. CC: Correlation Coefficient

Monthly expenditures of the consumers for fruit and vegetables are provided in Table 16. Accordingly, more than half of the consumers had a monthly expenditure of between 151 – 450 TL for fruit and vegetables. Average monthly expenditure for fruit and vegetables was calculated as 340.99 TL.

Change in monthly sweet and dessert consumption of the participant consumers during the pandemic is provided in Table 17. Accordingly, 73.46% of the consumers stated that there was no change in their sweet and dessert consumption. However, 26.54% stated that there was a change in sweet and dessert consumption and 51.20% had an increase of between 1 - 3 kg. In addition, while some of the consumers increased their sweet and dessert consumptions by 2.23 kg on average, some of them decreased by an average of 1 kg.

Table 31. Indirect and direct effect ratios of the variables

Variables	Correlation Coefficient	Indirect Effect		Direct Effect	
		Coefficient	(%)	Coefficient	(%)
G	0.198	0.058	29.34	0.140	70.66
Meat	0.207	-0.034	16.56	0.241	83.44
Fish	0.096	0.128	66.50	-0.032	33.50
Milk	0.078	0.204	61.82	-0.126	38.18
Fruit	0.215	0.033	15.41	0.182	84.59
Winter	0.171	0.019	11.12	0.152	88.88
Feature	0.216	0.050	23.08	0.166	76.92
Plant	0.219	0.109	49.67	0.110	50.33
Supple	0.260	0.126	48.42	0.134	51.58

Change in monthly spice and seasoning consumptions of the participant consumers is provided in Table 18 and 95.68% of the participants stated that there was no change in their monthly spice and seasoning consumptions. There was an average increase of 0.75 kg.

Monthly snack and appetizer consumptions of the participant consumers are provided in Table 19. Accordingly, while there was a change in snack and appetizer consumptions in 33.95% of the consumers, there was no change in 66.05% of them. Consumers increased their monthly snack and appetizer consumptions by 5.10 kg on average. For increased consumptions, 7.30% had an increase of 500g, 60.00% had increases of between 1 - 5 kg and 32.70% had an increase of over 6 kg. Restrictions and full-closures during the pandemic might have increased snack and appetizer consumptions.

Table 20 shows the attitudes of consumers towards whether or not to consume more frozen-canned food during the pandemic. While 18.50% of consumers started to consume more frozen-canned food, 81.50% did not change their consumption habits.

In terms of consumer attitudes of making their breads at home, the ratios of those who make bread at home, those who make it at home occasionally, and those who do not make it at all, were very close to each other (Table 3.21).

In terms of the effects of nutritional expenditures on expenditure capacity of the consumers during Covid-19 pandemic, 53.70% stated that nutritional expenditures affected their expenditure capacity, 28.40% stated that nutritional expenditures occasionally affected their expenditure capacity and 17.90% were not affected economically (Table 22). It can be said nutrition expenditures economically affected expenditure capacity of the consumers.

As can be inferred from Table 23, before the pandemic, 25.58% of the consumers preferred supermarkets for food purchases, 40.93% preferred local markets, 9.30% preferred convenience stores and 24.19% preferred public bazaars. Similar preferences were also seen in post-pandemic period. Accordingly, it can be stated that pandemic did not much affected consumer preference of place for food purchases.

Consumer considerations of the nutritional recommendations mentioned in the social media in this process are provided in Table 25. Accordingly, although the ratio of consumers who take and do not take into account was close to each other, the ratio of consumers who do not take into account was higher.

The purpose of using nutrient supplements is provided in Table 26. Accordingly, 48.39% use nutritional supplements to boost the immune system, 22.58% for protection from Covid-19 pandemic and diseases, 20.97% for better health, 3.23% used such supplements since they were not able to benefit from sunlight and 4.84% used for other purposes.

Select Variables in Path Analysis with Statistics

Of the participant consumers, 66.67% were female and 33.33% were male; 45% of the consumers stated that their nutrition level was affected during the pandemic, 22.84% were not affected and 32.10% were sometimes affected. For change in monthly meat consumption, 18.52% said "yes" and 81.48% said "no". For change in monthly fish consumption, 19.75% said "yes" and 80.52% said "no". For change in monthly dairy product consumption, 17.28% said "yes" and 82.72% said "no". Therefore, it could be stated that meat, fish and milk consumptions of the consumers did not change to a large extent during the pandemic. However, for change in monthly fruit consumption, 40.12% said "yes" and 59.88% said "no". Accordingly, it could be stated that consumers tend to fruits for vitamin supplementation during the pandemic period. The ratio of consumers who stated that their winter preparations did not change was 60.49% and the ratio of those who stated that it changed was 37.04%. During the pandemic, 34% of consumers stated that their medicinal and aromatic plant consumptions changed, 39.50% stated that it did not change and 26.50% sometimes changed.

According to the results of Pearson correlation analysis, there was a positive relationship between post-pandemic nutritional effects and all the other variables. The variables that had the highest positive correlations with the nutritional effects of Covid-19 pandemic were consumption of food supplements (vitamins, etc.) and medicinal and aromatic plants.

Standardized partial regression coefficients, significance levels and VIF values of the coefficients are provided in Table 29. The standardized multiple linear regression equation, in which post-Covid-19 nutritional habits were estimated, was estimated as "Y= 0.140 G + 0.241 MEAT -0.032 FISH -0.126 MILK +0.1825 FRUIT + 0.152 WINTER + 0.166 FEATURE + 0.110 PLANT + 0.134 SUPPLE". Since the coefficients are standardized in the equation, the constant number becomes zero. The partial regression coefficients (b1) in the equation represent the direct effects of each variable on the outcome variable.

Present findings revealed that Covid-19 pandemic had a positive effect on nutritional habits of the consumers. However, the indirect effect of monthly meat consumption change after the pandemic was negative. In addition, the direct effect of monthly fish consumption changes and monthly milk consumption change was also negative. It can be stated that there was no significant change in monthly meat, fish and milk consumption of consumers during the Covid-19 pandemic. While the direct effect of the monthly meat consumption change on consumer diet was 83.44% and the indirect effect was 16.56%. Of this indirect effect, 43.98% was coming from monthly milk consumption change and 24.81% from monthly fruit consumption change. While the direct effect of monthly fish consumption change on nutritional habits after Covid-19 pandemic was 33.50%, the indirect effect was 66.50%, of which 43.98% coming from monthly milk consumption change and 24.81% from monthly fruit consumption change. While the direct effect of monthly milk consumption change was 38.18% and the indirect effect was 61.82%, of which 37.64% coming from monthly fish consumption change and 33.97% from monthly fruit consumption change. While the direct effect of monthly fruit consumption change on nutritional habit after Covid-19 pandemic was 84.59%, the indirect effect was 15.41%, of which 31.27% coming from monthly milk consumption change, 19.49% from monthly meat consumption change and 17.78% from nutrient supplements taken after pandemic. Monthly food product changes indirectly affect each other in post-Covid-19 nutritional habits. While the direct effect of the winter preparation change on the post-Covid-19 nutritional habits was 88.88%, the indirect effect was 11.12%, of which 36.15% coming from monthly fruit consumption change. While the direct effect of medicinal-aromatic plant consumption was 50.33%, the indirect effect was 49.67%, of which 30.02% coming from nutritional supplements and 25.26% from gender differences. It can be said that women give more priority to the consumption of medicinal plants during the pandemic process. While the direct effect of nutrient supplements was 51.58%, the indirect effect was 48.42%, of which 28.22% coming from medicinal plant consumption and 22.33% from monthly fruit consumption change.

Conclusion

About half of the consumers stated that their nutritional levels were affected during the pandemic period. While the average monthly food expenditure of the consumers was 1042.46 TL before the pandemic, it increased to 1357.28 TL after the pandemic. It was also seen that consumers paid more attention to food products they consume during and after the pandemic and they usually preferred to consume fresh and season-fruit and vegetables.

Consumers increased their monthly snack and appetizer consumptions by 5.10 kg on average. It can be said that snack and appetizer consumptions increase more than the other products since the household members stayed at home during the restrictions in pandemic period.

During the pandemic period, consumers started to use nutritional supplements and almost half stated that they used nutrient supplements to boost their immune systems and the other half stated that they used nutrient supplements to protect themselves from the Covid-19 pandemic and diseases, to be healthier and to compensate the benefits of sunlight and for other purposes.

Pearson correlation analysis revealed that variables included in the path analysis had a positive effect on the nutritional habits of the consumers during the Covid-19 pandemic. However, the direct effect of monthly fish consumption change and monthly milk consumption change on post-pandemic nutritional habits was negative. It can also be stated that there was a change in monthly meat, fish and milk consumption of the consumers. The variables with the highest direct impact on nutritional habits during the Covid-19 pandemic were identified as the change in winter preparations (88.88%), monthly fruit consumption change (84.59%) and monthly meat consumption change (83.44%), while the variables with the highest indirect impact were identified as monthly fish consumption change (66.50%), monthly milk consumption change (61.82%) and medicinal-aromatic plant use (49.67%). Female consumers increased the use of medicinal plants more than male consumers after the pandemic.

It was concluded based on present findings that changes were encountered in nutritional habits of the consumers during the Covid-19 pandemic mostly because of restrictions and lockdown. Keeping foods as a good source of immune-supporting nutrients, scheduling mealtimes, meals, portions and keeping mostly the positive attitudes in mind may aid in combating the negative health effects of quarantine.

Author's Contributions

The contribution of the authors is equal

Statement of Conflict of Interest

Authors have declared no conflict of interest.

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