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Beyond a Health Crisis: What Has Changed in Food Consumption Behaviour? A DEMATEL Method Application[1]

(Research Article)

Bir Sağlık Krizinin Ötesinde: Gıda Tüketim Davranışında Neler Değişti? Bir DEMATEL Yöntemi Uygulaması

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ABSTRACT

The aim of this study is an attempt to determine the fundamental factors driving alterations in food consumption behaviour during pandemic days. The primary data of the study have been collected from 484 households in Turkey. In order to define the factors that are affecting changes in food consumption behaviour; first of all, the Stimulus-Response model has been constructed. Then, the DEMATEL method has been utilized to indicate and prioritize the position of the significant factors. It is noteworthy to further mention that by utilizing the DEMATEL method, our analysis rely on the findings of the model used but not depending on experts' opinions. Somers' D coefficients were computed for each pair of variables, in transforming the raw data into DEMATEL scores to expand the experience and benefit from multi-criteria method in using complex real life problems, in various fields. The findings indicate that the determining factors of food consumption turn out to be social factors, such as restrictions of restaurants, publicity posts on social media, having constrained to stay at home for a long period of time and eating with the family gatherings during the pandemic outbreak.

ÖZET

Bu çalışmanın amacı, pandemi günlerinde gıda tüketim davranışındaki değişiklikleri tetikleyen temel faktörleri belirlemeye çalışmaktır.

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Anahtar kelimeler:
Gıda Tüketim Davranışı, Stimulus Response Model, DEMATEL Yöntemi, Karar Analizi, Yansız Karşılaştırma Matrisi

Araştırmanın birincil verileri Türkiye'deki 484 haneden toplanmıştır. Gıda tüketim davranışındaki değişimi etkileyen faktörleri tanımlamak için; öncelikle Uyaran-Tepki modeli oluşturulmuştur. Daha sonra, önemli faktörlerin konumunu belirtmek ve önceliklendirmek için DEMATEL yönteminden yararlanılmıştır. DEMATEL yönteminde, analizin Somers' D katsayılarına dayandığını, ancak uzman görüşlerine bağlı olmadığını ayrıca belirtmekte fayda görülmektedir. Karmaşık gerçek hayat problemlerinin çeşitli alanlarında, DEMATEL yönteminin kullanılmasının yaygınlaşmasını sağlamak ve çok kriterli yöntemden yararlanmak için ham verilerin DEMATEL puanlarına dönüştürülmesinde her bir değişken çifti için Somers D katsayıları hesaplanmıştır. Bulgular, gıda tüketimini belirleyen faktörlerin; pandemi sırasında restoran kısıtlamaları, sosyal medyadaki tanıtım yazıları, uzun süre evde kalmaya zorlanmak ve aile bir arada yemek yemek gibi sosyal faktörler olduğunu göstermektedir.

1. INTRODUCTION

COVID-19 pandemic has spread rapidly across many countries since December 2019, and after the death of more than 4000 people, it was designated as a world-wide pandemic by the World Health Organisation (WHO) on the 11th of March, 2020 (Park, 2020). Many economic, social and cultural activities had been cancelled and followed by massive self-quarantine and social-distancing measures in order to contain the rapid spread of the virus (Borsellino et al., 2020; Ozlem and Mehmet, 2020). No single country or sector has been able to avoid the devastating consequences of the pandemic (WHO 2021b). To what extent countries across the world have been affected (Pellegrini et al., 2020), and the extent of devastation by the pandemic outbreak where the large sections of the communities had been already suffering from economic inequalities and social injustices. The situation unfortunately moved from bad to worse. In reference to the COVID-19 crises which is still unfolding, WHO has stressed that new health emergency crises are expected in the near future (WHO 2021a).

The lockdowns implemented in accordance with the measures imposed by countries have led to some changes in several areas, particularly food consumption behaviours as a basic need for populations (Carroll et al., 2020). Some researchers stated that the COVID-19 Pandemic crises could cause behavioural changes in dietary habits, and in the scope size of daily food consumption when people were under stress (Romeo-Arroyo et al., 2020; Dilber and Dilber, 2020; Temizkan et al., 2021). The potential effects of lockdowns have been drawn from many different aspects; such as increase in consumption of unhealthy food (Ashby et al., 2020; Sidor and Rzymski, 2020), junk food (Ashby, 2020; Kaner et al., 2022), drinks with sugar contents (Pietrobelli et al., 2020), and changes in weight and nutritional habits in adults (ALMughamis et al., 2020). Borsellino et al. (2020) has urged researchers to focus on the impact of the COVID-19 pandemic and in turn, suggested that they examined the implications of food purchasing behaviour. Studies quoted above emphasize the fact that the pandemic has stimulated researchers to investigate consumer behaviour related to new circumstances in different manners (Romeo-Arroyo et al., 2020).

The related literature includes various studies that examine changes in consumers' nutritional habits and food consumption in number of countries such as; the Netherlands (Poelman et al., 2020), Spain (Romeo-Arroyo et al., 2020), Lebanon (Haddad et al., 2020) and Poland (Sidor and Rzymski, 2020). Besides, some other studies conducted by Wang et al. (2020), Cavallo et al. (2020), Di Renzo et al. (2020) and Guney and Sangun (2021) also released possible drivers of changes in food consumption behaviour. Moreover, Demirbaş et al. (2022) revealed that

food waste awareness increased and consumers reduced food waste because of possible risks in accessing food.

However, to the best of our knowledge, even there are few studies that have revealed changes in food consumption behaviour and reported on the drivers of these changes during the Covid-19 pandemic period such as Cavallo et al. (2020), Gülçiçek Tolun and Bulut (2021), it is the first time, this study investigated drivers of the changes during the Covid-19 pandemic period by using the Stimulus-Response model. The objectives of the study are to determine the drivers of changes in food consumption behaviours, to evaluate the determined drivers to reveal their relationships, and to prioritize the determined drivers of changes in food consumption behaviours using the DEMATEL method. The study also utilized the Stimulus-Response Model to reveal factors (economic, psychological, cultural, social and product values) influencing consumer behaviours towards food consumption during the COVID-19 pandemic.

Research questions of the study is drawn below;

1. Are consumer preferences effected by economic factors?
2. Are consumer preferences effected by psychological factors?
3. Are consumer preferences effected by cultural factors?
4. Are consumer preferences effected by social factors?
5. Are consumer preferences effected by product values?

The current study provides a significant contribution to gain an advanced understanding of the changing consumer food purchasing behaviours during a public health emergency period. It is expected that the paper will pave the way for more research into individuals' food consumption behaviours and give new perspectives for both scholars and marketing actors.

This article is organized as follows. First, the theoretical models are presented. Second, the research methodology is explained. Third, the results of DEMATEL method are given. Finally, we discuss the theoretical and managerial contributions and study limitations, and provide future research directions.

2. THEORETICAL BACKGROUND

Kotler et al. (2001) underlined that the starting point for understanding consumer purchasing behaviour lies in the Stimulus-Response model. This model represents the marketing stimuli and buyers' characteristics for defining consumers' decision processes and it creates certain responses. This model exclusively presents interaction between consumer characteristics and responses (Furaiji et al., 2012). As it is shown in Figure 1, a consumer's buying behaviour is influenced by cultural, social, personal and psychological factors.

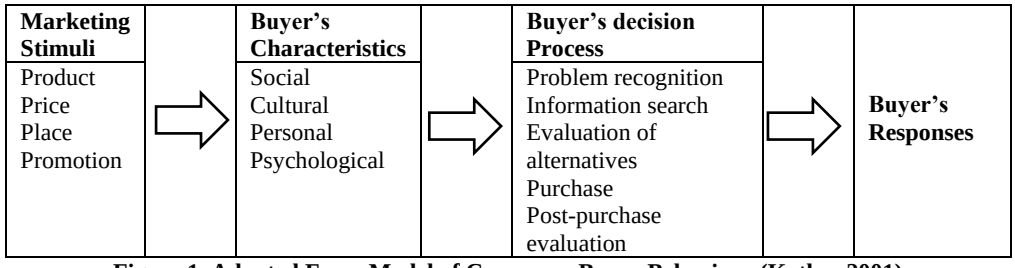

Figure 1. Adapted From Model of Consumer Buyer Behaviour (Kotler, 2001)

Some other researchers further classified and extended the model, and economic factors were taken into account as a different determinant by Keegan et al. (1992). Lately, Lobasenko (2017)

stressed that product value was taken into consideration as a separate factor. In addition to the contributions of previous studies (i.e. researchers focused on economic, cultural, social and psychological factors) this study also focuses on product values respectively. Factors influencing consumer behaviour are defined in Table 1.

Table 1. Definitions of Factors Influencing Consumer Behaviour

Factors	Definitions
Economic Factors*	Economic factors are characterized by income, expenditures and other economic conditions.
Social Factors	All groups such as membership groups, reference groups, family or membership groups that have a direct or indirect influence on the person's attitudes or behaviour.
Cultural Factors	The set of basic values, perceptions, wants, and behaviours learned by a member of society from family and other important institutions.
Psychological Factors	A person's buying choices are explained by four important psychological factors: motivation, perception, learning, and beliefs and attitudes.
Product values **	The elements of food selection such as nutrition, taste, shelf life are taken into consideration by consumers.

Sources: *Kotler et al., 2005; *Keegan et al., 1992. **Fieldhouse, 1996.*

3. MATERIAL AND METHODS

The survey was administered in Turkey and the data was collected from consumers aged above 18 years old in three metropolitan cities (Ankara, Izmir and Adana). Snowball sampling was utilized in compiling the sample. Questionnaires were sent to the participants, who were expected to submit their answers within 20 days in January, 2021. After the system were closed, a total of 492 questionnaires were submitted. However, six questionnaires were eliminated since the answers had included some extreme values. Therefore, 484 questionnaires were analyzed to proceed the research goals.

The data was gathered from households through an online structural questionnaire created by Google Forms. The questionnaires were delivered via institutional mailing lists, private social networks (Facebook and Instagram), and personal communication applications (WhatsApp groups). This method provided a highly effective way of reaching out to respondents since respondents were under COVID-19 pandemic restrictions.

In this study, the items related to the defined factors were adapted from previous studies in the related literature, expert evaluations and pre-testing. The factors and their related items are demonstrated in Table 2.

Table 2. Items Related to Food Consumption Behaviour During COVID-19 Pandemic

During the COVID-19 pandemic, ……

Codes	Factors	Sources
	Economic Factors (1. Significantly decreased..... 5. Significantly increased)	
EF1	How has your income changed?	Akyıldız, 2020
EF2	How has increase in food prices influenced food consumption quantity?	Ben Hassen et al., 2020
EF3	How has the increase in food prices influenced the variety of food consumption?	New
	Cultural Factors (1. Totally disagree ……...5. Totally agree)	
CF1	I received support from my family elders regarding my food needs.	New

CF2	I have been able to get food products from the village owing to my village connection	Akdemir et al., 2020
CF3	I think that it is necessary to have more food than I need	New
CF4	My tendency to shop online has increased.	Borsellino et al., 2020
CF5	I mainly have cooked new/innovative meals	Romeo-Arroyo et al., 2020
CF6	Difficulty buying the desired food and products has influenced my food consumption habits.	Haddad et al., 2020
	Social Factors (1. Totally disagree ……..5. Totally agree)	
SF1	My family and friends supported me for having a healthy diet.	Kumari, et al., 2020
SF2	Eating with the family has influenced my food consumption habits in a healthy way.	New
SF3	The limited availability of food from restaurants has reshaped my food consumption habits in a healthy way.	New
SF4	The posts about nutrition habits on social media influenced my food consumption habits in a healthy way.	New
SF5	Programs about nutrition habits on TV have influenced my food consumption habits in a healthy way.	New
SF6	I have paid more attention to nutritional advice from experts on social media.	New
SF7	I think that spending a lot of time at home during this period has a positive effect on my healthy diet.	New
	Psychological Factors (1. Significantly decreased.....5. Significantly increased)	
PsF1	How have your stress and anxiety levels changed?	Kumari et al., 2020
PsF2	How your sense of loneliness level influenced during the lock-down periods?	New
PsF3	How has your communication within the family changed?	New
	Product Values (1. Totally disagree ……....5. Totally agree)	
PV1	I consider the easy use of the product while purchasing food products	
PV2	I consider nutrition value of the product while purchasing food products	
PV3	I consider the price of the product while purchasing food products	
PV4	I consider the consumption cycle of the product while purchasing food products	
PV5	I consider the taste of the product while purchasing food products	
PV6	I consider the packaging of the product while purchasing food products	Fieldhouse, 1996
PV7	I consider the natural ingredient content of the product while purchasing food products	
PV8	I consider the eco-friendliness of the product while purchasing food products	
PV9	I consider the food safety aspect of the product while purchasing food products	

The following statistical and multi-criteria method were utilized to fulfil the objectives of the current research by using the SPSS Statistics 16.0 and Excel package program.

3.1. Statistical Analysis

The study initially used explanatory factor analysis for finding the factor structure with modified items. Foods are mainly grouped, based on Swindale and Bilinsky (2020), as cereals

(FC1), fruit and vegetables (FC2), meat and meat products (FC3), legumes (FC4), milk and milk products (FC5), and sweets (FC6). Additionally, previous studies illustrated those changes in beverages (FC7) by Dilber and Dilber (2020), traditional foods (FC8) by Kumari et al. (2020), processed food (FC9) by Romeo-Arroyo et al. (2020) and junk food (FC10) by Di Renzo et al. (2020) should be examined to improve understanding changes in individuals' food consumption habits. Cronbach's alpha was defined as 0.706 (KMO= 0.759; Barlett test= 0.000).

With seven items related to consumers' family and social memberships, social factors showed a high content reliability. Cronbach's alpha value of this factor was found 0.834 (KMO= 0.845; Barlett=0.000). Cultural factors had six items connected to consumers' environment. The other factors have the Cronbach's alpha values within the range [0.620, 0.764]. Although previous studies suggest that Cronbach's alpha value should be equal or above 0.70, Richter (2017) states that the value above 0.50 can be acceptable for the further analysis.

On the other hand, there were initially 28 items within the questionnaire, only 26 of them were to satisfy reliability and validity requirements. Totally two items, CF3 (stockpiling) and PsF3 (change in the mode of communication within family members) with unacceptable sampling adequacy were eliminated. All statistically adequate items are considered as the criteria (or factor) in the DEMATEL method (Tzeng et al., 2006).

3.2. Decision Making Analysis

The DEMATEL method is a multi-criteria decision making method to analyze the factors influencing to / influenced from the other factors in a system using expert knowledge. In the system, the task of uncovering the hidden intertwined relationships among factors that can be substantial in many fields. The DEMATEL method has originally been applied for expert opinions to generate the direct relation matrix as a first step, yet this characteristic may bring some potential disadvantages. First of all, finding experts for co-work is not easy to get by for particular fields. Secondly, experts' opinions may include their perceptions, professional experiences and skills that may vary in the face of challenging the complexities embedded in real life problems. Finally, when expert/experts reflect on contradictory opinions, the comparison scale of the factors is largely influenced by diverse opinions.

Considering these circumstances, the direct relation matrix of the DEMATEL method was constructed by using Somers' D coefficients (Altıntaş, 2021), since Somers' D statistics provide the monotonic correlation coefficients between two ordinal variables: the influencing and the influenced (Somers, 1962). By doing so, DEMATEL method can be applied to a real-life problem which have many factors with ordinal data.

DEMATEL method

The Decision Making Trial and Evaluation Laboratory (DEMATEL) method was developed by Andre Gabus and Emilio Fontela in 1972 (Gabus and Fontela,1972). The main idea was to build a structural model to represent the cause-and-effect relations between elements and their influence in the system using a scale to score the components through pairwise comparisons. The steps of the model is given below (Gabus and Fontela, 1972; Paksoy, 2017; Altıntaş, 2021):

Step 1. The first one is to generate the direct relation matrix (X) using DEMATEL scale. The DEMATEL scale consists of the numbers from 0 to 4 (0–No Influence, 1–Low inflence, 2-Medium Influence, 3-High Influence, 4-Very High Influence). In the direct relation matrix, diagonal elements are zero.

$$X=\begin{bmatrix} 0 & \cdots & x_{1n} \\ \vdots & \ddots & \vdots \\ x_{n1} & \ldots & 0 \end{bmatrix}$$

Step 2. Normalized direct relation matrix (N) is computed. The sum of each row of the matrix is calculated, and each component is divided by k. It represents the highest number among the values of the sum obtained before.

Step 3. Total relation matrix T is computed. An identity matrix (I) is generated first and then, the normalized matrix (N) is subtracted from it.

$$T = N * (I - N)^{-1}$$

Step 4. $R_i + C_j$ and $R_i - C_j$ values are computed. The R_i means the total impact that reflects the affect values of ith variable. The C_j represents the total impact received by each variable. Then the values $(R_i + C_j)$ and $(R_i - C_j)$ are calculated in order to interpret the results.

Computation of the Somers' D correlation coefficient

Since the Somers' D defines the effect coefficients between the dependent and independent ordinal variables, the effect value on the dependent variable is defined in the row; the affected value is expressed in the column. Somers' D correlation coefficient, r has the value within the interval $[-1,1]$. The meaning of the correlation coefficients in the literature is $r<0.20$ very low, $0.20\leq r<0.40$ low, $0.40\leq r<0.70$ moderate, $0.70\leq r<0.90$ high, and $0.90\leq r<1$ very high. It is divided into 5 categories just like the DEMATEL method (Altıntaş, 2020). In this sense, the data in the direct relationship matrix in the DEMATEL method can be created with the effect coefficients calculated within the scope of the Somers' D correlation coefficient between the variables. The Somers' D correlation coefficient, r is computed using SPSS package program depending on the formula (1).

$$r = (N_C - N_D) / (N_C + N_D + N_T) \quad (1)$$

where;

N_C: The number of concordant pairs
N_D: The number of discordant pairs
N_T: The number of tied pairs

According to the formula (1), if all pairs of the variables are disagree then r=-1 and there is absolutely negative relationship between the two variables. If all pairs of the variables are agree, then r=1 and there is absolutely positive relationship between the two variables.

To create the Somers' D correlation table, first the labels of the variables are placed in the rows and columns. Then the correlation coefficients between the variable pairs are calculated and placed in the cell located at their intersection. The variables placed in rows are independent variables, in other words they are influencing variables. The variables in the columns are dependent (affected) variables. All variables in both rows and columns are same, and therefore the matrix will be square to calculate the relationship between all pairs.

Table 3 has represented the relationship between the variables of food consumptions and economic factors. This table is used as the direct relation matrix of the DEMATEL method. By applying the steps of the DEMATEL method, Table 4 and Table 5 are obtained to show the C_j and R_i values for food consumptions and economic factors (or items). Similarly using food consumption variables with the other factors defined in Table 1, totally five direct relation

matrices of the DEMATEL method are constructed. Then for these tables, related R_i and C_j values are computed but not listed there.

Table 3. Somers'D Correlation Coefficients for Variables about Food Consumption and Economic Factors

	Factor	FC2	FC3	FC4	FC5	FC8	FC7	FC9	FC10	FC1	FC6	EF1	EF3	EF4
FoodCons1	**FC2**	0.00	0.31	0.28	0.34	0.27	0.00	-0.09	-0.04	0.13	0.05	0.11	0.12	0.13
	FC3	0.31	0.00	0.22	0.31	0.26	0.07	-0.01	0.10	0.09	0.08	0.17	0.00	0.12
	FC4	0.30	0.24	0.00	0.32	0.26	0.19	0.08	-0.01	0.11	0.86	0.05	0.12	0.01
	FC5	0.35	0.31	0.30	0.00	0.29	0.11	0.00	0.08	0.08	0.11	0.12	0.06	0.10
	FC8	0.29	0.27	0.26	0.30	0.00	0.13	0.01	0.12	0.17	0.11	0.01	0.04	0.11
FoodCons2	**FC7**	0.00	0.06	0.16	0.10	0.12	0.00	0.32	0.27	0.24	0.43	-0.02	0.09	-0.01
	FC9	-0.08	-0.01	0.07	0.00	0.01	0.32	0.00	0.36	0.19	0.30	0.03	0.10	-0.02
	FC10	-0.04	0.09	-0.01	0.07	0.10	0.25	0.35	0.00	0.23	0.29	0.07	-0.01	0.10
FoodCons3	**FC1**	0.12	0.08	0.09	0.07	0.15	0.24	0.19	0.24	0.00	0.44	0.22	0.05	0.03
	FC6	0.05	0.07	0.07	0.10	0.09	0.42	0.29	0.29	0.42	0.00	0.04	0.05	-0.01
EconFact	**EF1**	0.12	0.20	0.06	0.14	0.01	-0.03	0.04	0.09	0.03	0.06	0.00	0.03	0.08
	EF3	0.12	0.00	0.11	0.06	0.03	0.10	0.11	-0.02	0.05	0.06	0.03	0.00	0.46
	EF4	0.13	0.12	0.01	0.10	0.11	-0.01	-0.03	0.12	0.03	-0.01	0.07	0.47	0.00

Table 4. Rank of FCs and EFs considering C_j

Factors	R_i	C_j	Rank of C_j	
FC6	1.81	2.66	1	*
FC7	1.77	1.90	2	
FC1	1.80	1.82	3	
FC5	1.88	1.79	4	
FC2	1.82	1.75	5	
FC10	1.50	1.72	6	
FC3	1.71	1.64	7	
FC8	1.82	1.63	8	
FC4	2.49	1.58	9	
FC9	1.42	1.55	10	
EF3	1.02	1.00	11	
EF4	1.03	0.95	12	
EF1	0.83	0.91	13	

* The most affected variable

Table 5. Rank of FCs and EFs considering R_i

Factors	R_i	C_j	Rank of R_i	
FC4	2.49	1.58	1	*
FC5	1.88	1.79	2	
FC2	1.82	1.75	3	
FC8	1.82	1.63	4	
FC6	1.81	2.66	5	
FC1	1.80	1.82	6	
FC7	1.77	1.90	7	
FC3	1.71	1.64	8	
FC10	1.50	1.72	9	
FC9	1.42	1.55	10	
EF4	1.03	0.95	11	
EF3	1.02	1.00	12	
EF1	0.83	0.91	13	

* The most affected variable

All R_i and C_j values obtained by DEMATEL method and demonstrated in Table 7 and Table 8 in order to determine the factors that affect food consumption.

4. RESULTS AND DISCUSSION

For the questionnaire, 61.98% of respondents were women. The participants were in a younger age group (average: 38.87 years) and were well-educated (38.43% of them had a university degree). Of all the respondents, 52.3% were married and the average household size was 3.3 persons. The respondents were generally government and private sector staff (26.24% and 22.11% respectively). The household average income showed that 36.57% of the respondents earned between 511 and 1020 euro/month. As to the household food expenditure, 37.19% of them spent 128-255 euro/month on food products (Table 6).

Table 6. Sample Profiles of the Participants

Characteristics	n	%	Characteristics	n	%
Gender			**Age**		
Women	300	61.98	-30	173	35.74
Men	184	38.02	31-50	190	39.26
Total	484	100.00	51-	121	25.00
			Total	484	100.00
			Average (years)	38.87	
Marital Status			**Household Size**		
Married	298	61.57	1-2 persons	125	25.8
Single	186	38.43	3-4 persons	299	61.8
Total	484	100.00	More than 5 persons	60	12.4
			Total	484	100.0
			Average (person)	3.27	
Education Level			**Occupation**		
Primary School Graduate	14	2.89	Government Staff	127	26.24
Secondary School Graduate	9	1.86	Private Sector Staff	107	22.11
High School Graduate	173	35.74	Worker / Labour	15	3.10
University Graduate	186	38.43	Student	68	14.05
MA Degree	56	11.57	Academician	39	8.06
PhD Degree	46	9.50	Self Employed	20	4.13

Total	484	100.00	Retired	56	11.57
			Housewife	52	10.74
			Total	484	100.00
Family Income (Euro/month)			**Family Food Expenditure (Euro/month)**		
-510	131	27.07	-127	133	27.48
511-1,020	177	36.57	128-255	180	37.19
1,021-	176	36.36	256 -	171	35.33
Total	484	100.00	Total	484	100.00

1 Euro = 7.85 TL (the average exchange rate in July 2020)

"Influencing or influenced factors" are presented by the DEMATEL results in Table 7. The importance of influencing factors is ranked with respect to their R_i and C_j values. The claimed principle aim of this work was to reveal the factors that influence food consumption behaviour. Table 7 demonstrates the importance of each factor on food consumption behaviour and place each of them in overall ranking. As indicated, some of social factors, SF3 (restrictions of restaurants), SF4 (posts on social media), SF7 (staying at home) and SF2 (eating with family) had high importance with 1st, 2nd, 3rd and 4th order in the ranking. Although the factor PV9 (food safety) had the most important influence on food consumption behaviour in the product values' categories, it ranks 7th in the overall ranking. The EF1 factor, (change in income) had the least influence on the food consumption behaviour. This factor was followed by PsF2 (level of loneliness) and EF2 (effect of increase in food prices on consumption quantity).

Table 7. All Factors Influencing Food Consumption and Their R_i, C_j Values and Ranks

Factors	R_i	C_j	Importance of factors influencing food consumption within their groups	Overall importance of factors influencing food consumption
Economic Factors				
EF1	0.833	0.911	3	26
EF2	1.023	0.997	2	24
EF3	1.030	0.947	1	23
Social Factors				
SF1	3.641	3.646	7	8
SF2	4.351	4.307	4	4
SF3	4.711	4.735	1	1
SF4	4.560	4.721	2	2
SF5	4.324	4.468	5	5
SF6	4.151	4.314	6	6
SF7	4.366	4.626	3	3
Cultural Factors				
CF1	1.291	1.389	4	21
CF2	1.258	1.344	5	22
CF4	2.025	2.034	2	17
CF5	2.157	2.186	1	16
CF6	1.905	1.999	3	18
Psychological Factors				
PsF1	1.452	0.000	1	20
PsF2	0.930	0.000	2	25
Product Values				
PV1	1.711	1.999	9	19
PV2	3.104	3.334	6	13
PV3	2.389	2.370	7	14
PV4	3.135	3.017	5	12

PV5	3.481	2.566	2	9
PV6	2.351	2.463	8	15
PV7	3.401	2.957	4	11
PV8	3.480	3.593	3	10
PV9	3.790	3.607	1	7

Through another perspective within which food consumption factors are dominantly influenced by the other factors; and this fact is demonstrated by the DEMATEL results in Table 8. As shown in Table 8, FC6 (sweets) is the factor that is influenced by other factors the most with a high priority. FC7 (beverages) is the second factor influenced by other factors, except for the social factor. FC2 (fruit and vegetables) is the most influenced factor within social factors while FC6 (sweets) is the most influenced factor within the economic factors, cultural factors and product values.

Table 8. Influenced Food Consumption Factors from Other Factors

Food Consumption Factors	**Economic factors**		**Social factors**		**Cultural factors**		**Psychological factors**		**Product values**	
	C_j	**Rank**	C_j	**Rank**	C_j	**Rank**	C_j	**Rank**	C_j	**Rank**
FC1	1.822	3	2.200	9	2.010	3	1.791	3	1.807	9
FC2	1.753	5	3.465	1*	1.971	5	1.465	7	2.063	5
FC3	1.642	7	2.278	8	1.596	10	1.267	10	1.720	10
FC4	1.576	9	3.056	3	1.803	7	1.411	9	1.984	7
FC5	1.789	4	2.900	5	1.987	4	1.537	5	1.971	8
FC6*	2.664	1	3.420	2	2.930	1	2.529	1	2.945	1*
FC7	1.899	2	2.333	7	2.341	2	1.828	2	2.081	4
FC8	1.631	8	2.690	6	1.890	6	1.490	6	2.004	6
FC9	1.547	10	2.157	10	1.773	8	1.413	8	2.183	2
FC10	1.722	6	3.006	4	1.708	9	1.598	4	2.090	3

* is used to indicate the most influenced factor

The change in food consumption was mainly influenced by social factors. The most influencing key factor was found to be restrictions impose on restaurants. Although in some periods, people have had the opportunity to order, they reduced consuming take away food for fear that take away food might be contaminated. Hence, 61.36% of the participants stated that the limited use of restaurant services helps them to have healthier food consumption habits. This finding is confirmed by the studies by Ben Hassen et al. (2020).

The current study also showed that posts on social media and programs on television helped the public to have better diet patterns. The influence of social media on food consumption behaviour has been comprehensively examined and discussed by both academics and marketing executives (Fathelrahman and Basarir 2018). Having to spend a plenty of time at home was found to be a key factor for shaping people's nutritional habits. When the social factor is included fully, it appears that public have developed a healthier diet.

This study pays special attention to product values which is perceived as an important factor by consumers. The most significant key factor has been found as food safety. Given that, consumers' risk perception has increased and access to food safety has become more important since the start of this process. Also, taste was still a considerable key factor for consumers' behaviour towards food items. People seem not to have sacrificed their hard-core choices even under a public health emergency.

Food consumption has been influenced by cultural factors in various ways. Accordingly, the data reveals a significant increase in demand for new recipes. Psychological factors also have been influential in food consumption decisions. The current study also found that 80.79% of the participants reported their increased stress and anxiety. Moreover, 52.89% of them also indicated an increased degree of communication within the family. Furthermore, findings also reflect a change in sweets and bakery consumption patterns during this period.

5. CONCLUSION

This study produces knowledge on changes in food consumption behaviours and factors mainly influencing these changes. The results of the study showed that consumers changed the consumption of sweets; while 37.40% were found to increase sweet consumptions, 33.89% reported to decrease sweet consumptions during the COVID-19 pandemic. This finding indicated that the highest changes were observed in this food product group. As it has been reported in some previous studies, individuals may have more tendency to intake sweets in case of any positive or negative psychological alterations (Pilska and Nesterowicz, 2016; Jacques et al. 2019). Despite this change in sweets, the results indicated an increase in the consumption of fruits and vegetables (67.35%) and milk and milk products (46.70%) and a decrease in junk food (39.88%) and proceed foods (51.86%).

The change in food consumption was mainly influenced by social factors. The most influencing key factor was found to be restrictions of restaurants. People were restricted from or allowed limitedly in the restaurants during the pandemic. Although in some periods people had the opportunity to order, they reduced eating prepared food since this activity might cause contamination of COVID-19. Hence, 61.36% of the participants stated that the limited use of restaurants helped them to have healthier food consumption habits. This finding is confirmed by the studies conducted by Husain and Ashkanani (2020) and Ben Hassen et al. (2020). The current study also showed that posts on social media and programs on television helped the public to have better diet patterns such as consuming fruit and vegetables or milk and milk products. Recently, the influence of social media on food consumption behaviours has been comprehensively examined and discussed by both scholars and marketers (Seçer and Boğa, 2017; Holmberg, 2017; Fathelrahman and Basarir, 2018). Product values can be also considered as an important factor by consumers in this study. It can be concluded that consumers' risk perception has increased and access to safe food has become more important since the start of this process. Findings also suggested that taste was still a considerable key factor for consumers' behaviours towards food products. People seem to have not sacrificed their hedonic choices even under a public health emergency. Other product values taken into account by consumers were eco-friendliness and long shelf life. Cultural factors also influenced food consumption in various aspects. When this factor is considered, the data indicates an increase in cooking new recipes or foods. Di Renzo et al. (2020) confirm this finding and stress that people have a similar tendency to cook different homemade recipes in Italy. Psychological factors also influenced food consumption decisions; the findings showed a slight relationship between these topics and consumption. The current study also found that 80.79% of the participants reported increased stress and anxiety in this period. Moreover, 52.89% of them indicated increased communication within the family. These findings explain the change in sweets and bakery consumption. Following these factors, economic factors became a minor determinant of consumption. The factors consisted of food prices and income.

As a result, consumption behaviour is affected by economic, psychological, cultural and social factors and product values. The most important drivers of consumption behaviour were found

as restrictions of restaurants, posts on social media and programs on television, spending more time at home, and eating with other family members. These drivers are in the category of social factors. It is therefore concluded that social factors are the most effective factors in food consumption behaviour. Economic factors are the least effective factors. The factors related with product values are another important factors following social factors. The impressive result is that the cultural factors and psychological factors are more effective than the economic factors during the Covid 19 lockdown.

The findings are expected to support decision-makers in their conduct of decision making and execution in this regard. The current study is expected to provide some contribution to the knowledge in regarding literature. It is also hoped that this paper will encourage further research in this field. The findings may provide the practitioners with some valuable knowledge in marketing (i.e. it may help them to revise their marketing strategy).

In the study, the Stimulus-Response model, Somers' D coefficients and DEMATEL method are integrated for the first time in the literature. It is expected that integrated model may also guide further studies.

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