



Food-related consumer behaviours in times of crisis: Changes in the wake of the Ukraine war, rising prices and the aftermath of the COVID-19 pandemic

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ABSTRACT

When the COVID-19 pandemic subsided, the war in Ukraine led to further disruptions in consumers' daily behaviours, with rising prices for food and energy. We conducted a survey study on self-reported changes in food-related consumer behaviour in ten European countries and compared the results to a similar study conducted two years ago. A latent class cluster analysis distinguished five clusters and showed that different types of consumers can be distinguished based on how they react to the crisis as regards their eating habits. 19% of survey participants reported no major changes, and 32% reported changes mostly in terms of more price sensitivity. Among those that reported changes beyond reacting to higher prices, there are indications of more mindful eating and more deliberate choices. The changes already found earlier in response to the COVID-19 pandemic therefore seem to have been strengthened and supplemented by reactions to price increases. The results present a challenge to the food industry in terms of supplying healthy and sustainable food at affordable prices.

1. Introduction

Consumers around the world have experienced increases in the costs of living, including energy and food, during the past year, with annual inflation rates reaching up to 10% and even above in some countries. In the European Union, the annual inflation rate in food prices was 10.4% in August 2022, at the time of our study (European Union, 2022). The rise in prices was higher than it had been in more than 20 years, and public concern has risen about vulnerable consumer groups and how they can cope with daily expenses for heating, housing and buying food (Causa et al., 2022).

The price increases are directly or indirectly rooted in the situation in Ukraine. After the crisis escalated to open war in February 2022, there were immediate repercussions on the world trade of cereals, as Ukraine is one of the largest exporters of cereals in the world and its production has been severely impacted. This had two effects: less cereal available on the world market, especially for developing countries, and a surge in prices. European leaders condemned the Russian invasion of Ukraine and set up a number of sanctions that have made fossil energy sources

less accessible and more expensive, which is reflected in the price of food as well, as many food products require energy-consuming processing (e.g. bakery products) or storage (e.g. frozen products). Reduced export of fertilisers from Russia has had a further negative impact on food production in the world. These developments have resulted in concerns about how current food systems can accommodate these developments and whether they will result in major shortages in food supply in addition to the current price increases (Mbah & Wasum, 2022; Rose et al., 2023).

The Ukrainian war and subsequent price increases come in the wake of the COVID-19 crisis, that resulted in certain changes in consumer behaviour: consumers prepared more food at home, online buying of food and ready-to-eat meals increased and people's involvement with preparing meals and eating them at home with their families seemed to increase, together with, at least for some consumers, a tendency towards more mindfulness in their food choices (Grunert et al., 2021). Very few studies have explored whether COVID-19 has resulted in permanent changes in consumers' food choices and food-related behaviours, or whether consumers returned to their pre-COVID behaviours, and no

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studies as of now have investigated how the high inflation rate in 2022 and increased food prices have affected food-related consumer behaviours on top of the changes observed, at least for some consumers, during COVID-19.

The primary objective of our study is to find out how the increases in prices associated with the war in Ukraine are perceived by consumers and what kind of changes they have adopted in their food choices. Secondly, as the current crisis with increased prices is closely following the COVID-19 crisis - which also caused some changes in food-related behaviours - we wanted to compare the changes in the current crisis with those reported during the COVID-19 pandemic. On this background, our objective was to answer the following two research questions:

- How have consumers' food-related behaviours changed due to rising food and energy prices in the wake of the Ukraine war?
- How do changes in food-related behaviours due to rising food and energy prices in the wake of the Ukraine war compare to the changes observed due to the COVID-19 crisis?

2. Conceptual approach

Our point of departure is that crises are disruptive events that, by making fundamental changes to the environment in which consumer behaviour unfolds, can break existing habits and potentially encourage the formation of new ones. Much of food-related behaviours are habitual and occur without too much conscious thought (Köster, 2009), but habits thrive best in stable environments (Verplanken & Aarts, 1999), and crises can therefore potentially break habits.

Consumer reactions to the COVID-19 pandemic have been investigated quite thoroughly, although limited evidence exists on the extent to which the changes observed have remained stable. In the study by Grunert et al. (2021), based on data from ten European countries, a majority of consumers (60%) reported no major changes, but the rest reported more family meals, more time in the kitchen, more innovativeness and more enjoyment in cooking. Of those who reported changes, a majority also seemed to adopt a more mindful approach to food choice, although the opposite change was also observed. This is in line with other studies (De Backer et al., 2021; Molina-Montes et al., 2021) that focused on the health aspect in people's diet, and with the conclusions in a recent review of COVID-related changes from a family perspective (Titis, 2022). Little is known about whether these changes are evolving to a 'new normal' or reverting to 'old habits' now that the pandemic restrictions have been lifted. A few pieces of knowledge are available, though. A recent review suggests that better food waste management, which was one reaction observed during COVID, is still important for consumers post-pandemic (Borghesi & Morone, 2023). There is mixed evidence regarding the persistence of online shopping. A study of German consumers showed that while more than 10% of the consumers avoided physical stores during the lockdown, almost all of them returned afterwards (Brüggemann & Olbrich, 2022). According to a study of US consumers, overall spending is similar to pre-pandemic levels, with the exception of a 28% decrease in prepared food spending (Said et al., 2023). This study also demonstrates a transition in spending channels toward pickup and delivery modes. This suggests that the pandemic-induced experience with alternative delivery channels and increased use of online platforms is likely to persist over time. In contrast to the significant variations in spending at the start of the pandemic, this stability appears to be an indication of a developing *steady state* for spending behaviour (Salon et al., 2021).

Another stream of literature of relevance here is how people have reacted to food scares (e.g., BSE, e.Coli poisoning, listeria in chicken). In a review on the evidence on consumer reactions to major food scares since the mid-90s (Wansink, 2004), it was concluded that while the immediate reactions may be drastic, in the longer perspective consumers revert to their pre-scare patterns of behaviour.

Food scares were mostly food safety-related, and the COVID-19 pandemic, as far as food was concerned, was mostly related to restrictions with regard to shopping and eating out, and to changes in family life that had food-related consequences. The current situation is different in its focus on prices and the cost of living. There may be a parallel to the situation during the financial crisis, which resulted in income loss for many people. In 2008 and 2011, the world food price index was breaking records and it was estimated that up to 44 million people were driven into poverty and there was a surge in food riots in several low-income countries (Berazneva & Lee, 2013). Bonaccio et al. (2018) sought to examine the impact of the financial crisis on dietary habits, using results from the INHES study, a survey on nutrition and health conducted in Italy from 2010 to 2013. They found that participants who reported a negative impact of the economic crisis had a lower adherence to the Mediterranean diet - which is often used as a proxy for healthy eating - and a reduced quality of grocery products. The opposite was true for participants who reported no impact of the crisis. A study on Greek families similarly investigated whether the effect of the financial crisis on food spending had changed dietary habits (Kosti et al., 2021). Participants whose food spending had been impacted by the financial crisis reported a decreased consumption of fruits and vegetables, and an increased consumption of nutrient-poor foods. These studies thus suggest that rising costs of living lead to a less healthy diet.

In addition to the physical health of consumers, their mental health should also be considered. The accumulation of current challenges - the COVID-19 pandemic, climate change, wars, depletion of natural resources - could impact consumers' psychological wellbeing. A recent study revealed that young adults were more preoccupied by 21st century challenges and more willing to change habits in the future, while older adults reported the lowest scores (Barchielli et al., 2022). The study also found an association between anxiety, depression, stress, and concerns for the 21st century.

In response to sudden surges in food prices, much research focused on the causes of the food price peaks and how to avoid them. Less research focused on changes in consumer behaviour due to food price peaks. According to economic theory and particularly utility theory, consumers react to price changes by substituting relatively cheaper products for more expensive ones, i.e., a substitution effect kicks in that lowers demand for goods that became more expensive and increases demand for goods that become relatively less expensive. In addition, as price increases lower purchasing power, an income effect kicks in as well, which lowers demand for food products. The overall effect strongly depends on price and income elasticities of demand, e.g. on whether it is a luxury, normal or inferior good. It has been shown that consumers react to price changes linked to food policy taxes and subsidies and that these could be a way to steer consumers towards more healthy food purchases (Waterlander et al., 2019). A systematic literature review on consumers' reaction to price changes revealed that food away from home, soft drinks, juice and meats are most sensitive to price changes (Andreyeva et al., 2010). However, most studies focus either on relative changes in prices in industrialized countries where consumers can more easily move away from the product that becomes relatively more expensive or on the poverty and inequality impacts of food price peaks in low-income countries. Little research so far has focused on the overall impact of overall food price peaks on consumer behaviour in industrialized countries.

In analysing consumer reactions to the current situation and how they compare to the reactions during COVID, we adopt a broad view of food-related consumer behaviours, and we adopt an approach largely similar to the one used in Grunert et al. (2021) in order to facilitate comparison with the results reported in their study. We therefore focus on self-reported changes in food-related consumer behaviours along the meal provisioning chain, covering behaviours related to shopping, choosing products, meal preparation, eating and waste handling. We supplement this broad focus with a special focus on perceptions of and reactions to price increases. In addition, we look at four groups of factors

that can have an impact on the extent of change: demographic characteristics, food-related goals, trust, and crisis-induced distress and the ability to cope with crises (Fig. 1). In addition, we look at how these meal provisioning changes affect food consumption and consumer well-being.

3. Methodology

3.1. Data collection

Data were collected in 10 European countries: Spain, Sweden, Germany, UK, Poland, Italy, France, Greece, Finland and Romania. The countries were selected to have good geographical spread within Europe and to have diversity in terms of food, as evidenced by the fact that 7 of our 10 countries map into 7 different food clusters in the analysis of food cultures by Askegaard and Madsen (1998; their analysis did not include the 3 remaining countries). Also, for comparison purposes, the selection of countries is the same as in the study by Grunert et al. (2021), who also documented how these countries differed both in the severity with which they were affected by COVID-19 and in the way authorities handled it.

A total of 6324 respondents participated in the study. Data were collected in August 2022. The questionnaire was developed in English and translated into the other languages. It was proofread and pretested before the actual fieldwork. Data were collected using Compusense Cloud software (Compusense Inc. Guelph, Canada). Consumers were recruited via Cint (www.cint.com). In each country equal quotas were set for gender and for the age groups 18–40, 41–60 and 61–100. The average response time to complete the survey was 23.6 min (range 21.4–23.6 min). The Aarhus University Committee on Research Ethics approved the study protocol and all participants agreed to an informed consent statement in the beginning of the questionnaire. Socio-demographic characteristics of the participants are shown in Table 1.

3.2. Measures

Perceived changes in food-related behaviours were measured using 24 items selected from the modular food-related lifestyle instrument

(Brunso et al., 2021). These items are identical to those used in the study by Grunert et al. (2021) on changes in food-related behaviours induced by the COVID-19 pandemic. The items can be seen in Fig. 6. In line with the study by Grunert et al. (2021), items were scaled using a 7-point scale with labels 1-much less than before, 4-unchanged, 7-much more than before.

For 13 different food groups that can be seen in Fig. 8, respondents were asked whether they had seen no price increases/small price increases/significant price increases. They could also answer 'not sure' or 'not applicable'. For those food groups where respondents had noticed price increases, they were then asked how they reacted to these. Possible answers were *bought less of this product/switched to a cheaper brand/bought this product somewhere else/stopped buying this product altogether*. Respondents could select multiple options.

Food consumption changes were measured for the same 13 food groups. Respondents replied on a 5-point scale with labels 1-significant decrease in consumption, 3-no change in consumption, 5-significant increase in consumption, supplemented by the options 'not sure' and 'not applicable'.

Trust in food chain actors was measured using four single-item measures of trust in farmers, food manufacturers, retailers and authorities, adapted from Macready et al. (2020), to be answered on a 7-point scale anchored 1-I trust them much less than before and 7-I trust them much more than before. Social trust was measured using 3 items from Gefen and Straub (2004).

Food-related goals were measured using items from Dean et al. (2008). These measure the importance of 11 food-related goals (e.g., 'eat a healthy diet', 'choose food products and dishes that you enjoy eating' on a scale from 1-low importance to 7-high importance).

Satisfaction with food-related life was measured using the 5-item scale developed by Grunert et al. (2007). Overall satisfaction with life was measured using the 5-item scale from Diener et al. (1985). In addition, the happiness and domain-specific life satisfaction scale by Fugl-Meyer et al. (1991) was administered.

Respondents were asked about their degree of concern with a number of issues: COVID-19, the war in Ukraine, climate change, food shortages and rising energy prices. Respondents answered by a 7-point scales anchored 1-very little and 7-very strong.

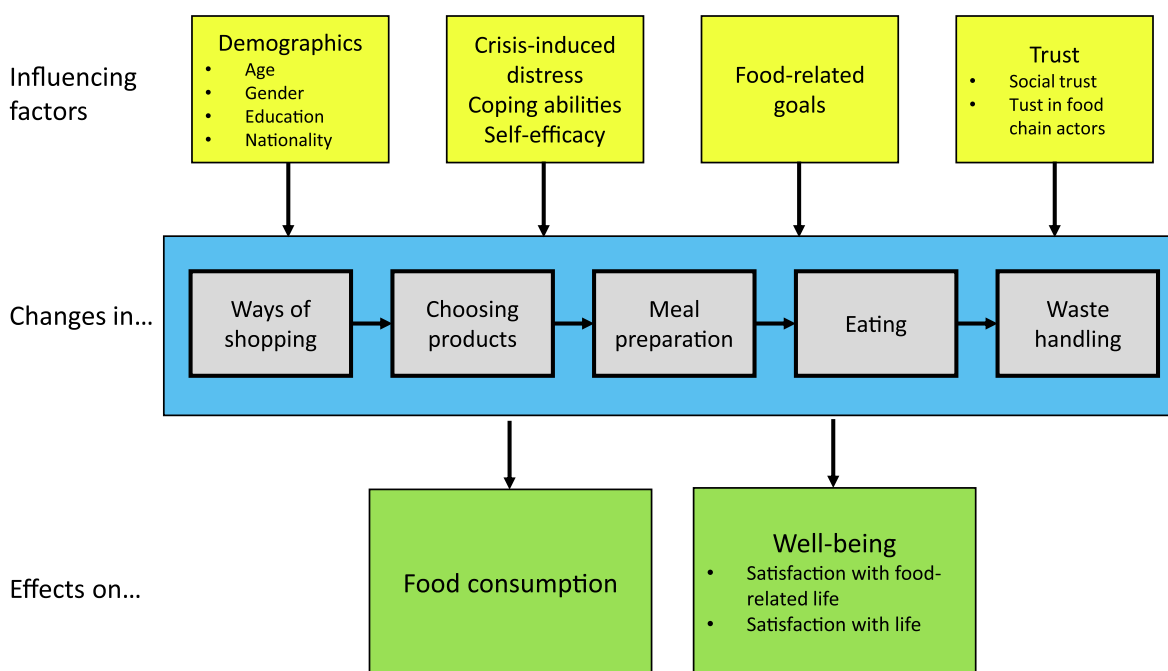


Fig. 1. Conceptual model
Adapted from Grunert et al. (2021).

Table 1
Socio-demographic characteristics of the sample (%).

	Spain N = 601	Sweden N = 717	Germany N = 601	UK N = 654	Poland N = 644	Italy N = 621	France N = 614	Greece N = 594	Finland N = 613	Romania N = 665	Total N = 6324
Gender											
Female	49.3	50.8	50.6	52.4	53.1	52.1	52.3	48.1	51.1	50.7	51.1
Male	50.7	49.2	49.4	47.2	46.9	47.9	47.7	51.9	48.6	49.3	48.9
Mean age in years											
18–40 years	48.6	48.9	50.5	51.5	47.5	48.1	48.7	47.1	48.9	46.6	48.6
41–60 years	35.1	35.7	32.6	31.8	34.5	35.4	34.9	36.7	36.9	38.0	35.2
61–100 years	34.5	33.2	35.8	31.3	38.6	38.1	34.9	38.0	32.8	35.2	35.2
30.4	31.1	31.6	36.9	26.9	26.5	30.2	25.3	30.3	26.8	29.6	29.6
Education											
Primary school	2.0	11.0	8.7	0.8	3.0	2.3	1.9	1.3	11.7	0.6	4.4
Secondary school	22.8	41.0	30.0	28.1	37.7	23.0	32.0	20.7	46.5	8.7	29.1
Higher education (not University)	27.1	17.4	35.9	28.0	10.4	38.3	23.1	18.4	20.6	30.8	24.9
University (First degree, Bachelor's degree)	33.8	22.7	13.8	31.0	14.0	15.3	26.8	36.2	8.8	43.3	24.6
University (Higher degree, Master's degree, PhD)	14.3	7.8	11.6	12.1	34.9	21.1	15.9	23.4	12.4	16.4	16.9
Shopping											
Responsibility for food shopping	79.0	71.5	75.4	75.2	74.1	80.9	76.1	84.5	75.2	70.4	76.1

Resilience in crises was measured by using the 15 items measuring the *resilience to crisis* and *resilience to uncertainty* dimensions of the I-ADAPT scale (Ployhart & Bliese, 2006).

Self-efficacy in a situation of rising food prices was measured by 6 items developed for this study, rated on a 7-point totally disagree-totally agree scale. An example item is *Despite higher food prices I am capable of choosing food products and dishes that I enjoy eating*.

Emotional reactions to recent price increases and food shortages were measured by 7 items on a 7-point frequency scale (*never/very rarely/rarely/sometimes/frequently/very frequently/all the time*): feeling hopeless, feeling restless or fidgety, feeling that everything requires more effort, feeling worthless, feeling nervous, feeling so depressed that nothing can cheer me up, feeling of struggling financially. The first six items are from the K6 scale of psychological distress (Kessler et al., 2002), the last item was added in the study by Grunert et al. (2021).

Demographics were ascertained by standard measures for gender, age, education, country of residence and nationality. In addition, respondents were asked whether their financial situation is today better or worse than before COVID-19 (7-point scale with anchors 1-much worse, 7-much better).

A few other measures were included that are not relevant for the present paper.

3.3. Analysis

Items measuring perceived changes along the meal provisioning chain were recoded into three categories, less/no change/more, for subsequent analysis.

Measures with multi-item scales (satisfaction with food-related life, overall life satisfaction, social trust, resilience to crisis, resilience to uncertainty, self-efficacy, psychological distress) were transformed into mean scores. Cronbach's alpha was computed for these scales both for the overall sample and per country; all values were >0.75. The four items measuring trust in the four food chain actors were transformed to a formative index of overall trust by summing them up.

A multilevel latent class analysis was performed on the 24 recoded items measuring perceived changes in food-related behaviours along the meal provisioning chain. By comparing similar patterns of responses to the variables that serve as the basis for clustering, latent class analysis estimates the respondents' likelihood to belong to one of a set of latent classes. Multi-level latent class clustering is used when respondents differ, not only in terms of their individual responses to the items that

form the basis for the clustering, but are in addition also organized into groups that are expected to have an effect on their pattern of responses (Vermunt, 2008). In this case, where respondents come from ten different countries, the second level of units is country of residence.

Latent class solutions were estimated for 1 to 7 clusters of respondents and for 1 to 3 groups of countries. A combination of a fit criterion, most commonly the Bayesian Information Criterion (BIC), and interpretability of the cluster solution are typically used to determine which cluster solution is chosen (Vermunt & Magidson, 2002). The model with the lowest BIC would typically be chosen (Paas, 2014). However, with large samples, the BIC continuously decreases as the number of clusters increases; as a result, a solution is chosen when the decrease of BIC when increasing the number of clusters is marginal (<1%). A 5-cluster solution was selected, because it seemed like the optimum balance between fit and interpretability, as further increases in the number of clusters resulted in a decrease of BIC of ≤1%. Additionally, the fit was examined for 1 to 4 groups of countries for each cluster solution. For cluster solutions consisting of 3 to 5 clusters, the fit was best for 2 country groups. Therefore, the optimum solution finally selected involves 5 groups of respondents and 2 groups of countries. BIC measures for 1–7 clusters and 1–4 groups of countries are shown in Table 2. The latent class clustering analysis was done in LatentGold 6.0 (Statistical Innovations, Arlington, MA).

To profile the clusters, a multinomial logistic model was adopted, using as baseline cluster the *resilient* cluster. This model identifies which factors affect the likelihood to belong to one cluster compared to the baseline one. The explanatory variables were demographics, psychographic variables and the various conditions linked to the current crisis and concerns. Demographics include age, gender, country of residence and level of education. Psychographic variables include trust in actors (i. e., farmers, manufacturers, retailers, and authorities), social trust and food-related goals. Variables that capture the conditions linked to the current crisis and concerns include satisfaction with their food-related life in relation to food, satisfaction with their life in general, less income compared to pre-COVID, emotional reactions to the current challenges, and the two dimensions of the I-ADAPT scale. A proxy for happiness level was included. This was based on the participants' self-assessment of their satisfaction with their life in terms of leisure time, work, ability to manage their self-care, financial situation, sexual life, partnership situation, family life, contacts with friends and acquaintances. Level of self-efficacy, measured by their self-assessed ability to fulfil their food-related goals despite the current Covid-19 and Ukraine

Table 2

Bayesian Information Criterion based on the log-likelihood (BIC-LL) for models with 1–4 country classes and 1–7 clusters.

	1 country class	2 country classes	3 country classes	4 country classes
1 cluster	300,726	300,735	300,743	300,752
2 clusters	282,444	282,351	282,347	282,365
3 clusters	272,136	272,029	272,037	272,067
4 clusters	266,473	266,357	266,379	266,394
5 clusters	265,034	264,589	264,995	264,638
6 clusters	263,365	263,276	263,237	263,311
7 clusters	261,989	261,917	261,911	261,941

Multi-level latent class cluster analysis based on 6234 respondents in 10 countries.

crisis, was also included in the model as explanatory variable. Finally, variables on concerns cover their worry for getting Covid-19, the war in Ukraine, climate change, food shortages and rising energy prices. All the analyses were carried out with STATA (StataCorp, College Station, TX).

4. Results

4.1. Perception of price increases and reactions to them

For the majority of food categories, participants reported noticing price increases. Participants particularly observed significant price increases in animal products. Significant price increases in red meat, fish, and dairy were reported by 55.5%, 52.4% and 51.1% of the participants, as reported in Fig. 2.

Different strategies were adopted by consumers in reaction to the price increases: they buy less, opt for a cheaper brand, shop in a different store, or stop buying certain food products (see Fig. 3).

Nearly 4 in 10 consumers (36.8%) report that they are buying less red meat, while a third are buying less fish (33.4%) and less poultry (32.5%). Some consumers have also ceased the purchase of certain products entirely; one in ten consumers (9.8%) stopped buying alcoholic beverages, and 12.4% stopped buying convenience foods. When it comes to cereals and dairy products, a third of the participants (35.2% and 33.3%, respectively) reported having switched to a cheaper brand.

4.2. Latent class analysis

A multi-level latent class analysis was performed in order to investigate differences in self-reported changes in food-related behaviours. This analysis led to the selection of a solution with five clusters of consumers and two groups of countries. Results are visualized in Figs. 4, 5 and 6.

Cluster 1, *more price sensitive*, is the biggest one, accounting for 32.5% of the sample. People in this cluster report checking prices more and throwing food away less than before COVID-19, but otherwise report few changes in their food-related behaviours. Cluster 2, *more mindful food choices*, is close in size to Cluster 1, accounting for 32.2% of the sample. People in this cluster report many changes in their food-related behaviours. They report being more aware of prices and use-by-dates, product information on food labels, packaging, and the presence of additives and preservatives in the food. They report throwing away less food, which is also the case in Cluster 1 and Cluster 3. Interestingly, they report that eating is a very exciting and sensory experience and pay more attention to their diet to control their weight. Cluster 3, *resilient*, is third in size, accounting for 19.0% of the sample. Its main characteristic is that the people in this cluster report no changes in their food-related behaviours compared to pre-COVID-19. Cluster 4, *less food involvement*, accounts for 8.9% of the sample. In this cluster, food involvement decreases, and people report doing less of most of the

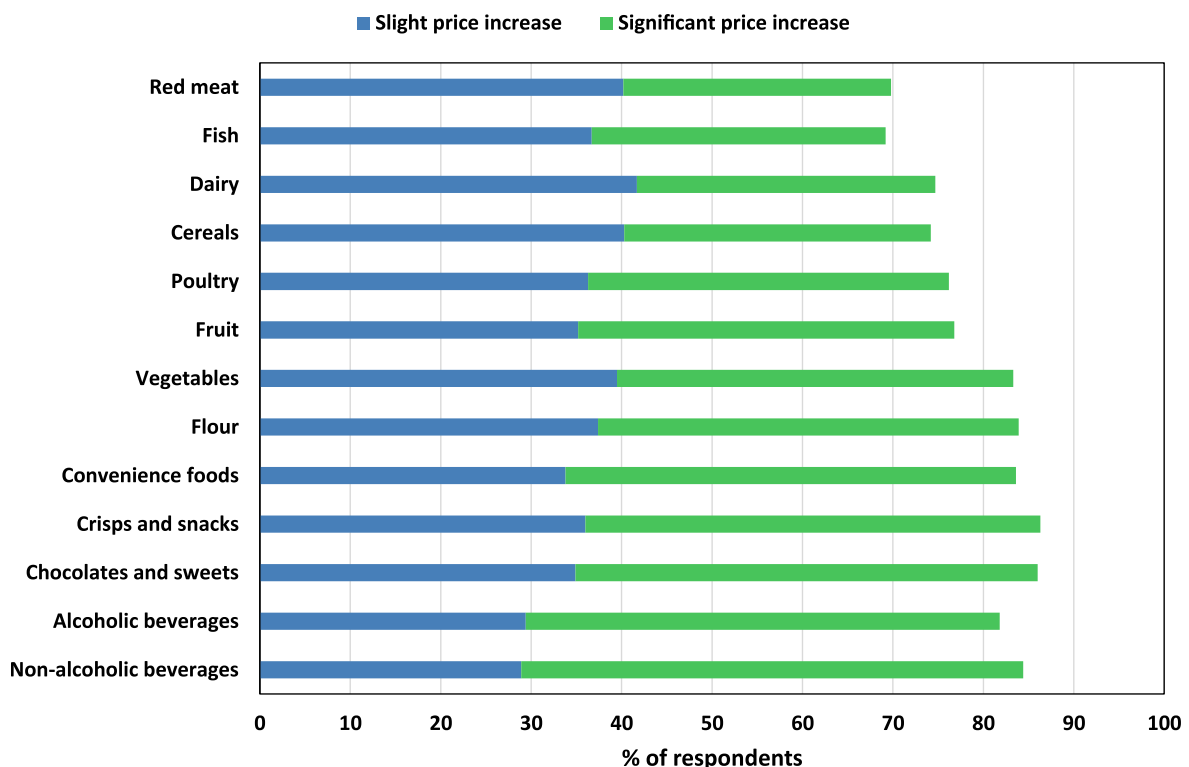


Fig. 2. Perception of price increases for different food categories % of respondents in survey, n = 6234.

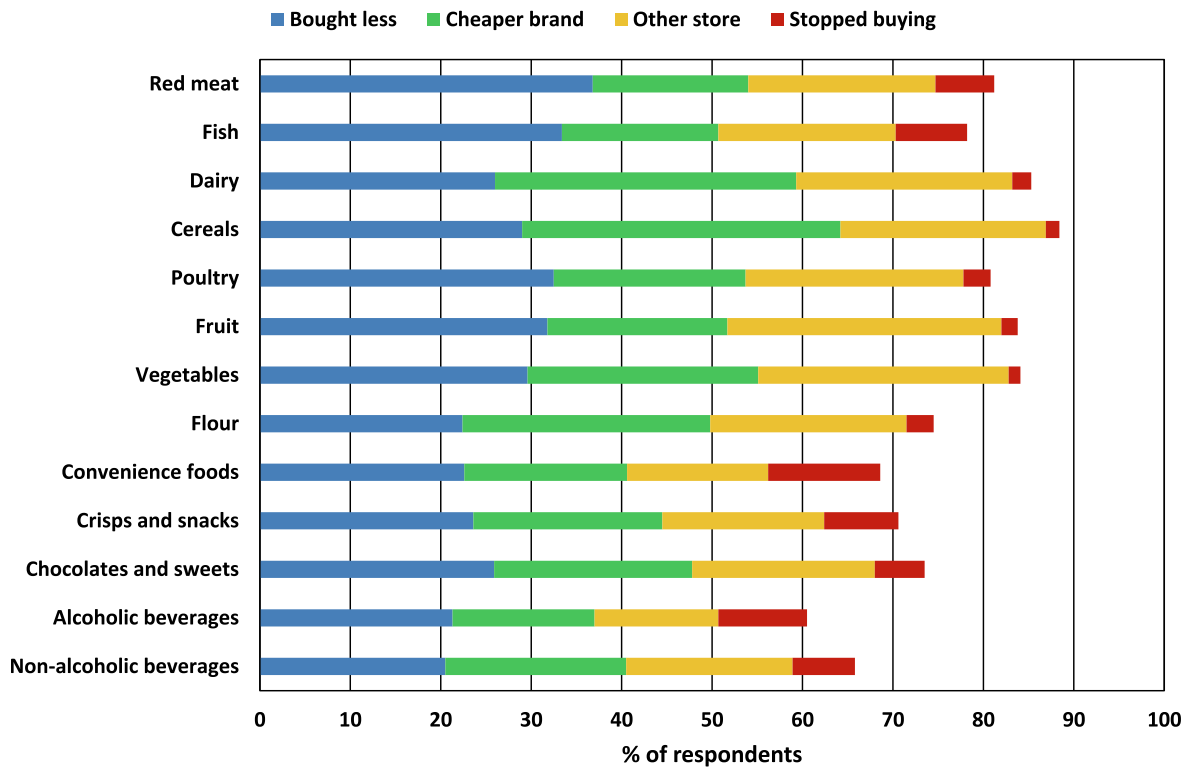


Fig. 3. Reactions to price increases for different food categories % of respondents in survey, n = 6234.

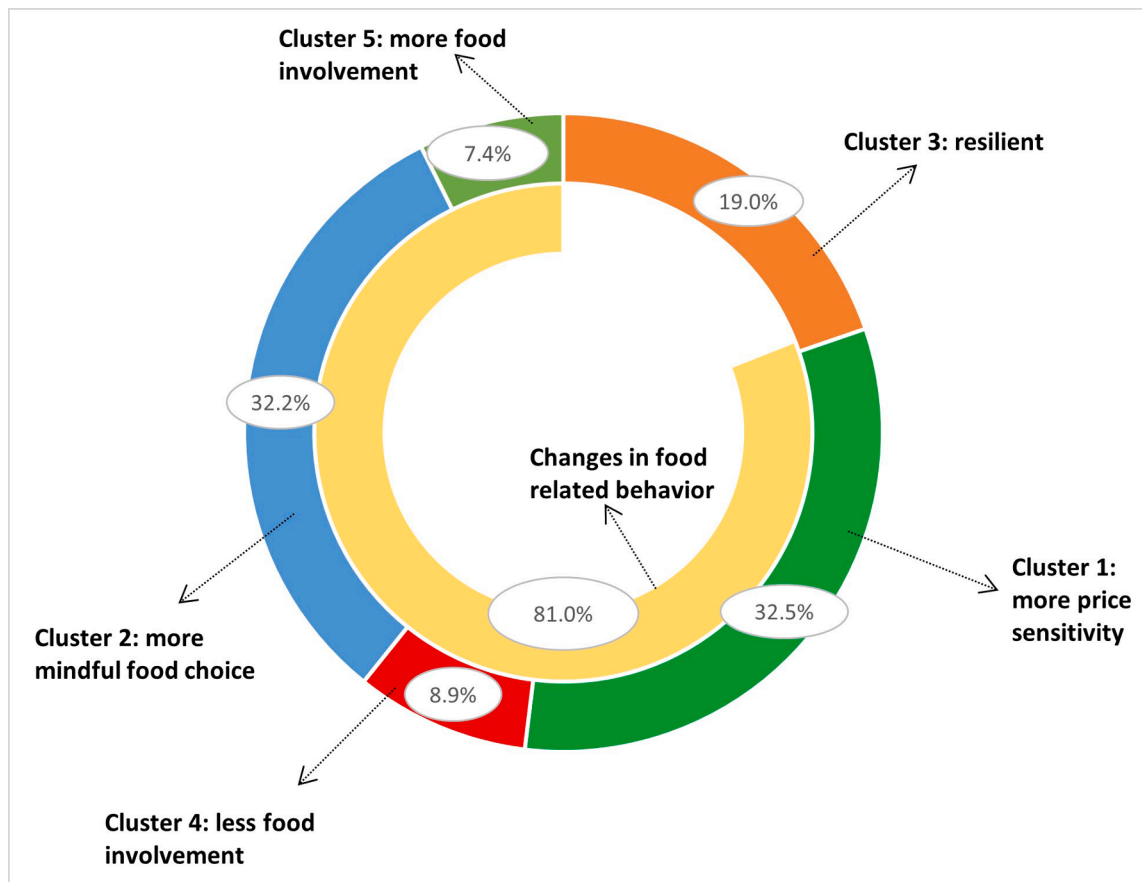


Fig. 4. Clusters of change % of respondents in survey, n = 6234.

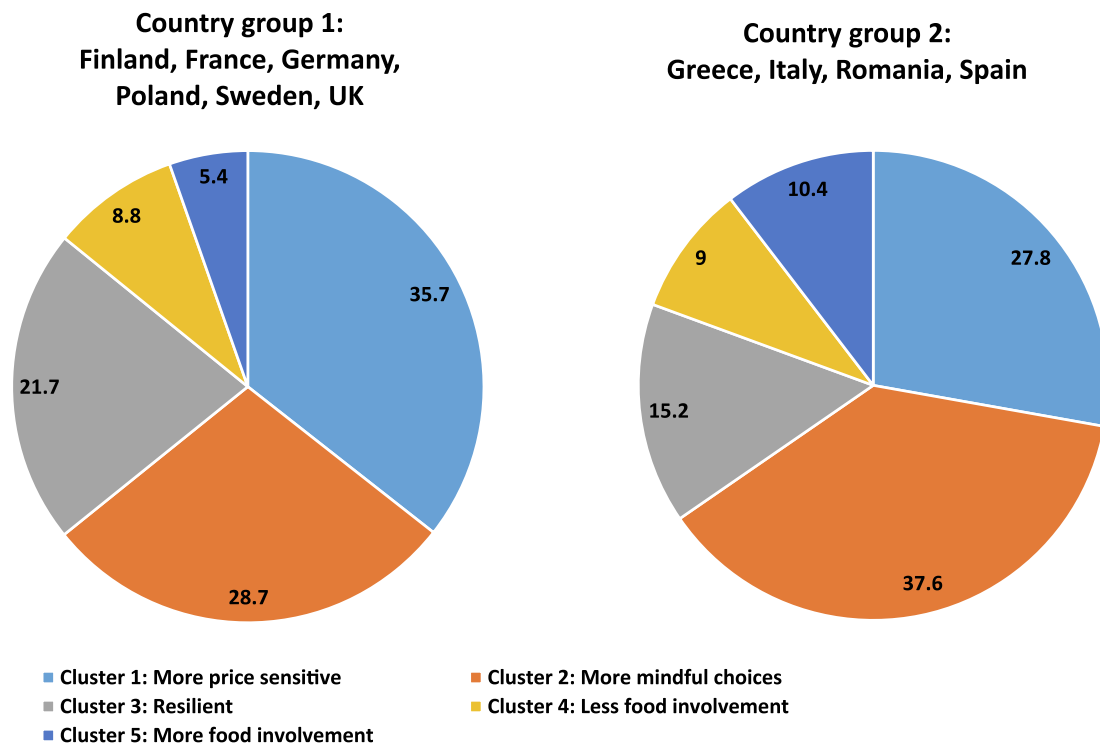


Fig. 5. Distribution of change clusters in two country groups % of respondents in survey, n = 6234.

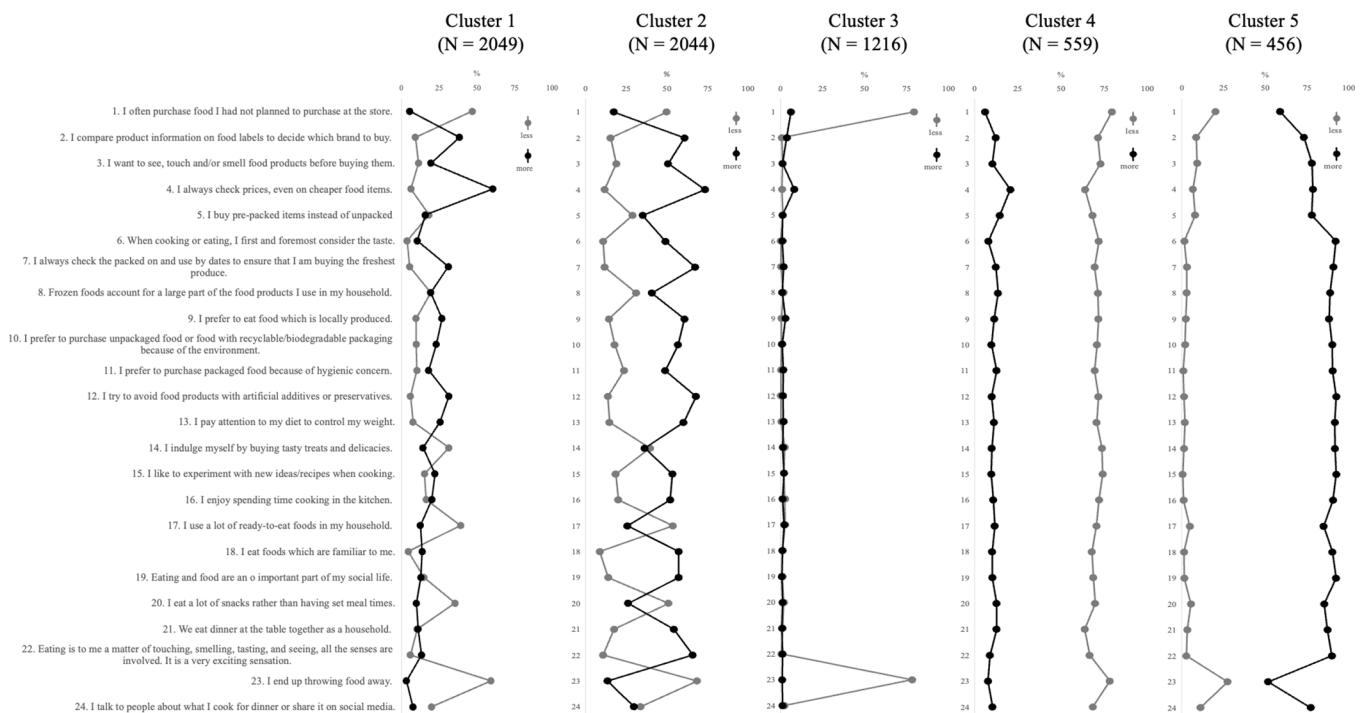


Fig. 6. Share of respondents increasing or decreasing behaviours in the clusters.

behaviours assessed. Cluster 5, *more food involvement*, accounts for 7.4% of the sample. In this cluster, food involvement increases, and people report doing more of most of the behaviours assessed.

As a result of the country grouping variable, there are two groups of countries, a Northern group comprising Finland, France, Germany, Poland, Sweden and the UK, and a Southern group comprising Greece, Italy, Romania, and Spain. In the Southern group, respondents reported

more changes across all categories, whereas in the Northern group they reported fewer changes, except for becoming more price sensitive.

4.3. Cluster profiling

Fig. 7 shows percentages of respondents not reporting any reaction to price changes, even though price changes were perceived, for the five

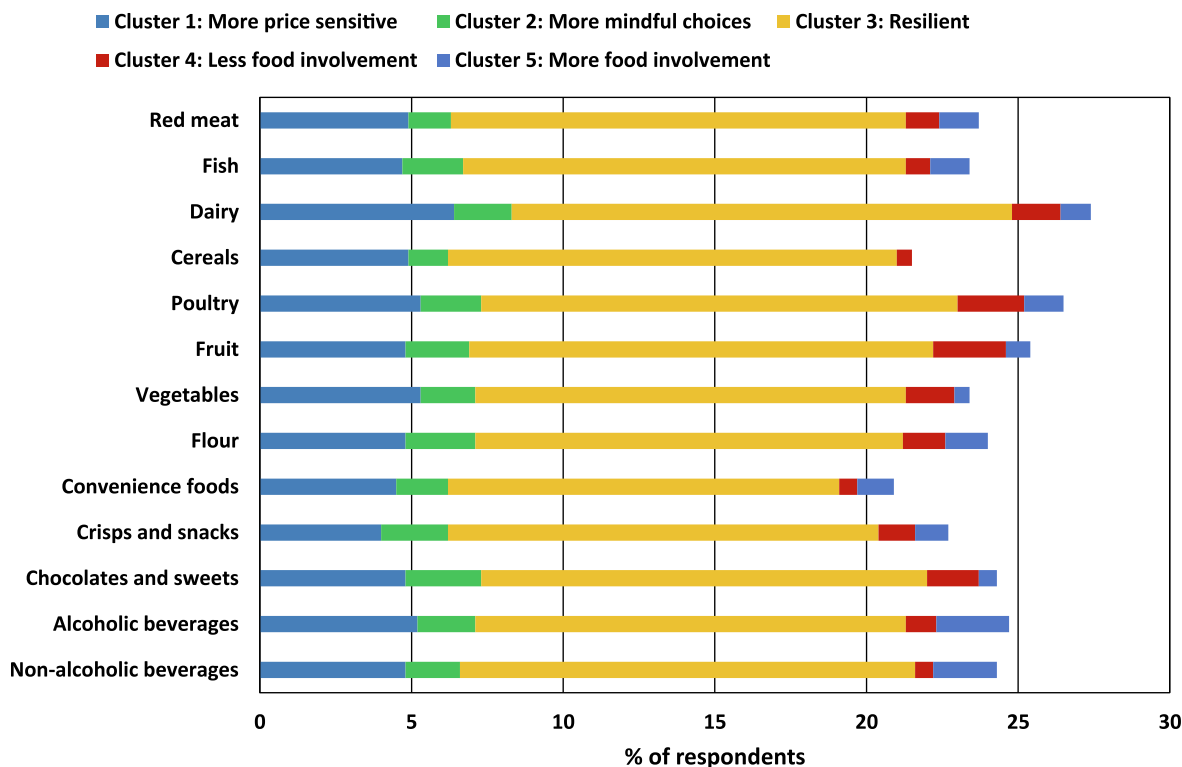


Fig. 7. Share of respondents not reporting reactions to perceived price increases by product category.

clusters and per food category. The food category where the most people did not report a change despite noticing price increases is the *dairy products* category, but the percentages of *no reaction* participants are quite similar across food categories (Fig. 7). People reporting no reactions to perceived price increases are, not surprisingly, more likely to

be in the *resilient* cluster.

Fig. 8 shows that clusters are quite different based on the self-reported changes in food consumption. Clusters 1 and 2 were most similar in that respondents reported consuming less red meat, fish, expensive food products, and more inexpensive food products.

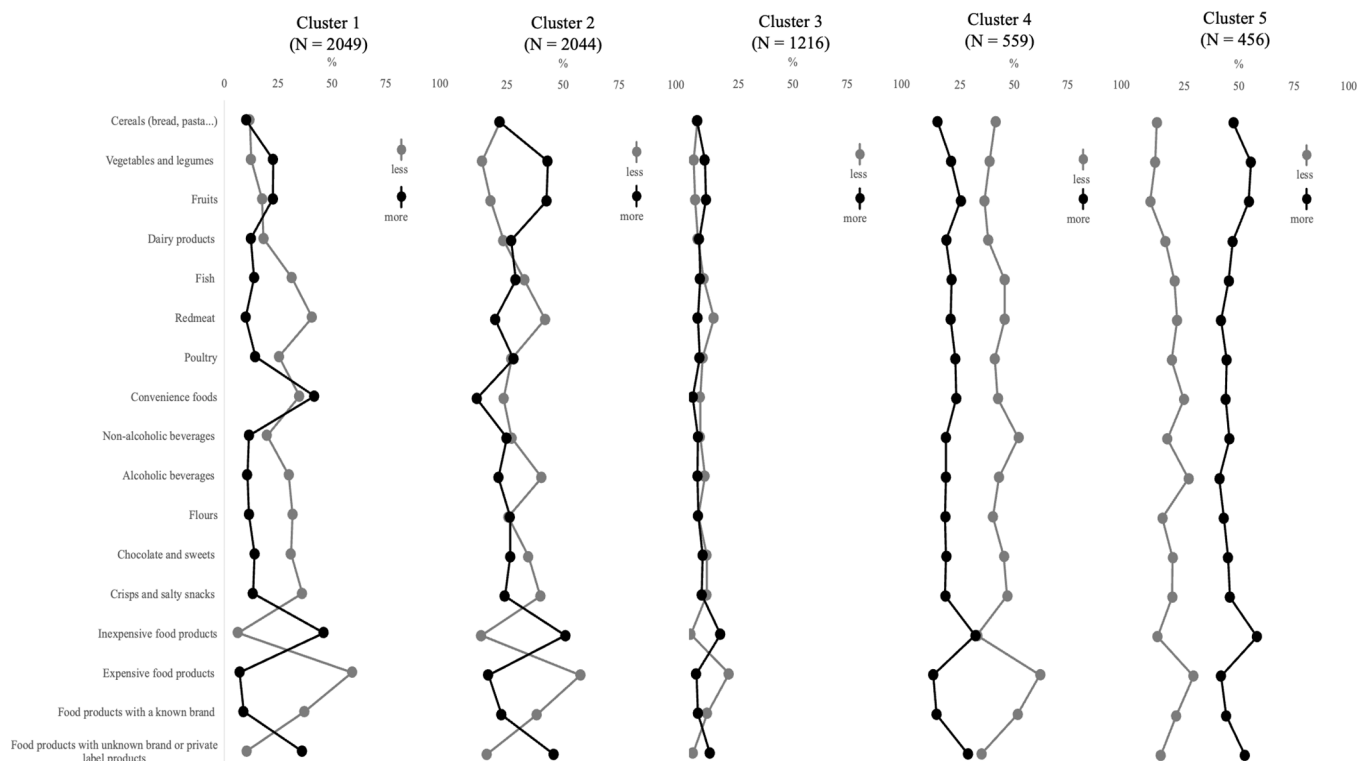


Fig. 8. Decrease and increase in self-reported consumption of foods in the five clusters.

Respondents in cluster 3 reported least changes. Respondents in cluster 4 used less of almost everything expect inexpensive food products. Respondents in cluster 5 used more of almost all food categories.

Table 3 shows the results of the logistic regression. Compared to the resilient cluster, all clusters report being more worried about food shortages and having more negative emotions during this crisis (such as being more stressed, feeling more hopeless and nervous). With the exception of the *more food involvement* cluster (7.4% of the sample), they also give more priority to cooking for other people. However, except for the more food involvement cluster, they also report to be less able to fulfil their goals and priorities in terms of food consumption.

In the *more price sensitivity* cluster (32.5% of the sample), people pay more attention to a healthy diet and having low food expenditures compared to the resilient cluster. They also value more being able to cook for other people and are less keen to opt for easy and quick food options. During this crisis, they felt to be more stressed and to be less

able to pursue their goals related to food. They also have less trust towards actors in the food sector. While they worry less about COVID-19, they are concerned about food shortages and rising energy prices.

In the *more mindful eating* cluster (32.2% of the sample), participants are younger and are less likely to come from Sweden compared to the resilient cluster. In terms of education, this cluster has more members who obtained a Master's degree or a higher level of education. It is important to eat a healthy diet and keep the food traditions of their region or country for them. They also value being able to cook for other people and having time to cook. On the other hand, they are not keen to choose products that are quick to prepare.

They report being more satisfied with their food-related life, however they also felt more stressed and hopeless during this crisis. Nonetheless, they also stated feeling more resilient to face a crisis and uncertainty in the future. In addition, they report being less worried about the war in Ukraine, but, on the other hand, show more concerns

Table 3
Results of the multinomial regression, base = cluster 3: Resilient.

Variables	Cluster 1: more price sensitivity (32.5%)		Cluster 2: more mindful eating (32.2%)		Cluster 4: less food involvement (8.9%)		Cluster 5: more food involvement (7.4%)	
	Coeff	P value	Coeff	P-value	Coeff	P value	Coeff	P-value
Demographics								
Age (reference: 18–40)								
41–60	−0.025	0.798	−0.729	0.000	−0.326	0.013	−1.200	0.000
61–88	0.111	0.300	−0.667	0.000	−0.358	0.020	−1.883	0.000
Gender (reference: female)	−0.082	0.296	0.158	0.053	0.027	0.812	0.054	0.703
Country (reference: Spain)								
Sweden	−0.038	0.795	−0.383	0.031	0.335	0.219	−0.252	0.403
Germany	0.192	0.288	−0.246	0.189	0.180	0.541	−0.214	0.510
UK	0.266	0.122	−0.010	0.957	0.721	0.010	−0.312	0.337
Poland	0.185	0.322	0.087	0.644	0.750	0.007	0.240	0.438
Italy	−0.132	0.473	−0.198	0.275	0.158	0.582	−0.054	0.850
France	−0.037	0.834	−0.254	0.158	0.154	0.580	−0.593	0.062
Greece	0.273	0.173	0.149	0.455	0.881	0.002	0.317	0.302
Finland	0.233	0.204	0.127	0.504	1.077	0.000	−0.535	0.110
Romania	0.021	0.908	0.301	0.110	1.083	0.000	0.487	0.082
Education (reference: primary school)								
Secondary school	−0.037	0.839	−0.169	0.399	−0.228	0.376	−0.151	0.711
Higher education (not university)	0.212	0.267	0.204	0.326	0.034	0.899	0.298	0.471
Bachelor	0.279	0.153	0.329	0.119	−0.069	0.801	0.420	0.312
Master's	0.295	0.148	0.398	0.068	−0.195	0.499	0.271	0.527
Goals								
Choose food products and dishes that you enjoy eating	0.051	0.176	0.027	0.507	−0.313	0.000	−0.189	0.010
Eat a healthy diet	0.114	0.002	0.080	0.039	−0.006	0.914	−0.010	0.884
Vary your menu and have a wide range of foods and dishes	−0.035	0.364	0.006	0.889	−0.032	0.563	0.016	0.823
Eat your daily meals in nice surroundings	0.025	0.512	0.031	0.444	0.024	0.656	−0.024	0.739
Keep your expenditures on food as low as possible	0.053	0.075	−0.049	0.119	−0.006	0.900	−0.041	0.497
Eat your meals together with other people	−0.010	0.743	0.021	0.498	0.012	0.795	0.007	0.904
Maintain the cultural traditions of your country or region in relation to food	−0.001	0.937	0.089	0.003	0.044	0.314	0.232	0.000
Manage your weight through your choice of food	−0.018	0.565	0.029	0.374	0.056	0.240	−0.033	0.605
Be able to cook meals for others	0.060	0.044	0.109	0.001	0.114	0.014	0.110	0.090
Choose food products and dishes that are quick and easy to prepare	−0.069	0.027	−0.084	0.011	−0.015	0.755	0.175	0.011
Have time to cook meals	0.055	0.118	0.121	0.001	0.076	0.148	0.052	0.463
Conditions								
Satisfaction with food related life	0.045	0.361	0.115	0.000	−0.058	0.426	0.104	0.308
Satisfaction with life in general	−0.052	0.279	−0.029	0.560	0.122	0.083	0.163	0.073
Happiness level	0.060	0.278	0.044	0.455	0.011	0.888	0.090	0.383
Income loss	0.024	0.359	0.041	0.129	0.152	0.000	0.171	0.001
Emotional reactions	0.194	0.000	0.373	0.000	0.227	0.000	0.642	0.000
Self-efficacy	−0.183	0.000	−0.166	0.001	−0.230	0.000	0.143	0.132
Trust towards actors	−0.018	0.099	0.056	0.000	−0.128	0.376	0.231	0.000
Resilience to crisis	0.049	0.198	0.102	0.012	−0.050	0.053	0.129	0.106
Resilience to uncertainty	−0.010	0.855	0.109	0.064	−0.153	0.041	0.277	0.007
Social trust	0.030	0.339	0.027	0.407	−0.099	0.255	0.162	0.005
Concerns								
Covid-19	−0.079	0.002	−0.008	0.764	0.043	0.255	0.164	0.000
War in Ukraine	0.023	0.441	−0.065	0.039	−0.089	0.045	−0.096	0.109
Climate change	0.065	0.016	0.090	0.002	0.072	0.078	0.048	0.161
Food shortages	0.057	0.076	0.105	0.002	0.187	0.000	0.134	0.043
Rising energy prices	0.173	0.000	0.155	0.000	−0.033	0.482	−0.077	0.230
Constant	−2.266	0.000	−5.919	0.000	1.135	0.057	−15.019	0.000
Observations	6,323		6,323		6,323		6,323	

related to climate change, food shortages and rising energy prices.

In the *less food involvement* cluster (8.9% of the sample), people are younger and more likely to be from the United Kingdom, Poland, Greece, Finland and Romania relative to the resilient cluster. They tend to give less importance to choosing products they like but value cooking for other people. They also feel more satisfied in their life (in aspects like job, family, relationships with friends and partners), but report being sadder, stressed and hopeless. Some members of this cluster have lost part of their original income since the beginning of the pandemic. They are less worried about the war in Ukraine, but show concerns for food shortages.

In the *more food involvement* cluster (7.4% of the sample), people come from younger groups than the baseline. They give less importance to having food and dishes that they enjoy but value maintaining their country's traditions in terms of food. Cooking for others is important for them and at the same time they prioritize dishes that are easy and quick to prepare. They are happier and feel that both food chain actors and society in general are more trustworthy. Concerning uncertainty in the future, they state to be more resilient, despite reporting a higher income loss. COVID-19 still concerns them and they also report being worried about food shortages.

5. Discussion and conclusion

5.1. Theoretical implications

We found in our study that European consumers react in different ways to the current crisis. Only 19% report no changes. The two biggest groups are first one that reacts by becoming more price sensitive, but otherwise reports few changes to their food-related behaviour, and another one that, in addition to becoming more price sensitive, also reports more attention to label information, more attention to date labels and the presence of additives, fewer unplanned purchases, stronger preference for local food, less snacking and less use of ready meals. They also report enjoying time in the kitchen more and having more family meals. These two groups each account for 32% of the sample. In addition, we found two smaller groups where food as a whole became more or less important compared to pre-COVID.

People who are more affected by the crisis are more likely to change. Consumers who are more concerned or are emotionally distressed by the crisis are more likely to be in one of the change clusters, and people who feel a high degree of self-efficacy in dealing with the crisis are more likely to be in the *resilient* cluster. This is in line with similar results for how people reacted to the COVID pandemic (Grunert et al., 2021; McAtamney et al., 2021; Robinson et al., 2021).

People in the two major change clusters, *more price sensitive* and *more mindful eating*, had already before COVID a goal of eating a healthy diet. However, only people in the latter cluster report changes in that direction, showing that the disruptions did not facilitate living up to pre-existing goals for all.

We found that the ten countries in this study fall into two groups that are different in their change profiles. In the North of Europe – Germany, France, UK, Sweden, Finland, Poland – the biggest cluster is the *price sensitive* cluster, whereas in the South of Europe – Italy, Spain, Greece, Romania – the biggest cluster is the *more mindful eating cluster*. Consumers in the South did report more changes than consumers in the North. This is similar to the grouping obtained by Grunert et al. (2021), except for the placement of Poland. Grunert et al. (2021) related the grouping to differences in the severity of COVID-19 and in the way it was handled by authorities, and some of this may still explain the current grouping. However, our grouping is also related to the differences in severity by which countries were hit by rising prices. Poland, Germany, Sweden (group 1), and Romania (group 2) have experienced the highest inflation rates for food prices, with rates of 16.5%, 15.5%, 14.3% and 19.1%. In August 2022. While the inflation rate for food therefore does not quite follow our country grouping, the inflation rate for energy more

closely does. Indeed, the inflation rate for energy is higher in the Southern than in the Northern group. Energy inflation rates in our first country group are 76.4% in Italy, 70.5% in Greece, 54.3% in Spain, and 33.8% in Romania. In our second country group, energy inflation is 23.8% in France, 32.2% in Finland, 40% in Poland, 42% in Sweden, and 46% in Germany. The UK (69.3%) is an exception, possibly due to Brexit-related factors. These differences may explain why the Southern countries reported more changes in their food-related behaviours: while food prices have increased, it is likely that much higher inflation rates for energy play a larger role in consumer spending.

When comparing the clusters of change obtained in this study with the one reported by Grunert et al. (2021) in their study from 2020, three things are noticeable. First, in 2020 60% of consumers were placed in the *resilient* cluster, which reported no major changes due to COVID-19. Here in 2022, only 19% are in the *resilient* cluster, but an additional 32.5% are in the *more price sensitive* cluster, where the only changes reported relate to more attention to prices, as a direct response to rising prices. This indicates that, compared to pre-COVID times, there are more changes in 2022 than in 2020, but a large part of these additional changes are reactions to higher prices. Second, the cluster *more mindful food choice*, accounting for 26% of consumers in 2020, is now up to 32.2%, suggesting that the changes towards more mindful choices have actually been strengthened in the period after 2020. Finally, the study from 2020 also identified a cluster labelled *more convenient enjoyment*, consisting of people who engaged in more snacking, more indulgent foods and more convenience. We do not find such a cluster in this study, suggesting that this might have been a pandemic-specific response that has since subsided.

Much of food behaviour is habitual, and habits thrive best in stable environments (Verplanken & Aarts, 1999). Our study supports the notion that disruptive changes in the environment can lead to changes in habitual behaviours, and that this effect is mediated both by individually felt distress and by traits that can help in coping with crisis situations. They also show, as already noted by Grunert et al. (2021), that changes are guided by goals that people had before the crisis broke out.

5.2. Implications for industry and public policy

The results indicate both a trend towards more thriftiness and a trend towards more mindful food choices, and the trend towards more thriftiness is found also among those that change towards more mindful food choices. The trend towards more mindful food choices is in line with the green transition of the food sector promoted by the EU and other national and supra-national policy actors, indicating an increased demand for food products that are healthier and that stem from more sustainable production. Currently, many of the more sustainable food alternatives within a product category (e.g., organic products, local products, fair trade certified products) are products where the increased sustainability also carries a price premium. When thriftiness and mindfulness converge, this indicates that there is a need for innovation that combines health and sustainability with a value-for-money positioning of food products. This is a challenge for the food industry, which has viewed the trends towards health and sustainability mostly as an opportunity to differentiate their products by utilizing newly developed alternative ingredients, building responsible networks to resource raw material or using sustainable production methods, which has resulted in many healthy and sustainable products carrying a price premium. In bringing about increases in the overall level of sustainability of food products made available, retailers can play a major role due to their standard setting role (Reardon & Timmer, 2008).

Public policy can help bring such innovation about, not only by supporting research and development of cost-effective healthy and sustainable products, but also by creating more transparency about differences in sustainability not only between product categories, but also between products within a category, by instruments like eco-labelling (Miranda-Ackerman & Azzaro-Pantel, 2017; Torma &

Thøgersen, 2021). In addition, raising minimum standards for sustainability also will help mitigate the current polarisation of the market. As noted, retailers, by their standard setting and certification activities, also have an important role here.

5.3. Limitations

This study is based on self-report measures of behavioural changes and not on actual behavioural data. Self-report measures can be biased in terms of underreporting undesirable and overreporting desirable behaviours. In addition, we asked for changes compared to the pre-COVID-19 situation, in order to see whether changes due to COVID-19 are still there, have been strengthened or weakened due to the current crisis. The pre-COVID-19 situation is four years ago, and people's memory may have been weakened due to the disruptive events during the past four years. However, we chose this option to gather data in a format that is directly comparable with the previous study despite of the uncertainties described above.

The methodology in our study is largely identical to the study by Grunert et al. from 2020 (Grunert et al., 2021) in order to facilitate comparison of the results. Our major tool in this comparison has been to interpret our latent class clustering solution on the background of the latent class clustering solution reported for the 2020 data. However, clustering is an exploratory technique, and the comparison of two clustering solutions obtained from two different sets of data is by necessity a qualitative exercise and gives a rough overall picture of the changes.

5.4. Conclusion

Food-related behaviours in 2022 were characterized by a higher degree of price-consciousness than before, but also by an extension of the trends towards more mindful food choices that was observed already as a reaction to COVID-19 in a similar study carried out two years ago. We are therefore witnessing a change in food-related behaviours where thriftiness and mindfulness come together. This can facilitate the green transition of the food sector, but also presents new challenges for the food sector.

CRediT authorship contribution statement

Klaus G. Grunert: Supervision, Conceptualization, Methodology, Writing – original draft. **Costanza Chimisso:** Methodology, Visualization, Writing – original draft. **Liisa Lähteenmäki:** Conceptualization, Methodology, Writing – original draft. **Delphine Leardini:** Methodology, Visualization, Writing – original draft. **Mari A. Sandell:** Conceptualization, Methodology, Visualization, Writing – original draft. **Annukka Vainio:** Conceptualization, Methodology, Writing – original draft. **Liesbet Vranken:** Conceptualization, Methodology, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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