

Changes in households' stances on wasting food during the COVID-19 pandemic

Martina MORÁVKOVÁ, Lucie VESELÁ, Lea KUBÍČKOVÁ

Department of Marketing and Trade, Faculty of Business and Economics, Mendel University in Brno, Zemědělská 1665/1, 613 00 Brno,
e-mail: lucie.vesela@mendelu.cz

Abstract

In developed countries in Europe, households, meaning consumers, are part of the links of the food chain that contribute the most to overall food waste. This results in considerably adverse economic, social, and also environmental impacts. The COVID-19 pandemic, which erupted at the beginning of 2020, brought with it unprecedented changes on a global scale that deepened concerns regarding resources and led to an even greater effort to reduce food waste. Although the research that has already been performed shows results that are not united in view of the real change to the amount of consumer food waste caused by the pandemic, the results do agree that, during the pandemic, consumers began to contemplate food waste more, at least tried to reduce the amount of food they wasted, and also started to cook more at home.

This article looks at how the COVID-19 pandemic influenced the subjective stances and habits of Czech households when handling and wasting food, as well as the actual changes seen in this area during the pandemic. The results are based on an analysis and comparison of primary data (the Mann-Whitney U test was used) achieved via two questionnaire surveys amongst Czech households, which were held during the pandemic's first (395 respondents) and second outbreaks (442 respondents).

In the subjective estimates of the amount of households' food waste, a shift may be seen towards higher estimates of the amount of food wasted. Before the pandemic, this estimate was set at 12.27 kg/person/year, however, it rose to 15.43 kg/person/year during the pandemic. Statistically significant changes may also be found in the causes of food waste in households. Although food spoiling and exceeded use-by and best before dates are still the main causes of food waste, we can track an increase in the number of households that also throw out food because they purchase packages that are too large and are unable to consume them in time. During the pandemic, more households started to purchase food regularly, inspect the condition of their supplies before going shopping, and purchase large packages of food. More households also admitted that, during the pandemic, it was more difficult for them to plan when to prepare and consume at home so that nothing would be thrown away and that shopping for food to prepare and consume immediately ended up costing more than before the pandemic. In terms of the individual categories of food, this primarily resulted in a reduced frequency of fruits and vegetables being thrown out, however, the opposite is true for meat products, home-cooked meals, and ready-made meals brought home from restaurants. No statistically significant change was observed for bakery products during either period, even though bakery products are similar to fruits and vegetables in that they remain the most often wasted type of food.

Keywords: food waste, households, changes due to pandemic, subjective opinion

Introduction

The issue of food waste is a society-wide problem. Food waste occurs throughout the entire food chain, and, unfortunately, households are largely involved^{1,2,3,4}. In developed countries, households (consumers) are responsible for an estimated 53% of food waste⁵. Food waste is a phenomenon with significant economic and, above all, social impacts; food waste also bears considerable environmental demands^{6,7}. The most avoidable food waste is actually produced at the household level, i.e., food waste

that is preventable and has the greatest potential in terms of the options available for its reduction and its contribution to solving environmental problems⁸. Households are part of the links in the food chain with the threats to increase waste⁵, even though the majority of people consider wasting food to be an undesirable effect, and if they do end up wasting food, it makes them feel bad⁹. Therefore, learning the subjective stances and opinions of households towards wasting food is important so that their behaviour may be influenced towards desirable actions, meaning a reduction of food wasted at the household level, i.e., the consumer level.

Behaviour related to wasting food is a relatively frequent topic for scientific articles. Multiple authors focus on the question of whether a link exists between the properties of the food (influencing purchasing decisions) and the behaviour related to wasting¹⁰. An intriguing discovery can then be seen in the fact that, technically speaking, consumers can be divided into two groups (labelled by the authors as 'homo economicus' and 'homo moralis'). The behaviour of homo moralis (here one can refer to behavioural theories emphasising the 'altruistic motive' of pro-environmental action) may be significantly impacted by moral appeal and providing information on the negative effects of wasting¹⁰. For homo economicus (appropriately fitting into behavioural theories emphasising the egoistic motive of action), however, this strategy isn't so unequivocally effective, but at the same time, no consistent association with waste may be observed – the authors emphasise that disposable income presumably has a significant influence here (if expenses for food are comparatively marginal overall, these actors consider them to be trivial and they won't pay them more significant attention)¹⁰. Technically speaking, it also stands that consumers who are better informed about food and nutritional values have less of a tendency to waste¹⁰. The actual act of wasting doesn't have to come from purely rational behaviour, as it's accompanied by high economic costs of waste. For instance, in the UK, the household costs of waste make up approx. 15% of the costs for food¹¹; in the USA, these costs are estimated to be over 900 USD per year¹². In this context, the discovery that the COVID-19 pandemic had a fundamental effect on households' food waste is quite interesting; households tried to waste food less¹³.

In the Czech Republic, various surveys of consumers emerged that aimed to uncover the reasons for food waste, the options for preventing waste, etc. These were studies founded on verifying consumers' stances on various partial topics related to the issue of food waste; for instance, the study completed by the agency IPSOS – PotravinyPomahaji.cz¹⁴, or research from The Public Opinion Research Centre¹⁵, etc.

Some authors monitored various case studies focused on food waste at the household level and identified diverse factors that could impact the amount of food wasted¹⁶. In particular, these factors include the size and composition of the family (e.g., there is a difference between food waste according to the number of family members; there is a larger amount of waste for families with children than for those without; even the age of the children plays a role), household income (low-income households waste less), the composition of the household according to age (younger members of the household waste more than older ones), and culture⁴. According to some authors, purchasing habits are also an important factor in wasting food when the intention to not waste serves as a significant predictor of spending patterns; other significant factors include the perceived ability to influence the result (perceived control)¹⁷. Other authors then pursued the relation between the production of food waste and other factors, such as the settlement pattern (countryside x city), type of home (single-apartment homes, multi-apartment homes), and distance from the city where the separating receptacles for biowaste are located¹⁸. The results of the completed case studies displayed a higher rate of generated food waste in cities than in villages and multi-apartment homes¹⁸.

Furthermore, research dealing with food waste at the household level also strives to discover what type of food is wasted the most. The most significant source of food waste is foods that spoil quickly – this most frequently refers to fresh fruits and vegetables, bakery products, dairy products, meat, and fish¹⁶. This waste then often relates to the consumer behaviour of the household. In the research on food waste at the retail and consumer level, three basic groups of food were identified that frequently result in the greatest losses: meat, vegetables, and dairy products¹².

The worldwide COVID-19 pandemic bore unprecedented turbulence to social and economic systems all over the world and therefore it is possible to monitor resource concerns the same as it is possible to

monitor the efforts to reduce waste¹⁹. The question is how are these changes displayed, especially in the area of food waste, because the COVID-19 pandemic brought with it fundamental changes in consumer behaviour. The authorial collective Aldaco et al. states that, according to the report of the Spanish Ministry of Agriculture, the consumption of food has significantly increased across all categories²⁰. The pandemic has effectively offset a series of demand- and supply-side shocks that have enormously disrupted food supply chains²¹. From the perspective of demand, the coronavirus crisis impacted the way in which citizens purchase and consume food (panic buying at the start of the epidemic, subsequent fear of shopping, and larger, one-time purchases), which lead many households to waste more food due to a lack of forethought, while other households reduced their food waste because of how they utilised food due to concerns of making repeated purchases²⁰. It was observed that the COVID-19 pandemic actually positively influenced consumer behaviour, i.e., household behaviour, in many regards when managing food, and it did so in such a way that consumers began contemplating food waste more, trying to waste less, and also began cooking more at home²². Not all of the research, however, agrees on whether or not consumers reduced or increased their subjective estimates in regard to the amount of food waste. It can be observed in the research performed in Italy²³, Mexico²⁴, and New Zealand²⁵ that, during the pandemic, consumers were of the opinion that they wasted food less. On the contrary, research performed in Serbia, i.e., expanding to the Balkan countries, showed that consumers increased their estimates of the amount of wasted food²⁶. There is even some research (e.g., in Portugal) that shows that the majority of people believe that the volume of food waste in their household did not change during the pandemic²⁷. A discrepancy can also be documented in the effect of the respondent's age on the change in their estimated amount of food waste during the pandemic. According to some, primarily young people reduced their food waste as well as those who started to focus more on food management in the household²³, while according to others, older people, part-time workers, and people without children wasted food less²⁵.

However, an agreement can be observed in the change in the frequency of purchasing food, where, generally speaking, there was a decrease in the frequency with which households shopped for food during the pandemic^{23,28,29}. At the same time, the size of individual instances of purchasing food grew²⁶. Consumers also began purchasing food in local stores more often²⁷. Additionally, households were aware that their expenses for purchasing food increased^{23,24,30}. During the pandemic, changes were also observed in the wasting of individual types of food. The wasting of bakery products grew the most, which households threw out more often during the pandemic than before^{30,31}, as well as in greater amounts³⁰. As for fruits and vegetables, several studies claim that the frequency at which they were thrown out decreased³¹, as did the amounts²⁷, even though they still remain amongst the types of food that are quite frequently wasted. Some studies affirm, however, that an increase in food was observed in this category³⁰. Other studies add dairy products³², as an important category that also belongs amongst the most often wasted foods during the pandemic, and the category of leftovers from home-cooked meals is also significant as its amount of food waste increased during the pandemic³⁰.

Amongst the most often provided causes as to why food was wasted in households during the pandemic was the amount of cooked food being too large³¹, expiration dates²⁹, and purchasing too much food (poor food management), which the households are unable to consume, leaving the food to spoil³². Nevertheless, the pandemic had a positive impact on a number of aspects of consumer behaviour when purchasing food. For instance, households started inspecting the condition of their supplies at home more often before going shopping for food^{29,31}, they plan more what they are going to cook and purchase what they need according to that plan²⁷, and make shopping lists more often, which they then adhere to while shopping^{27,29}.

Materials and methods

With the aim of discovering the households' (i.e., consumers') subjective stances and opinions on food waste, a collection of primary data was performed using the questionnaire survey method. The questionnaire surveys were held in two periods. The first survey took place at the end of 2019 and the beginning of 2020, i.e., the period that preceded the eruption of the worldwide COVID-19 pandemic, and the second survey took place throughout 2021, during which society-wide life had already been significantly impacted by the measures related to the on-going COVID-19 pandemic. In accordance with the goal of the Technology Agency of the Czech Republic project, within the bounds of which both

questionnaire surveys were performed, the respondents were households from the city of Brno and its surroundings. The surveys were always filled out by representatives of the household (i.e., consumers), and their answers pertained to the entire household in which they live. The surveys included meritorious questions focused on the stances, opinions, and behaviours of the household in relation to food waste, as well as questions regarding the number of household members (economically active and non-active), their average monthly income, their average expenses for purchasing food for immediate consumption and preparation, and the type of residential area of which the household is a part (housing estate, rural, villa).

In the following Table 1, the basic characteristics of the respondents from both questionnaire surveys are given based on the identifying questions. The total number of respondents from the first survey, whose results will hereinafter be referred to as “before the pandemic”, was 395 households ($n_1=395$). The total number of respondents from the second survey, whose results will hereinafter be referred to as “during the pandemic”, was 442 households ($n_2=442$).

Table 1: Basic characteristics of the respondents from both questionnaire surveys

Variable	1. questionnaire survey ($n_1=395$)		2. questionnaire survey ($n_2=442$)	
Gender	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Woman	299	75,7 %	344	77,8 %
Man	96	24,3 %	98	22,2 %
Age	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
18 – 29 years	191	48,4 %	241	54,5 %
30 – 49 years	150	38,0 %	160	36,2 %
50 – 64 years	40	10,1 %	33	7,5 %
65 and more years	14	3,5 %	8	1,8 %
Prevailing economic activity	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Self-employed	22	5,6 %	25	5,7 %
Employee	230	58,2 %	178	40,3 %
Student	103	26,1 %	182	41,2 %
Maternity leave	16	4,1 %	40	9,0 %
Pensioner	12	3,0 %	11	2,5 %
Unemployed	5	1,3 %	3	0,7 %
Other	6	1,5 %	3	0,7 %
Farmer	1	0,3 %	0	0,0 %
Type of residential area	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Housing estates	268	67,85 %	327	73,98 %
Family house – private villas	97	24,56 %	66	14,93 %
Family house – rural houses	30	7,59 %	49	11,09 %
Net monthly household income	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Less than 30 000 CZK	108	27,3 %	127	28,7 %
30 001 – 45 000 CZK	115	29,1 %	106	24,0 %
45 001 – 60 000 CZK	82	20,8 %	103	23,3 %
60 001 – 75 000 CZK	37	9,4 %	56	12,7 %
More than 75 000 CZK	53	13,4 %	50	11,3 %

The data received from the questionnaire surveys were evaluated using basic methods of descriptive statistics (means, medians, modes, quartiles, and absolute and relative frequencies). To discover changes in the households' stances during the pandemic compared to the stances held by households before the pandemic, the Mann-Whitney U test was implemented, which is suitable for assessing the sameness/differentness of the medians for the two independent selections (they may be largely unequal) and for ordinal data. Therefore, it is suitable if the normal distribution assumption is violated³³.

The Mann-Whitney U test was implemented to assess the sameness/differences in the respondents' answers to a range of questions (10-point scales) before (1st selection) and during the pandemic (2nd selection), and therefore, they helped to determine whether the discovered changes in the answers can be considered statistically significant. H_0 tells that the medians of both selections are the same. By means of comparison, the alternative hypothesis H_A tells that the medians of both selections are different. The test is based on the test statistics U (1) for each of the two selections:

$$U_1 = n_1 n_2 + \frac{n_1(n_1+1)}{2} - \sum R_1, \quad U_2 = n_1 n_2 + \frac{n_2(n_2+1)}{2} - \sum R_2 \quad (1)$$

where n_1 is the number of values in the first selection, n_2 is the number of values in the second selection, R_1 is the sum of the ranks of the values in the first selection, and R_2 is the sum of the ranks of the values in the second selection. If the minimum $\{U_1, U_2\}$ is less or equal to the tabulated critical value at the chosen significance level (a significance level of 5% was used), then H_0 can be rejected, and H_A ³⁴ accepted.

For the graphical depiction of the discovered differences in the households' stances towards food waste and their behaviour before and during the pandemic, box plots were used based on the medians, the upper and lower quartiles, and the maximum and minimum value of the monitored quantity.

Results

Learning the households' subjective stances and opinions on food waste is important so that their conduct may be influenced towards a desirable method of behaviour, which is to reduce the amount of food waste at the household level, i.e., the consumer level. First, it is necessary to pay attention to how much food consumers estimate that they waste, and compare their estimates to reality, meaning the true amount of food waste.

Subjective estimate of food waste in the household

Figure 1 displays the subjective estimates of the average amount of food waste for one week in the household before and during the pandemic. Before and during the pandemic, the fact remains that households most often estimate their weekly amount of wasted food at 0.5 kg. Nevertheless, it can be seen in Figure 1 that the number of households that throw out 0.5 kg of food per week decreased overall during the pandemic (by 15 pp). Contrarily, the number of households that estimated that they throw out between 0.5 kg and 1 kg of food grew (by 8 pp), as did the number of households that estimated that they throw out more than 1 kg of food per week (by 7 pp). Thus, the shift is unequivocal: during the pandemic, consumers began to admit more often that food waste in their households had actually come to be.

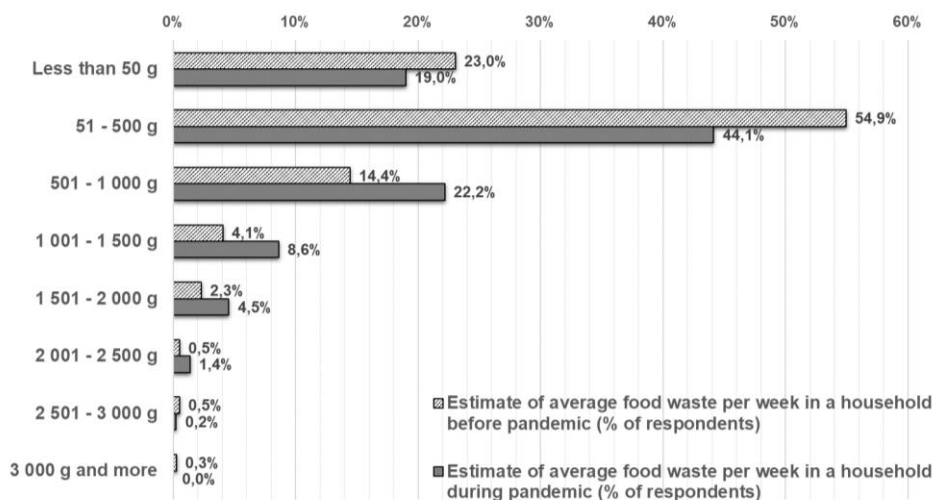


Figure 1: Estimates of the food waste amount (per week/household) before and during pandemic

Furthermore, this subjective estimate of food waste per week, per household, can be re-calculated to the subjective estimate of food waste in kg per person, per year (for this re-calculation, the average number of household members in the South Moravian Region in the years 2019 and 2021 was used in accordance with the data from the Czech Statistical Office). Before the pandemic, this estimate was 12.27 kg/person/year. During the pandemic, however, the estimate increased to 15.43 kg/person/year.

In order to assess whether the consumers' subjective estimate correlates to reality, i.e., whether the consumers can estimate correctly how they are behaving, it was necessary to compare this data with the real data on food waste at the consumer level. From the analysis of the mixed municipal waste, which ran as part of the same Technology Agency of the Czech Republic project as the questionnaire surveys, it was discovered that, on average, the inhabitants of Brno throw out 37.4 kg of food per person, per year³⁵ (measured in 2019/2020), and in the following period, which had already seen society distinctly impacted by the pandemic, the average rate was 33.3 kg of food per person, per year (measured in 2020/2021).¹ In addition, these numbers do not include food waste that the inhabitants of Brno can liquidate in other ways (composting, feeding animals, etc.). Therefore, a definite discrepancy exists between how consumers perceive their behaviour and how they actually behave. In the first monitored period, their estimates accounted for approximately 1/3rd of reality. In 2021, the division between the consumers' estimate and reality shrunk, given that the consumers' subjective estimate made up less than half (46%) of the actual amount of food waste. Even though consumers continue to severely underestimate their food waste, it can be stated that they've become more aware of it more often, which is why their estimate saw a slight increase.

The fact that consumers prefer to view their behaviour in a good light is also shown by the evaluation of the subjective perception of the amount of food waste in the household, which was valued on a scale from 1 (the least) to 10 (the most). The results from both questionnaire surveys show that consumers perceive food waste in their households to be low; the value chosen most often before the pandemic (modus) was 2 out of 10. During the pandemic, a slight change was observed, however, only increasing the value to 3 (modus), which still indicates a lower estimate of the amount of food waste in the households. Nevertheless, the median evaluation remains at 3 for both periods, and the Mann-Whitney U test (see Table 2) shows that a statistically significant change in the consumers' perceived amount of food waste in the household before and during the pandemic did not take place (H_0 cannot be rejected).

Table 2: Mann-Whitney U test (A change in the perceived degree of household food waste)

Variable	Mann-Whitney U Test								
	Sum of ranks in group (1)	Sum of ranks in group (2)	U	Z	p-value	Z	p-value	Number of valid values (1)	Number of valid values (2)
Perception of household food waste degree	159713,5	190989,5	81503,5	-1,6585	0,0972	-1,6955	0,0899	395	442

Causes of food waste in the household (basic statistics)

Before and during the pandemic, consumers considered *food spoiling when stored (1)*, *food with an expired 'use-by' date (2)*, or *food with expired 'best before' date (3)* to be amongst the most frequent causes of food waste in households. On a 10-point scale, starting from 1 (the least frequent cause) to 10 (the most frequent cause), consumers rated the stated causes with an average value ranging from 3.9 to 6.6 (before the pandemic) and 4.5 to 6.1 (during the pandemic), i.e., frequent causes of food being

¹ A detailed description of the method used in the analysis of the mixed municipal waste for the purpose of discovering the amount of food waste is further explained and described in the article "Kubíčková L., Veselá L., Kormaňáková M.: Food Waste Behaviour at the Consumer Level: Pilot Study on Czech Private Households. Sustainability 13(20), 11311 (2021). doi: 10.3390/su132011311."

thrown out in households. For more detailed results, see Table 3, where the individual causes are ranked in descending order from the most frequent to the least frequent according to the mean achieved in the period before the pandemic.

Table 3: Causes of food waste in the household (basic statistics)

Causes of household food waste	1. questionnaire survey (before pandemic)				2. questionnaire survey (during pandemic)			
	Mean	Median	Lower quartile	Upper quartile	Mean	Median	Lower quartile	Upper quartile
The food spoils during storage. (1)	6,6	7	4	9	6,1	7	4	9
Exceeding the 'use by' date. (2)	4,3	3	1	7	5,1	5	2	8
Exceeding the 'best before' date. (3)	3,9	3	1	6	4,5	4	2	7
The purchased food is not of adequate quality. (4)	3,4	2	1	5	3,3	2	1	5
There is too much cooked food, it is impossible to consume it. (5)	3,2	2	1	4	3,6	3	1	5
It doesn't taste good to me. (6)	2,6	2	1	3	2,9	2	1	4
A large crop of our own production that we cannot process. (7)	2,3	1	1	3	2,2	1	1	3
I don't like the look of the food. (8)	2,3	1	1	3	2,3	1	1	3
A large package of purchased food. (9)	2,1	1	1	2	2,5	2	1	3
The product has a damaged packaging. (10)	2,1	1	1	2	2,1	1	1	3
The food spoils before I can get it home. (11)	1,6	1	1	1	2,0	1	1	2

Using the Mann-Whitney U test, further research was performed regarding which causes resulted in a statistically significant change in the consumers' evaluation during the pandemic compared to the period before the pandemic. The results are depicted in Table 4. The highlighted tests are significant at a 5% significance level, and for these causes, the H_0 may be rejected.

Table 4: Mann-Whitney U test (Changes in evaluating the causes of food waste in the household)

Causes of household food waste	Mann-Whitney U Test								
	Sum of ranks in group (1)	Sum of ranks in group (2)	U	Z	p-value	Z	p-value	Number of valid values (1)	Number of valid values (2)
The food spoils during storage. (1)	172252,5	174275,5	77255,5	2,60	0,0094	2,61	0,0090	392	440
Exceeding the 'use by' date. (2)	148892,0	193486,0	73037,0	-3,54	0,0004	-3,58	0,0004	389	438
Exceeding the 'best before' date. (3)	149992,5	191558,5	74526,5	-3,05	0,0023	-3,10	0,0020	388	438
The purchased food is not of adequate quality. (4)	165437,5	179427,5	83286,5	0,74	0,4577	0,76	0,4448	392	438
There is too much cooked food, it is impossible to consume it. (5)	156500,0	188365,0	80255,0	-1,61	0,1076	-1,65	0,0999	390	440
It doesn't taste good to me. (6)	155237,0	186314,0	79382,0	-1,64	0,1010	-1,71	0,0878	389	437
A large crop of our own production that we cannot process. (7)	158723,0	181177,0	83645,0	-0,27	0,7887	-0,31	0,7588	387	437
I don't like the look of the food. (8)	160456,0	181922,0	84990,0	-0,05	0,9592	-0,06	0,9554	388	439
A large package of purchased food. (9)	149872,5	191678,5	74406,5	-3,09	0,0020	-3,33	0,0009	388	438
The product has a damaged packaging. (10)	157156,5	185221,5	80911,5	-1,25	0,2096	-1,38	0,1672	390	437
The food spoils before I can get it home. (11)	151054,5	191323,5	75588,5	-2,79	0,0052	-3,44	0,0006	388	439

Therefore, it can be stated that statistically significant changes occurred during the pandemic only in the causes of food spoiling when stored (1), expired 'use-by' dates (2), expired 'best before' date (3), large packages of purchased food (9), and food spoiling even before it's stored (11). The changes are shown graphically using box plots in Figure 2, which capture the medians, upper and lower quartiles, and the maximum and minimum evaluation of the given cause in both periods, i.e., before and during the pandemic.

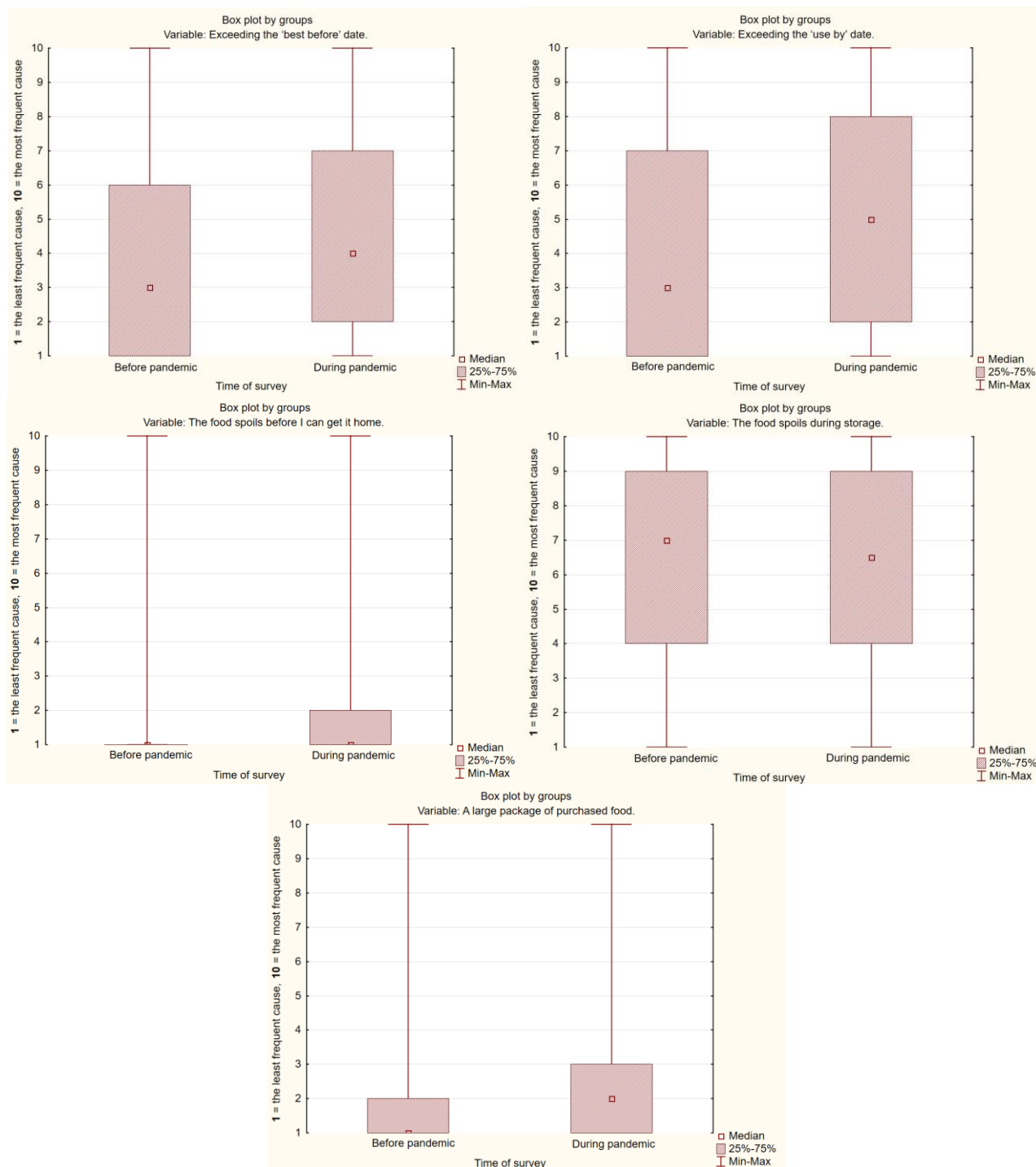


Figure 2: Changes in evaluating the causes of food waste in households during the pandemic

Generally speaking, it's true that consumers are throwing out food less often during the pandemic due to the food spoiling when stored (1) than before the pandemic. Food spoiling when stored, however, still remains the main cause for consumers to waste food. Furthermore, it can be said that consumers are

contrarily throwing out food due to expired 'use-by' dates (2) and expired 'best before' dates (3) more often during the pandemic than before. Also, during the pandemic, consumers are throwing away food more often because they purchased packages of food that are too large and are unable to consume them in time (9), or because the food spoils sooner than they are able to bring them home, i.e., before they are even stored (11). Nevertheless, it can still be said that this takes place less often, meaning both causes are less significant. As for the other causes of food waste, no statistically significant changes may be observed during the pandemic compared to before the pandemic.

Households' characteristic behaviour in relation to food waste

A number of statements given in Table 5 were used to describe the behaviour of households when purchasing and consuming food, as well as to learn their opinions regarding the issue of food waste. Here respondents expressed their degree of agreement on a scale from 1 (I absolutely disagree) to 10 (I absolutely agree). The statements are arranged in the table in descending order according to the average degree of agreement expressed in the 1st questionnaire survey (before the pandemic), starting with what the consumers agree with most, to what they agree with least. For the following textual comments, the 10-point scale was converted into a 5-point scale with the following indications: 1,2 = I absolutely disagree; 3,4 = I disagree; 5,6 = neutral view; 7,8 = I agree; 9,10 = I absolutely agree.

More than half of households affirmed that they *go shopping for food regularly* (54.7% before the pandemic, 59.8% during the pandemic), *inspect the condition of their supplies before going shopping* (66.3% before the pandemic, 72.8% during the pandemic), *adhere to the shopping list they made in advance* (54.5% before the pandemic, 54.5% during the pandemic), *do not see any challenges in planning their purchases and preparing food so that nothing is wasted* (55% before the pandemic, 47.2% during the pandemic), and *don't give preference to purchasing large packages of food* (51.6% before the pandemic, 45.3% after the pandemic). In addition, nearly half of households affirm that they *do not consider the price an important factor when purchasing food* (46.9% before the pandemic, 42.1% during the pandemic) and *do not utilise discounts or purchase food on sale* (47.2% before the pandemic, 45.8% during the pandemic). Even here an unequivocal discrepancy may be observed between how consumers subjectively evaluate their behaviour and how they actually behave, and that's because other studies show the opposite, that the typical Czech consumer is quite sensitive to prices and gives preference to shopping for items on sale³⁶. Another important discovery is that more than 3/4th of consumers are aware of the severity and topicality of the issue of food waste and agree that *the issue of food waste is very topical* (85.3% before the pandemic, 82.5% during the pandemic) and that *food waste represents a large threat for us in the future* (77.5% before the pandemic, 75.8% during the pandemic).

Table 5: Households' behaviour in relation to food waste (basic statistics)

Household behavior in relation to food waste	1. questionnaire survey (before pandemic)				2. questionnaire survey (during pandemic)			
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
<i>The issue of food waste is topical. (1)</i>	8,3	9	8	10	8,2	9	8	10
<i>Food waste is a big threat to us in the future. (2)</i>	7,8	9	7	10	7,8	9	7	10
<i>Before I go grocery shopping, I go through the food I have at home. (3)</i>	7,1	8	5	9	7,4	8	6	10
<i>I consume all the food I buy. (4)</i>	6,5	7	5	8	6,3	7	4	8
<i>I go grocery shopping regularly. (5)</i>	6,2	7	3	9	6,7	7	5	9
<i>I shop according to a pre-prepared list that I stick to. (6)</i>	6,1	7	4	8	6,3	7	4	9
<i>I shop less often and make larger purchases. (7)</i>	5,1	5	2	7	5,1	5	2	8
<i>Price is the most important factor for me when buying food. (8)</i>	4,8	5	3	7	5,0	5	3	7
<i>I take advantage of discounts and often buy foods that are on sale, even if I don't need them at the moment. (9)</i>	4,8	5	2	7	5,1	5	3	7
<i>It is very difficult to plan shopping and food preparation so that nothing is wasted. (10)</i>	4,5	4	2	7	5,1	5	2	8
<i>I prefer buying large packages of food, as they are cheaper per piece.(11)</i>	4,4	4	2	6	4,9	5	3	7

Also using the Mann-Whitney U test, it was discovered that, for several statements, a statistically significant change in the consumers' evaluation came to be during the pandemic compared to the period before the pandemic. The results are depicted in Table 6. The highlighted tests are significant at a 5% significance level, therefore, for these statements, it is possible to reject H_0 and accept H_A regarding the change in the period of the pandemic.

Table 6: Mann-Whitney U test (Changes in households' behaviour in relation to food waste)

Household behavior in relation to food waste	Mann-Whitney U Test								
	Grouping variable: Period before the pandemic (1) and during the pandemic (2) Marked tests are significant at the $p < 0.05$ level								
	Sum of ranks in group (1)	Sum of ranks in group (2)	U	Z	p-value	Z	p-value	Number of valid values (1)	Number of valid values (2)
The issue of food waste is topical. (1)	168518,0	180512,0	83051,0	1,10	0,272	1,14	0,252	394	441
Food waste is a big threat to us in the future. (2)	164711,0	183484,0	85581,0	0,30	0,762	0,31	0,758	392	442
Before I go grocery shopping, I go through the food I have at home. (3)	153046,0	191819,0	77191,0	-2,49	0,013	-2,53	0,012	389	441
I consume all the food I buy. (4)	167569,5	181460,5	83557,5	0,95	0,344	0,96	0,339	393	442
I go grocery shopping regularly. (5)	153865,5	190999,5	78010,5	-2,25	0,024	-2,27	0,023	389	441
I shop according to a pre-prepared list that I stick to. (6)	158762,0	186934,0	82907,0	-0,89	0,375	-0,89	0,372	389	442
I shop less often and make larger purchases. (7)	161481,0	185047,0	85236,0	-0,28	0,783	-0,28	0,782	390	442
Price is the most important factor for me when buying food. (8)	157070,5	189457,5	80825,5	-1,55	0,121	-1,56	0,119	390	442
I take advantage of discounts and often buy foods that are on sale, even if I don't need them at the moment. (9)	155314,0	189551,0	79848,0	-1,71	0,087	-1,72	0,085	388	442
It is very difficult to plan shopping and food preparation so that nothing is wasted. (10)	153154,0	193374,0	76518,0	-2,80	0,005	-2,82	0,005	391	441
I prefer buying large packages of food, they are cheaper per item. (11)	155847,0	194019,0	78032,0	-2,59	0,009	-2,61	0,009	394	442

Thus, it can be stated that statistically significant changes arose during the pandemic but only for the statements that households check the food that they have at home before going grocery shopping (3), they go shopping regularly (5), it is difficult for them to plan purchases and food preparation in such a way that nothing is wasted (10), and they give preference to purchasing large packages of food because, in this way, they are cheaper per item (11). The changes are represented graphically using box plots in Figure 3, which capture the medians, the upper and lower quartiles, and the maximum and minimum value of the given statement both before and during the pandemic.

In general, during the pandemic, households are purchasing food regularly to a greater extent, they are also more aware that it is difficult to plan the purchase and preparation of food in such a way that nothing is wasted, furthermore, more households are checking what food they already have at home before going shopping and are purchasing more large packages of food because they are cheaper per item. On the other hand, during the pandemic, no statistically significant change was observed in the evaluation of price as an important factor when purchasing food, despite the fact that households are aware that they spend more money on purchasing food for immediate consumption and preparing food during the pandemic.

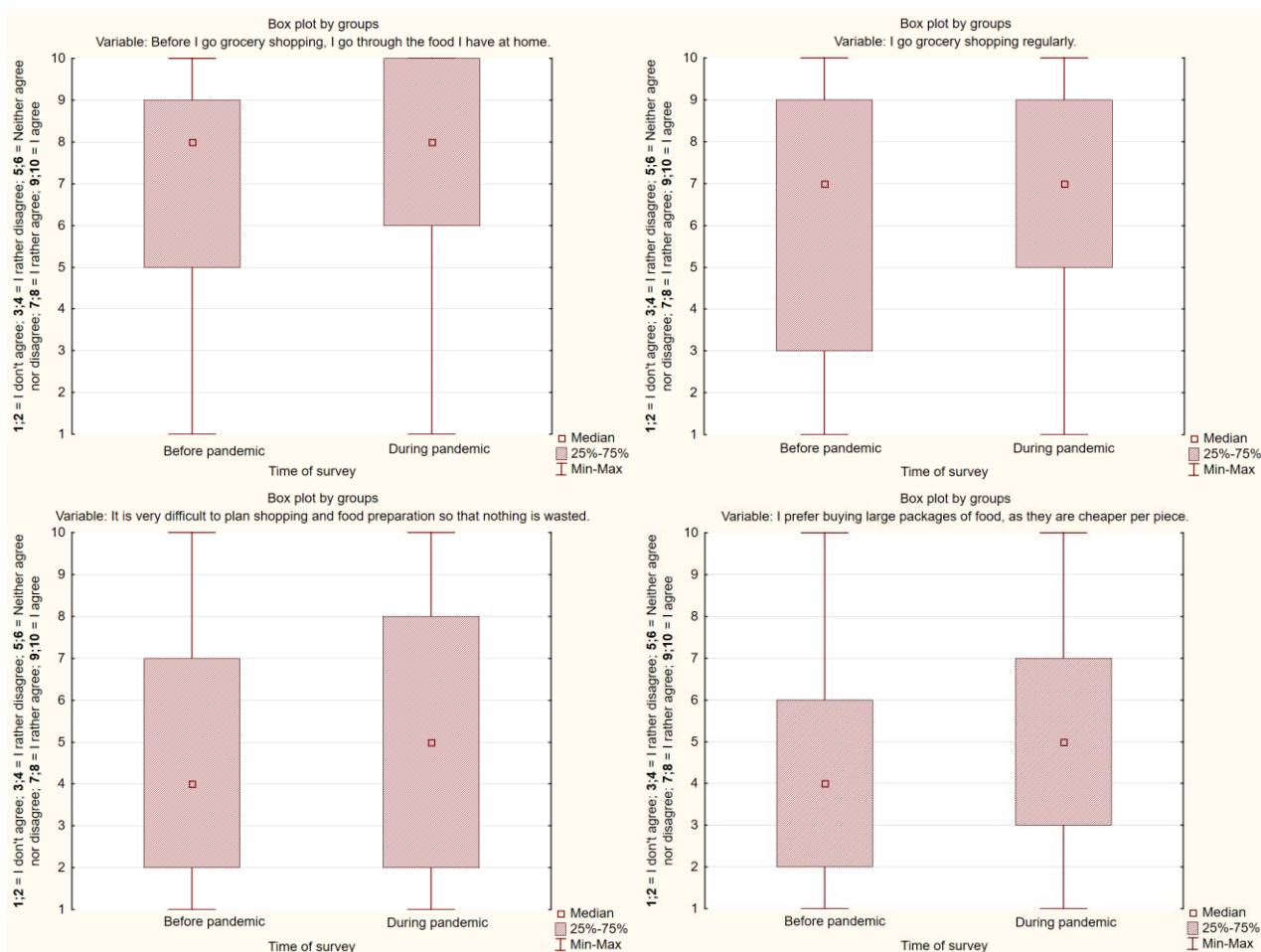


Figure 3: Changes in households' behaviour in relation to food waste during the pandemic

A change in household expenses for purchasing food

Both before and during the pandemic, households most frequently paid 4,000 – 6,000 CZK per month when purchasing food for immediate consumption and preparing food. In addition, before the pandemic, 38% of households spent more than 6,000 CZK per month on food, whereas, during the pandemic, this number rose to more than 46% of the surveyed households (see Figure 4). This is unequivocal evidence that households' monthly expenses for purchasing food increased. To a certain extent, this may be caused by larger purchases of food meant for cooking during periods when restaurants and canteens were closed, as well as by the gradual increase in food prices.

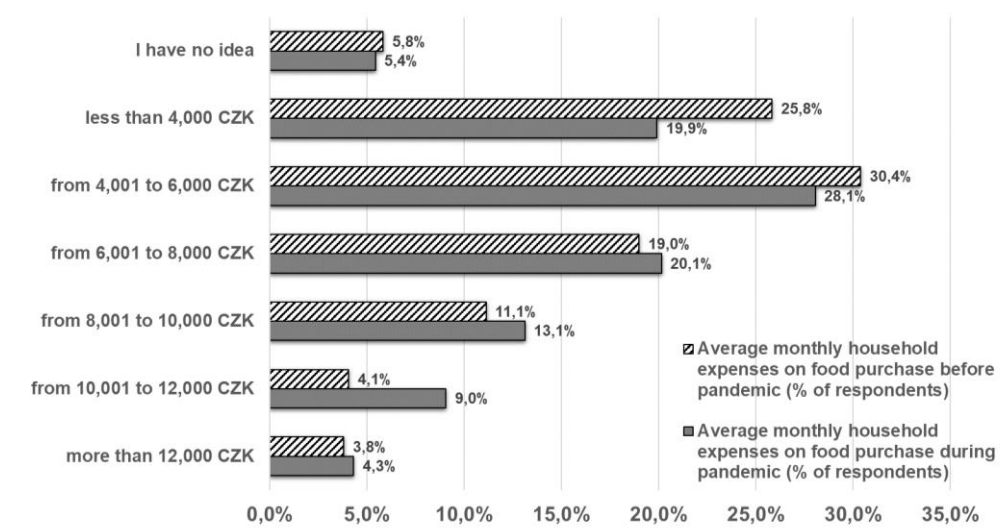


Figure 4: Average monthly household expenses on food purchases before and during pandemic

Using the Mann-Whitney U test, it was investigated whether the difference in the amounts spent on purchasing food before and during the pandemic can be considered statistically significant (see Table 7). The result of the test is statistically significant at a 5% significance level. Therefore, there are clearly differences in the amount of average monthly expenses when purchasing food for immediate consumption and preparing food between the period before and during the pandemic. Both before and during the pandemic, households most often spent between 4,000 – 6,000 CZK on food. Nevertheless, during the pandemic, the number of households that spent more than 6,000 CZK on food per month increased (by 8.5 p.b., by 22.4%) (see Figure 5).

Table 7: Mann-Whitney U test (A change in household expenses when purchasing food)

Variable	Mann-Whitney U Test								
	Sum of ranks in group (1)	Sum of ranks in group (2)	U	Z	p-value	Z	p-value	Number of valid values (1)	Number of valid values (2)
Average monthly household expenses on food purchase	155851,0	194852,0	77641,0	-2,76	0,0057	-2,83	0,0046	395	442

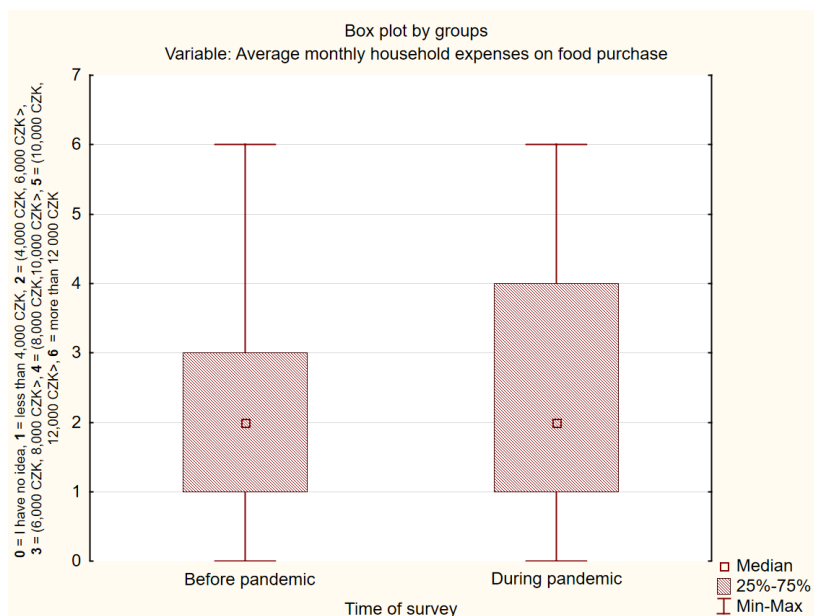


Figure 5: Changes in household expenses on food purchases during the pandemic

Wasting various categories of food

In addition to finding out the total amount of food the consumer wastes, it's also important to know what the structure of wasted food is, i.e., which categories of food the consumer wastes most often or the most. Due to the data collection method used, however, it was not possible to determine the exact amount of food thrown away in individual categories (for this, it would be better to carry out diary surveys in specific households, for example). Instead, how often households throw out individual categories of food before and during the pandemic was discovered. The results are depicted in Table 8, where the relative frequencies of individual responses are given. The value in each cell, therefore, expresses the percentage of households that throw away a given category of food with a given frequency. Values marked in bold represent the most frequently reported frequency of throwing away the given food category. Thus, it is evident that households most often waste **bakery products** and **fruit and vegetables**. Next, less often households waste dairy and meat products as well as home-cooked meals. Very rarely do they throw out perishable food, ready-made meals brought home, and raw meat or fish.

Using the Mann-Whitney U test, it was investigated which categories of food display a statistically significant difference between the frequency of food waste before and during the pandemic. The results are depicted in Table 9. The highlighted tests are significant at a 5% significance level, and for these categories of food, it is possible to reject H_0 and accept H_A regarding the change in frequency of their waste during the pandemic. Therefore, these differences are observed for fruits and vegetables, meat products, home-cooked meals, and read-made meals brought home (from the restaurant, canteen, etc.).

During the pandemic, households report that they are throwing away fruit and vegetables less often than before the pandemic. On the contrary, meat products and home-cooked meals are thrown away slightly more often during the pandemic than before, although the most frequently reported value for meat products is still 'never' (the modus during and before the pandemic). Households also throw away meals that they bring home (from restaurants, etc.) more often than in the period before the pandemic. This can be explained by the fact that people took home much more food to eat at a time when they often worked from home and food services were closed when compared with the period before the pandemic. However, even during the pandemic, the fact that most consumers never throw away this food or throw it away very little (see Table 8) remains true.

Table 8: Frequency of wasting various categories of food before and during the pandemic

Food category	Frequency of food waste before pandemic (1. questionnaire survey)						
	Never	Less than 1 time per quarter	1 time per quarter	1 time per month	2 to 3 times per month	1 to 2 times per week	3 or more times per week
Fresh fruit	20,8%	19,3%	15,2%	25,9%	15,2%	3,6%	0,0%
Fresh vegetables	16,8%	19,1%	16,3%	27,3%	17,3%	3,1%	0,0%
Dairy products	26,1%	29,4%	15,0%	19,8%	9,6%	0,0%	0,0%
Meat products	41,5%	25,7%	13,0%	13,2%	6,1%	0,5%	0,0%
Meat and fish (raw)	65,3%	23,0%	5,8%	4,6%	0,8%	0,5%	0,0%
Bakery products	17,1%	14,3%	11,5%	17,4%	25,6%	12,3%	1,8%
Perishable foods	75,0%	20,4%	1,8%	2,3%	0,5%	0,0%	0,0%
Home-cooked meals (exclud. side dishes)	32,7%	25,8%	11,6%	15,7%	11,1%	2,3%	0,8%
Home-cooked side dishes	27,5%	21,6%	16,5%	15,8%	13,5%	4,3%	0,8%
Ready-made meals brought home	73,1%	17,3%	5,8%	2,3%	0,8%	0,3%	0,5%
Food category	Frequency of food waste during pandemic (2. questionnaire survey)						
	Never	Less than 1 time per quarter	1 time per quarter	1 time per month	2 to 3 times per month	1 to 2 times per week	3 or more times per week
Fresh fruit	25,3%	26,9%	14,9%	17,6%	12,0%	2,9%	0,2%
Fresh vegetables	23,5%	25,3%	14,7%	21,5%	12,0%	2,5%	0,5%
Dairy products	22,2%	25,6%	20,6%	19,9%	8,8%	2,7%	0,2%
Meat products	35,3%	26,5%	14,9%	12,2%	7,9%	2,7%	0,5%
Meat and fish (raw)	63,3%	21,7%	8,6%	3,4%	1,4%	1,6%	0,0%
Bakery products	17,0%	15,2%	11,3%	14,1%	22,2%	17,7%	2,5%
Perishable foods	78,7%	15,6%	2,7%	1,8%	0,9%	0,2%	0,0%
Home-cooked meals (exclud. side dishes)	27,7%	25,2%	14,1%	14,7%	11,6%	5,9%	0,9%
Home-cooked side dishes	20,6%	23,8%	16,3%	14,5%	15,2%	8,8%	0,9%
Ready-made meals brought home	60,6%	21,0%	7,5%	5,2%	2,9%	1,6%	1,1%

In addition, it was discovered (surveyed in the period before the pandemic at the end of 2019 and the beginning of 2020) that the most common choice of households for the disposal of all the listed categories of food is to **throw them in mixed municipal waste**. For fresh fruit and vegetables, households also often choose to **compost** these items (approx. 20% of households). Home-cooked meals, as well as side dishes and dairy products, are also quite often thrown away as **waste – into the sewer system** (approx. 11% of households choose this method for home-cooked meals, approx. 6% of households do the same for home-cooked side dishes, and approx. 9% of households for dairy products). On the contrary, households often dispose of bakery products by **feeding them to animals** (approx. 27% of households); for other categories of food, only 5% of households choose feeding them to animals as a method of food disposal. Throwing food into the **organic bin** seems to be a minority choice for all categories of food so far; the most significant was observed in fresh fruit and vegetables (1.5% and 1.8% of households, respectively).

Table 9: Mann-Whitney U test (A change in the frequency of wasting various categories of food)

Frequency of waste in different food categories	Mann-Whitney U Test								
	Grouping variable: Period before the pandemic (1) and during the pandemic (2) Marked tests are significant at the $p < 0.05$ level								
	Sum of ranks in group (1)	Sum of ranks in group (2)	U	Z	p-value	Z	p-value	Number of valid values (1)	Number of valid values (2)
Fresh fruit	175726,0	174140,0	76237,0	3,11	0,0019	3,18	0,0015	394	442
Fresh vegetables	176097,5	172097,5	74194,5	3,58	0,0003	3,66	0,0003	392	442
Dairy products	158466,5	191399,5	80651,5	-1,84	0,0654	-1,89	0,0589	394	442
Meat products	157157,5	191872,5	79736,5	-2,05	0,0408	-2,13	0,0331	393	442
Meat and fish (raw)	163023,0	187680,0	84813,0	-0,71	0,4773	-0,84	0,4032	395	442
Bakery products	160020,0	186508,0	83384,0	-0,82	0,4132	-0,83	0,4060	391	441
Perishable foods	166520,0	181675,0	83772,0	0,82	0,4102	1,12	0,2616	392	442
Home-prepared meals (exclud. side dishes)	158728,0	191138,0	80518,0	-1,89	0,0591	-1,94	0,0527	395	441
Home prepared side dishes	156018,5	193011,5	78597,5	-2,37	0,0177	-2,42	0,0156	393	442
Prepared meals brought home	152708,0	197158,0	74893,0	-3,49	0,0005	-4,18	0,0000	394	442

Conclusions

Consumer behaviour in relation to food changed during the pandemic, what was predicted by many researchers. However, it's interesting to look at how studies differ in their conclusions. While some point to less food waste in households^{23,24,25}, others to increased food waste²⁶. Therefore, this article focuses on the Czech consumers and compares their stances on food waste, as well as their behaviour in food handling before and during the pandemic. From the measurement of the real amount of food waste in mixed municipal waste, it is clear that, during the lockdowns, this number decreased by 11%. So how has household food management changed in this period, and does this new experience have an effect on changing consumers' stances?

We can state that over the years there has been a deepening of awareness of the issue of food waste, and consumers are increasingly aware of the need to change their behaviour towards sustainable consumption. In the subjective estimates of the amount of wasted food from consumers, the opposite trend can be seen than what the real data from waste analyses show. In 2019, their estimate was roughly 1/3rd of the reality. In 2021, the gap between the estimation and reality narrowed, as consumers' subjective estimate accounted for less than half (46%) of the actual amount wasted, which can be explained by the fact that consumers had more insight into the amount of their food supply during pandemic, and thus, they spent most of their time at home and were more aware of food waste. However, they still see themselves in a better light (almost half say that price is not the most important factor and that they don't shop sales).

During the pandemic, consumers more often indicate exceeding the 'use-by' or 'best before' date as the most common cause. This can also be caused by a change in the frequency of shopping, although the purchases are regular, but for a longer period. Consumers plan their purchases more, and they also check their food stocks more, however, due to the limitation of frequency, they prefer large packages of food. A statistically significant difference was also measured in people's perception of the difficulty of planning and preparing food to avoid waste. This issue is becoming more and more pressing for households, as household expenses on food purchases continues to rise. We can also observe a smaller increase in discarded ready-made meals, although it is still the category of food that is wasted the least, along with meat. This reinforces the idea that planning the right amount of food for a family who eats at home is a difficult task. Therefore, it would be appropriate to lend a helping hand to households in the form of assisting with planning the appropriate amount of food (per person, per day), proper education regarding the storage of individual types of food, and by offering specific advice and tips on how to process any surpluses.

Acknowledgement

The study was performed as part of TACR project no. TL02000092, named the 'Pro-environmental behavior of households and incentives for behavioral change in food waste production'.

References

1. Katsarova, I. *Tackling Food Waste: The EU's Contribution to a Global Issue*. EPRS, European Parliamentary Research Service, Strasbourg 2016.
2. Stenmarck Å. and 14 coauthors: *Estimates of European Food Waste Levels*; Research report FUSIONS. IVL Swedish Environmental Research Institute, Stockholm. 2016. doi:10.13140/RG.2.1.4658.4721.
3. Aschemann-Witze I.J., de Hooge I., Amani P., Bech-Larsen T., Gustavsson, J.: *Consumers and Food Waste-a Review of Research Approaches and Findings on Point of Purchase and in-Household Consumer Behaviour*. EAAE-AAEA Joint Seminar 'Consumer Behavior in a Changing World: Food, Culture, Society'. 2015 March 25-27, Naples, Italy. Agricultural and Applied Economics Association.
4. Ilakovec B., Voca N., Pezo L., Cerjak M.: *Quantification and Determination of Household Food Waste and Its Relation to Sociodemographic Characteristics in Croatia*. *Waste Manag.* 102, 231 (2020). doi:10.1016/j.wasman.2019.10.042.
5. Östergren K. and 21 coauthors: *FUSIONS Definitional Framework for Food Waste – Full Report*, Project Report FUSIONS, 2014. ISBN 978-91-7290-331-9.
6. Papargyropoulou E., Lozano R., Steinberger J.K., Wright N., bin Ujang Z.: *The Food Waste Hierarchy as a Framework for the Management of Food Surplus and Food Waste*. *J. Cleaner Prod.* 76, 106 (2014). doi: 10.1016/j.jclepro.2014.04.020.
7. Notarnicola B., Sala S., Anton A., McLaren S.J., Saouter E., Sonesson U.: *The Role of Life Cycle Assessment in Supporting Sustainable Agri-Food Systems: A Review of the Challenges*. *J. Cleaner Prod.* 140(2), 399 (2017). doi: 10.1016/j.jclepro.2016.06.071.
8. Beretta C., Stoessel F., Baier U., Hellweg S.: *Quantifying Food Losses and the Potential for Reduction in Switzerland*. *Waste Manag.* 33(3), 764 (2013). doi: 10.1016/j.wasman.2012.11.007.
9. Evans, D.: *Food Waste: Home Consumption, Material Culture and Everyday Life*. Bloomsbury Publishing, 2014.
10. Herath D., Felfel A.: *Determinants of consumer food waste behaviour: Homo Economicus vs. Homo Moralis*, 2016 Annual Meeting, July 31-August 2, Boston, Massachusetts 236260, Agricultural and Applied Economics Association. doi: 10.22004/ag.econ.236260.
11. WRAP - Quested T., Johnson H.: *Household Food and Drink Waste in the UK*. Report prepared by WRAP (Waste and Resources Action Programme), Banbury. 2009.
12. Buzby J.C., Hyman J.: *Total and per Capita Value of Food Loss in the United States*. *Food policy*, 37(5), 561 (2012). doi: 10.1016/j.foodpol.2012.06.002.
13. Accenture: *How COVID-19 will permanently change consumer behavior*. [online]. 2020. [cit.2022-06-16]. Available at: https://www.accenture.com/_acnmedia/pdf-123/accenture-covid19-pulse-survey-research-pov.pdf.
14. IPSOS: *Návyky české společnosti se nemění – plýtvání potravinami pokračuje*. [online]. 13. 10. 2015 [cit.2022-06-20]. Available at: <https://www.ipsos.com/cs-cz/navyky-ceske-spolecnosti-se-nemeni-plytvani-potravinami-pokracuje>.
15. CVVM SOÚ AV ČR - Hanzlová R.: *Plýtvání potravinami, nákupní a spotřební chování českých domácností – Potraviný 2021*, press release [online]. Praha, 19. 11. 2021 [cit. 2022-06-20]. Available at: <https://cvvm.soc.cas.cz/cz/tiskove-zpravy/ostatni/ostatni-ruzne/5499-plytvani-potravinami-nakupni-a-spotrebni-chovani-ceskych-domacnosti-potravin-2021>.

16. Parfitt J., Barthel M., Macnaughton S.: *Food Waste within Food Supply Chains: Quantification and Potential for Change to 2050*. Philos. Trans. R. Soc., B: Biological Sciences 365(1554), 3065 (2010). doi: 10.1098/rstb.2010.0126.
17. Stefan V., van Herpen E., Tudoran A.A., Lähteenmäki L.: *Avoiding food waste by Romanian consumers: the importance of planning and shopping routines*. Food Qual. Prefer. 28(1), 375 (2013). doi: 10.1016/j.foodqual.2012.11.001.
18. Lebersorger S., Schneider F.: *Discussion on the Methodology for Determining Food Waste in 816 Household Waste Composition Studies*. Waste Manag. 31(9-10), 1924 (2011). doi: 10.1016/j.wasman.2011.05.023.
19. Neumeyer X., Ashton W.S., Dentchev N.: *Addressing resource and waste management challenges imposed by COVID-19: An entrepreneurship perspective*. Resour., Conserv. Recycl. 162, 105058 (2020). doi: 10.1016/j.resconrec.2020.105058.
20. Aldaco R. and 12 coauthors: *Food Waste Management during the COVID-19 Outbreak: A Holistic Climate, Economic and Nutritional Approach*. Sci. Total Environ. 742, 140524 (2020). doi: 10.1016/j.scitotenv.2020.140524.
21. Hobbs J.E.: *Food Supply Chains during the COVID-19 Pandemic*. Canadian Journal of Agricultural Economics 68(2), 171 (2020). doi: 10.1111/cjag.12237.
22. Qian K., Javadi F., Hiramatsu M.: *Influence of the COVID-19 Pandemic on Household Food Waste Behavior in Japan*. Sustainability 12(23), 9942 (2020). doi: 10.3390/su12239942.
23. Principato L., Secondi L., Cicatiello C., Mattia G.: *Caring more about food: The unexpected positive effect of the Covid-19 lockdown on household food management and Waste*. Socio-Economic Planning Sciences 82(A), 100953 (2022). doi: 10.1016/j.seps.2020.100953.
24. Vargas-Lopez A., Cicatiello C., Principato L., Secondi L.: *Consumer expenditure, elasticity and value of food waste: A Quadratic Almost Ideal Demand System for evaluating changes in Mexico during COVID-19*. Socio-Economic Planning Sciences 82(A), 101065 (2022). doi: 10.1016/j.seps.2021.101065.
25. Sharp E.L., Haszard J., Egli V., Roy R., Te Morenga L., Teunissen L., Decorte P., Cuykx I., De Backer C., Gerritsen S.: *Less Food Wasted? Changes to New Zealanders' Household Food Waste and Related Behaviours Due to the 2020 COVID-19 Lockdown*. Sustainability 13(18), 10006 (2021). doi: 10.3390/su131810006.
26. Berjan S., Vaško Ž., Ben Hassen T., El Bilali H., Allahyari MS., Tomić V., Radosavac A.: *Assessment of household food waste management during the COVID-19 pandemic in Serbia: a cross-sectional online survey*. Environ. Sci. Pollut. Res. 29(8), 11130 (2022). doi: 10.1007/s11356-021-16485-8.
27. Pires, I.M., Fernandez-Zamudio M.A., Vidal-Mones B., Martins R.B.: *The impact of COVID-19 lockdown on Portuguese households' food waste behaviors*. Human Ecology Review, 26(1), 59 (2021). doi: 10.22459/HER.26.01.2020.06.
28. Vittuari M., Masotti M., Iori E., Falasconi L., Gallina Toschi T., Segrè A.: *Does the COVID-19 external shock matter on household food waste? The impact of social distancing measures during the lockdown*. Resour., Conserv. Recycl. 174, 105815 (2021). doi: 10.1016/j.resconrec.2021.105815.
29. Nicewicz R., Bilska B.: *Analysis of Changes in Shopping Habits and Causes of Food Waste Among Consumers Before and During the COVID-19 Pandemic in Poland*. Ochrona Srodowiska i Zasobów Naturalnych 32(3), 8 (2021). doi: 10.2478/oszn-2021-0010.
30. Çavuşa O., Bayhan I., Ismail B.B.: *An Overview of the Effect of Covid-19 on Household Food Waste: How Does the Pandemic Affect Food Waste at the Household Level?* International Journal on Food System Dynamics 13(1), 1 (2022). doi: 10.18461/ijfsd.v13i1.A1.
31. Muresan I.C., Harun R., Andreica I., Chiciudean G.O., Kovacs, E., Oroian C.F., Brata A.M., Dumitras D.E.: *Household Attitudes and Behavior towards the Food Waste Generation before and during the COVID-19 Pandemic in Romania*. Agronomy 12(3), 746 (2022). doi: 10.3390/agronomy12030746.

32. Bogevska Z., Berjan S., El Bilali H., Sadegh Allahyari M., Radosavac A., Davitkovska M.: *Exploring food shopping, consumption and waste habits in North Macedonia during the COVID-19 pandemic*. *Socio-Economic Planning Sciences* 82(A), 101150 (2022). doi: 10.1016/j.seps.2021.101150.
33. Bors, D.: *Data analysis for the social sciences*, SAGE Publications, London 2018.
34. Budíková M., Králová M., Maroš B.: *Průvodce základními statistickými metodami*, Grada Publishing, Praha 2010.
35. Kubíčková L., Veselá L., Kormaňáková M.: *Food Waste Behaviour at the Consumer Level: Pilot Study on Czech Private Households*. *Sustainability* 13(20), 11311 (2021). doi: 10.3390/su132011311.
36. GfK: *Slevové akce: fenomén trhu i v době ekonomického růstu*. (2019). <https://www.gfk.com/press/slevove-akce-fenomen-trhu-i-v-dobe-ekonomickeho-rustu>, staženo 23. 6. 2022.

Změny v postojích domácností k plýtvání potravinami během pandemie Covid-19

Martina MORÁVKOVÁ, Lucie VESELÁ, Lea KUBÍČKOVÁ

Ústav marketingu a obchodu, Provozně ekonomická fakulta, Mendelova univerzita v Brně, Zemědělská 1665/1, 613 00 Brno

Souhrn

Domácnosti, tedy spotřebitelé, patří ve vyspělých zemích Evropy mezi ty články potravinového řetězce, které se největší měrou podílejí na celkovém potravinovém odpadu. To má za následek velké ekonomické, společenské a také environmentální negativní dopady. Pandemie COVID-19, která vypukla na začátku roku 2020, přinesla bezprecedentní změny v celosvětovém měřítku, které prohloubily obavy o zdroje a vedly k ještě větší snaze o snížení plýtvání potravinami. Ačkoliv výsledky již provedených výzkumů nejsou jednotné v pohledu na reálnou změnu v množství vyplývaných potravin u spotřebitele vlivem pandemie, shodují se v tom, že spotřebitelé během pandemie začali o plýtvání potravinami více uvažovat, alespoň se snažili o snížení plýtvání potravinami a také začali v domácnostech více vařit.

Článek se zabývá tím, jak pandemie Covid-19 ovlivnila subjektivní postoje a návyky českých domácností při nakládání a plýtvání s potravinami a tím, k jakým skutečným změnám během pandemie v této oblasti došlo. Výsledky vycházejí z analýzy a porovnání primárních dat (byl využit Mann-Whitneyův test) získaných prostřednictvím dvou dotazníkových šetření mezi českými domácnostmi, jež proběhla v období před vypuknutím pandemie (395 respondentů) a během pandemie (442 respondentů).

V subjektivních odhadech množství vyplývaných potravin domácnostmi je možné zaznamenat změnu směrem k vyšším odhadům množství vyplývaných potravin. Zatímco před pandemií činil tento odhad 12,27 kg/osoba/rok, během pandemie se zvýšil na 15,43 kg/osoba/rok. Také u příčin plýtvání potravinami v domácnostech lze nalézt statisticky významné změny. I přesto, že stále platí znehodnocení potravin během jejího uskladnění, překročení data použitelnosti i trvanlivosti k hlavním příčinám vyhazování potravin, můžeme vysledovat nárůst počtu domácností, které potraviny vyhazují také proto, že nakoupí příliš velké balení a nestihnou ho spotřebovat.

Během pandemie začalo více domácností dělat nákupy potravin pravidelně, zjišťovat stav svých zásob před samotným nákupem a nakupovat velká balení potravin. Také více domácností připouští, že během pandemie je pro ně obtížnější naplánovat přípravu a konzumaci jídel doma tak, aby se nic nevyhodilo a že za nákup potravin pro přímou spotřebu a přípravu jídel vydávají více peněz než před pandemií. Z hlediska jednotlivých kategorií potravin došlo hlavně u ovoce i zeleniny ke snížení frekvence, s jakou jsou v domácnostech vyhazovány, u masných výrobků, doma uvařených příloh a přinesených hotových jídel z restaurací je to ale naopak. U pečiva nebyla pozorována žádná statisticky významná změna v obou obdobích, i když pečivo spolu s ovocem a zeleninou stále zůstává nejčastěji plýtvaným druhem potravin.

Klíčová slova: plýtvání potravinami, domácnosti, změny vlivem pandemie Covid-19, subjektivní postoje