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# Implications of COVID-19 pandemic on sustainable consumption patterns. Evidence from Iasi County, Romania

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Across the literature, two broad behavior strategies toward sustainable food consumption are emphasized across the literature. The first strategy is related to sustainable product choices concerning how the outcome is produced, while the second one keeps a check on sustainable dietary patterns in terms of the composition within product categories. Considering these behavior strategies, while focusing especially on purchasing sustainable organic foods and preferring curtailment behaviors, conversion to this type of intake became a relevant objective among the specialists established for attaining sustainability. Consequently, the aim of this study was to observe the main changes in sustainable consumption patterns concerning these behavior strategies during the COVID-19 pandemic (August 2020), compared to the previous period (November–December 2019), in Iasi County, Romania. This study emphasizes an image of daily consumption that has been changed, at least regarding some specific aspects, due to the pandemic in the investigated Romanian context. First, the tendency to shop more during the working days could be generally observed and completed by the fact that the consumers felt safer in open spaces, like the food markets, compared to close spaces, be they supermarkets or grocery stores. Next, other main results showed that (1) the responsibility of consumers increased with regard to the purchase and waste of fresh vegetables and meat, preferring to buy more often and throw away less during the pandemic; (2) the behavior strategy in terms of organic food seemed to be discouraged in this period; and (3) local food appeared to have increased consumers' support. In addition, the pandemic crisis was shown as a driver in the digitalization of the shopping process. Accordingly, the COVID-19 pandemic seemed to have significant effects on sustainable consumption over the short and (at least) medium run, determining some changes in consumption patterns that could support, to a considerable extent, the effort of attaining a more sustainable path. However, our findings revealed

some gaps in terms of societal knowledge about sustainable consumption and, consequently, call for the necessity of educating individuals on what this concept really means and why it is important to be achieved.

KEYWORDS

**sustainable consumption, COVID-19 pandemic, patterns of consumption, waste, organic and local food**

## Introduction

Food production and consumption are closely linked to several environmental concerns, such as GHG emissions, water pollution, or loss of biodiversity (Reisch et al., 2013), being responsible for a large share of environmental impact (Azzurra et al., 2019, p. 1). Accordingly, if considering this negative input to global problems (Intergovernmental Panel on Climate Change, 2014), the food sector appears to be not as sustainable as it should be (Reisch et al., 2013). In addition, it is related to sustainability through its influence on global challenges, such as food security, poverty, and inequality (Field and Barros, 2014).

Equally, focusing on our analysis of food consumption highlights its importance in shaping the sustainability of the food supply (Verain et al., 2016). Consequently, it appears as an effect of deliberate or unconscious actions of consumers that could choose to buy sustainable products, balance their consumption, or avoid food waste (Azzurra et al., 2019, p. 2). This happens in the context in which the consumer is part of the list with the main actors configuring the sustainable development process, representing a "key stakeholder" in this regard (e.g., in food EU policies). The consumerist pattern intensively promoted a couple of years ago tends to change into a more oriented one toward social, economic, and environmental individual and also general wellbeing, more careful to maintain a good status of health, to nature, and its protection, and also to the possibilities of individuals from the economic point of view. This might be observed across different studies, awareness public campaigns, and also within the marketing strategy of some companies, at least at the declarative level. Accordingly, it could be overseen by general support (truly, still shy) to encourage the replacement of the consumerist option with a more sustainable one, the type of model promoting huge and irresponsible consumption tending to become a not viable one, while the sustainable consumer being promoted as the correct and most recommended alternative. Particularly, the approach regarding the sustainable consumption shift should take into consideration different barriers toward change, such as lack of consumer awareness regarding the impact of, for example, eating meat on the environment (Hartmann and Siegrist, 2017; Mullee et al., 2017; Vermeir et al., 2020); perceived and actual prices, as organic food products are generally more expensive than non-organic alternatives (Aschemann-Witzel and Zielke, 2017; Held and Haubach, 2017; Vermeir et al., 2020); more important priorities of consumers such as saving money, indulging, or looking for a convenient and comfortable way of living in the short-term (Lanzini and Thøgersen, 2014; Tate et al., 2014; Vermeir et al., 2020) or time pressure, especially in the case of local food, generally implying more time for buying this type of products (Feldmann and Hamm, 2015; Vermeir et al., 2020). Accordingly, properly responding to these barriers could be a step forward to a higher level of sustainable consumption.

However, a lot of effort is required to change the pattern of consumption of individuals to a large scale, the responsibility being addressed to the entire society, from the common individual to companies, NGOs, and public entities. Different definitions of sustainable food consumption follow the same lines in terms of responding to basic needs while improving life quality accompanied by an orientation toward environmental protection. However, the lack of clarity is especially regarded in the manner in which the consumption process becomes really sustainable when analyzing its complete effects on the whole system, in the context in which, in some cases, what seems to be sustainable at a first glance could prove to be the contrary when deeply investigating it. In other words, considering the society-wide rebound effects and negative spillovers that can erode the environmental benefits, for example, solutions are even more complex than they appear at first sight (Sorrell et al., 2020; Brockway et al., 2021; Hatmanu et al., 2022; Ulman et al., 2022). In this context, a more specific case is the one of local food that, on one hand, is considered to be approximately synonymous with sustainable food in the perception of many consumers, and, on the other hand, its limitations as a proxy for sustainability are well recognized (Morley, 2021). Consequently, this pattern of transformation needs to take into consideration the complexity of the sustainable food consumption concept, and its both diverse drivers (Vermeir and Verbeke, 2006; Laureati et al., 2013; Reisch et al., 2013; Hemmerling et al., 2015; Verain et al., 2015, 2016), resorting to different approaches (Azzurra et al., 2019, p. 3), and also the contradictory research findings (Reisch et al., 2013). Assuming these gaps that may explain why its definition remains unclear represents one additional step for finding new perspectives of enriching it.

However, if considering the actual global environmental concerns, it goes without saying that the challenge of convincing people to sustainably consume is becoming an increasingly pressing aspect. Increasing awareness in terms of perceptions is crucial for determining concrete action in this respect. However, as Vermeir et al. (2020) stated, although many people already hold positive attitudes toward sustainable food, a large gap between these favorable positions and the actual sustainable purchase and consumption of food products appears to be generally present across societies. It was shown that food practices are closely linked to diverse non-food ones, and also to everyday routines, such as work schedule, family composition, geographical area of the household, etc. (Plessz et al., 2016; Gojard and Véron, 2018; Dobernig and Schanes, 2019), but also the general socio-economic context. In this way, food-related decisions are characterized by the complexity which renders them to be sensitive to diverse social, cognitive, affective, and environmental influences (Bublitz et al., 2010). In such a context, the efforts of promoting sustainable consumption compete with other contextual factors with regard to people's food choices (Vermeir et al., 2020, p. 2). This perspective lays stress on the difficulty of determining a change in the case of a routinized process such as food buying. It reveals the multiple facets of the transformation process, the diverse factors affecting it, and the necessity of responsibly taking its main determinants into consideration for attaining the desired transformation across society. Moreover, the rigidity of people to change, possibly to happen in certain conditions, based on strong (internal and/or external) stimuli and requiring sufficient time should be also considered. In our opinion, the COVID-19 pandemic could be classified among such types of stimuli, determining important changes in the daily routine of people, but also in regard to perspectives of life, attention to issues that were positioned before in the second or even last place in terms of prioritization, etc. This is why this study centers on some basic questions: (1) Has the pandemic influenced the patterns of consumption in terms of shopping basket content and orientation toward organic and local food products?; (2) Has the pandemic affected the manner of acquisition in terms of frequency and places of buying, but also the habit of wasting food?; (3) Is there any link between the shopping basket content and the preferences for organic or local food, and does the pandemic make any difference in this regard?

In this context, starting from the shopping-as-practice approach that focuses on the practical, routinized, and material aspects of shopping (Elms et al., 2016), our endeavor intended to link sustainable consumption, analyzed from the perspective of different types of consumed food (organic vs. conventional and meat and dairy vs. vegetable and fruits oriented) to patterns of consumption in terms of frequency, places of acquisition, and waste. In this respect, our study laid special stress on the manner in which the pandemic crisis changed the patterns of consumption in a specific context, i.e., in Iasi County, Romania. In detail, the main objectives of the research involve: (1) observing the patterns of consumption in terms of shopping basket content and orientation toward organic and local food products in relation to food waste, frequency, and places of acquisition during the pandemic period, compared to the previous ones; and (2) analyzing the associations between the shopping basket content and the orientations toward organically, and also locally produced food during the pandemic period, compared to the previous ones.

The study is structured into five parts. After the Introduction, Literature review Section deals with the scientific literature issued in the field, while Materials and methods Section describes the data and methodology used. The results obtained are presented and discussed in Results and discussions Section, followed by the conclusion reached, which is presented in Conclusion Section.

## Literature review

A relevant definition of sustainable food consumption could be the one considering it as the use of food products "that respond to basic needs and bring a better quality of life while minimizing the use of natural resources, toxic materials, and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations" (IISD, 1994). Accordingly, the focus is put on human and environmental wellbeing, while positioning on the second place the economic part of consumption could be easily overseen from this definition.

One of the most important examples of such sustainable food consumption refers to the increase in plant-based consumption (Lea et al., 2006), while decreasing the meat-based one (Hoek et al., 2004), and/or opting for seasonal products (Macdiarmid, 2014). In addition, buying locally (MacGregor and Vorley, 2006) and/or organically produced food (Hughner et al., 2007) could also be a more environmentally sustainable option. Thus, the main recommendations in this regard would be the reduction of meals containing meat, while enriching the diet with vegetables and different other supplies that are generally less harmful to the environment. In this respect, local food is considered to be approximately synonymous with sustainable food in the perception of many consumers, even though its limitations as a proxy for sustainability are well recognized (Morley, 2021). At the same time, a considerable number of papers have demonstrated the improvements and benefits brought by short food supply chains in terms of sustainability in comparison with traditional food systems (Chiffoleau and Dourian, 2020).

Moreover, as stated in other studies (Galanakis, 2020; Haghjou et al., 2020; Voinea et al., 2020; Brumă et al., 2021), a new reconfiguration in terms of food and health security, as a consequence of the new context imposed by the actual sanitary crisis, can be noticed. The pandemic imposed on individuals the necessity of making different changes with regard to a diverse

palette of things related both to their professional and personal life aspects. In some countries, due to the crisis triggered by this pandemic, people started to purchase more fresh vegetables and food, both directly and online, from local producers/processors (Butu et al., 2020; Jensen et al., 2021). In addition, as mentioned in different studies (Jensen et al., 2021; Forster and Mundell, 2022), the concern about contracting the virus while making in-person grocery shopping remained and still influenced the shoppers' behavior in the summer of 2020. However, Grashuis et al. (2020), using a choice experiment to determine how online shopping attributes and COVID-19 conditions might influence preferences for online grocery shopping, postulated that consumer's online shopping behavior is motivated at least in part by concerns about buying inside grocery stores; their results suggested that, when pandemic conditions subside, many online shoppers will choose to return to brick-and-mortar shopping. This finding raises questions also regarding the other different changes determined by the sanitary crisis and their maintenance in the long run. Thus, the COVID-19 pandemic has tremendously impacted most people's purchasing behavior, giving, at the same time, an unprecedented upturn to the organic market in many countries (Willer et al., 2022, p. 261). More precisely, the ecological international market registered an important increase in 2020, from 106 to 121 billion euros (Willer et al., 2022, p. 64). In this way, a growing trend of self-cooking and also of the intensity of consumption of organic food was identified during this period (Wachyuni and Wiweka, 2020). In Romania, multiple changes with regard to food consumption were identified (Constantin et al., 2021), while food security was shown to become a priority (Marcuă et al., 2021) during the pandemic period. Thus, the image of daily consumption has changed, at least in regard to some specific aspects, due to the pandemic. But this change proved to be not necessarily uniform or present in the same proportions in different geographical and socio-economic contexts and, thus, the whole amount of studies trying to intercept it, especially the ones focusing on consumption patterns, had a very solid rationale at their basis.

Moreover, due to the marketing theory and practice, food choices are subject to communication efforts of food companies that have caused changes in dietary norms, in food and drink category preferences (at the population level) and in the cultural values underpinning food behaviors (Cairns, 2019). This influence could be also overseen during the pandemic period, while the companies adapted to the new context and tried to be empathic to their client's needs in terms of health security. Such a position became a kind of a must in the marketing strategy of all types of businesses as people generally proved to be very receptive and responsive regarding the protection requirements. However, the complexity of food-related decisions makes them susceptible to a wide range of social, cognitive, affective, and environmental influences (Bublitz et al., 2010). Shortly, efforts to promote sustainable food consumption compete with other contextual influences on people's food choices (Vermeir et al., 2020, p. 2), possibly to strengthen each other or contrary, to concrete into different barriers to people's adoption of such a type of food consumption. According to our perception, but also revealed in the literature (refer to, for example, Borsellino et al., 2020; Wachyuni and Wiweka, 2020; Jaeger et al., 2021; Fioramonti et al., 2022), the pandemic context was a beneficial one for determining people to embrace a more open and positive (at least) attitude regarding sustainability as a principle to follow in their daily life, while the increased wariness and, consequently, the high accent put on assuring a good status of health constituting the main explanation for this change. Somehow, it managed to transform into daily practice through adopting different behavior patterns, and, according to our knowledge, this perspective of action put into practice during the pandemic crisis could be the real gap in the literature.

Moving on and focusing on what could mean sustainable food consumption in everyday practice, we followed the definition of sustainable diets proposed by FAO (2010), namely: "protective and respectful of biodiversity and ecosystems; culturally acceptable, accessible, economically fair, and affordable, nutritionally adequate, safe, and healthy while at the same time optimizing natural and human resources," completed by the one provided by the World Health Organization (Waxman, 2004), pointing on the fact that healthy and sustainable diets are rich in vegetables, fruits, and whole grains, with a limited intake of saturated fats, trans fats, sugar, and salt.

In this way, one can deduce that sustainable food consumption is mainly characterized by reduced consumption of meat and dairy products, while increasing that of fruits and vegetables (Jungbluth et al., 2000; de Faria Coelho-Ravagnani et al., 2021). This conclusion is also reached in other studies, like that of the Health Council of the Netherlands (2011), or that of Lang and Barling (2013). Different studies revealed that consumers can significantly increase the sustainability of their food consumption by consuming organic (Jungbluth et al., 2000) and local products (Chiffoleau and Dourian, 2020; Paciarotti and Torregiani, 2021). Moreover, improvements can be achieved in other several ways, considering not only the sustainability of production but also the quantity consumed and thrown away (Hoogland et al., 2005). During the COVID-19 pandemic, there was a growing trend of self-cooking and also of the intensity of consumption of organic food (Wachyuni and Wiweka, 2020).

Moving on, from such a consumer perspective, Verain et al. (2015, p. 376) mentioned two broad behavior strategies toward sustainable food consumption: (1) sustainable product choices concerning the manner in which the outcome is produced (e.g., organic or fair trade products) and (2) sustainable dietary patterns concerning dietary composition within product categories (e.g., reduced meat consumption). Accordingly, consumers could differ in terms of the type of sustainable behavior, such as purchasing sustainable organic foods or preferring curtailment (Jansson et al., 2009; Abeliotis et al., 2010). This explanation is relevant in the context in which

the heterogeneity of consumers related to food acquisition and consumption behaviors has to be taken into consideration (Dolnicar and Grün, 2009).

Following this general background, as observed from academic literature, and integrating into our analysis the types of consumed food (organic vs. conventional, meat and dairy vs. vegetable and fruits-oriented ones), together with the patterns of consumption in terms of frequency, places of acquisition, and waste, our study aims at enriching these results, while also offering a perspective on the influence of the pandemic crisis upon sustainable consumption within local context. More specifically, the comparative analysis (before vs. during the COVID-19 pandemic) aims at evidencing some changes observed in individuals' consumption patterns.

# Materials and methods

## Study design and analyzed data

The aim of the present study is to observe the main changes in sustainable consumption patterns in terms of dietary composition within product categories and sustainable product choices concerning the manner in which the outcome is produced in the COVID-19 pandemic period, compared to the period before the sanitary crisis, in Iasi County, Romania. The activity rate in this county in 2020 was equal to 58%, registering an increase of 0.1% compared to 2019; while the employment rate decreased in 2020 with the same percentage compared to 2019, having a value equal to 56.2%. Regarding the average net monthly income, it was 3,327 RON (approximately 650 EUR) with an increase of 202 RON (approximately 40 EUR) in comparison to the 2019 level (Iftimoaei, 2022).

In order to accomplish such a comparative analysis, the Rural Development Research Platform developed a questionnaire that focused on the respondents living in Iasi County, Romania, applied during two periods of time: 15 November to 15 December 2019 and 1–31 August 2020. The questionnaire was distributed on social media networks (mainly Facebook, the most accessed social media platform in Romania). Informed consent was obtained from all respondents involved in the study. All survey participants were provided with the option "I do not want to respond." The authors did not obtain personal information about the participants. After being informed with regard to the aim of the study and their right to quit the survey, participants agreed to be part of our study.

Respondents were grouped into two categories, based on the period in which they participated in the survey: the former contained the 15 November to 15 December 2019 respondents, a period when the COVID-19 sanitary crisis was not affecting the people of Iasi, Romania; the latter category included the August 2020 respondents, when the pandemic imposed several restrictions and changed, in general, the daily living.

Table 1 presents the variables used in the study, reflecting their description and the possible categories that could be selected. No transformations of the variables were performed before using them in the analysis.

## Statistical methods

For conducting the comparative analysis, descriptive statistics containing frequencies and cross-tabulations were first performed regarding: (1) how often respondents purchase food and from which locations; (2) how often respondents buy some types of products and the percentages of waste for each one; (3) the level of encouragement regarding local products consumption; (4) how often respondents consume organic products; and (5) which type of products do they purchase if all of them have the same price. Next, in order to study the associations between the frequency of purchasing each type of product from the shopping basket and the encouragement and consumption of organic products, given that the variables observed have ordinal scales, Kendall's Tau-b coefficients were determined. This test represents the appropriate measure of association in the case of ordinal by ordinal data (Khamis, 2008). Its interval variation is [-1,1] and, depending on its value in absolute terms, it can indicate the intensity of the relationship between the two variables: a very weak relationship if it is less than 0.1; a weak relationship for values between 0.1 and 0.19; a moderate relationship when the value ranges within the interval delimited by 0.2 and 0.29; and, finally, if it is 0.3 or above, a strong relationship (Singh, 2007).

# Results and discussions

## Descriptive statistics

The total sample size comprised 285 respondents from urban areas of Iasi County, Romania. The number of valid answers is higher than the estimated sample size (273) in the Iasi population while considering a 90% confidence level and a 5% margin of error. Figure 1 illustrates the distributions regarding gender and age of respondents from each period.

In both 2019 and 2020, the percentages of interviewed females (60.43% in 2019 and 68.87% in 2022) were higher than those of males (39.57% in 2019 and 31.13% in 2020). In terms of age, in 2019, most of the respondents had ages ranging between 39 and 48 (37.41%) and 29–38 years (30.22%). In the case of 2020, the age intervals with the highest number of respondents remained the same, but the percentages were significantly different: 24.53% for the interval of 39–48 years and 34.91% for that of 29–38 years. The percentage of respondents with ages between 59 and 68 years increased from 3.60% in 2019 to 9.43% in 2020.

TABLE 1 Description of variables.

| Variable | Description | Categories |
|---|---|---|
| Supply | Frequency of food supply | 1 = Daily; 2 = During the working days; 3 = Over the weekend; 4 = Monthly |
| Source_of_supply | Location where the respondent purchases his/her food and the buying frequency | Location:<br>(a) Supermarket; (b) Permanent market; (c) Grocery store; (d) Directly from the producer; (e) Online store<br>Frequency:<br>1 = Very frequently; 2 = Frequently; 3 = Rarely; 4 = Never |
| Contents_of_shopping_basket | Product categories which the respondent purchases and the buying frequency | Product categories purchased:<br>(a) Vegetables; (b) Fruits; (c) Dairy products; (d) Meat<br>Frequency:<br>1 = Very frequently; 2 = Frequently; 3 = Rarely; 4 = Never |
| Waste | Product categories which the respondent throws away and the buying frequency | Product categories thrown away:<br>(a) Vegetables; (b) Fruits; (c) Dairy products; (d) Meat<br>Frequency:<br>1 = Very frequently; 2 = Frequently; 3 = Rarely; 4 = Never |
| Encouragement_local_food | Level of encouragement of local products consumption | 1 = Very frequently; 2 = Frequently; 3 = Rarely; 4 = Never; 5 = Not interested |
| Consumption_organic_products | Frequency of organic products consumption | 1 = Very frequently; 2 = Frequently; 3 = Rarely; 4 = Never |
| Equal_price_type_of_products_consumed | Preferred type of products to be consumed in the hypothetical situation of an equal price | 1 = Organically-certified food products; 2 = Locally sourced food products; 3 = Non-certified food products; 4 = Traditionally certified food products |

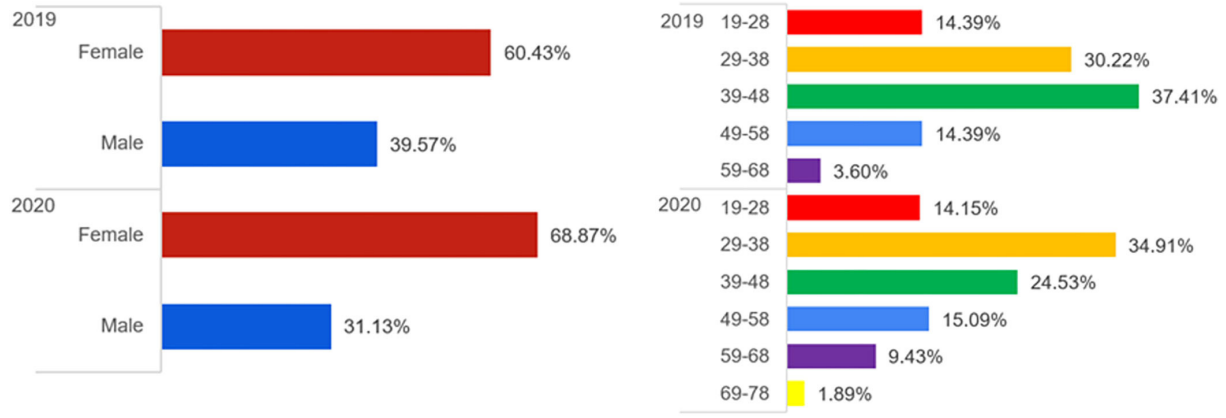


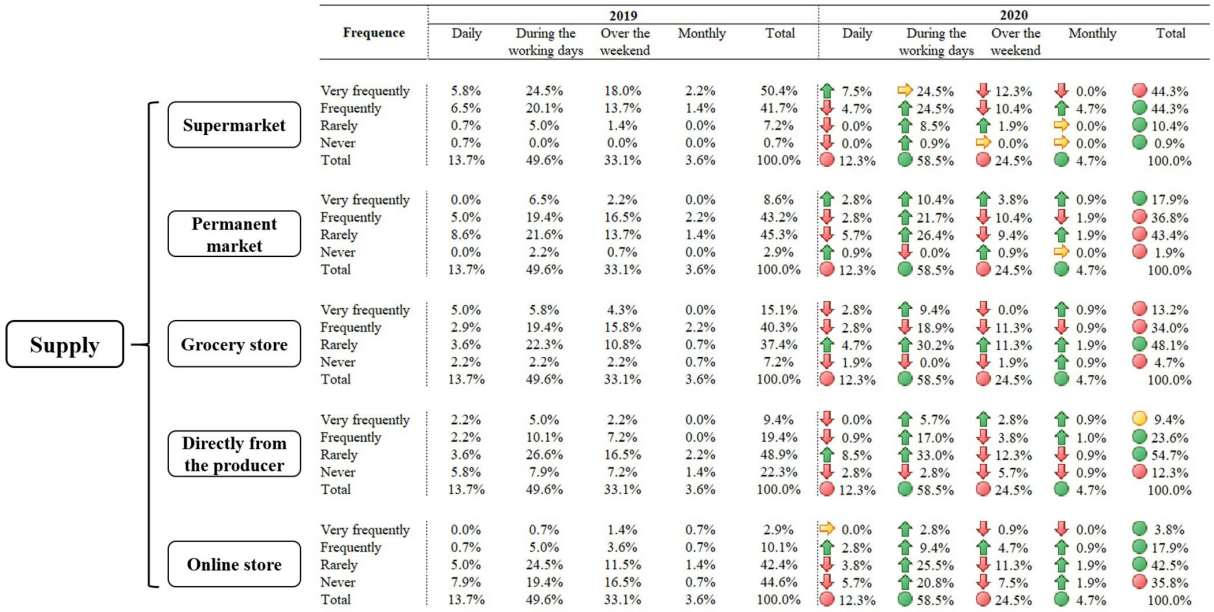

FIGURE 1
Sample structure by gender and age.

## Shopping patterns

The shopping-as-practice approach, laying special stress on the practical, routinized, and material aspects of shopping (Elms et al., 2016), acquisition in terms of frequency (daily, during working days, during weekends, and monthly), and places of buying (supermarket, permanent market, grocery store, directly from producers, and online store) represents one of the main parts of the shopping pattern.

As observed in Figure 2, as it was expected, during the sanitary crisis, some changes were registered compared to the precedent period, with regard to both frequency and places of acquisition. Accordingly: (1) the frequency of buying during working days increased in the pandemic crisis (from 49.6 to 58.5%), as a consequence of avoiding the congestion generally

10.3389/fsufs.2022.1050977




| Frequence | 2019 Daily | 2019 During the working days | 2019 Over the weekend | 2019 Monthly | 2019 Total | 2020 Daily | 2020 During the working days | 2020 Over the weekend | 2020 Monthly | 2020 Total |
|---|---|---|---|---|---|---|---|---|---|---|
| **Supermarket** | | | | | | | | | | |
| Very frequently | 5.8% | 24.5% | 18.0% | 2.2% | 50.4% | 7.5% | 24.5% | 12.3% | 0.0% | 44.3% |
| Frequently | 6.5% | 20.1% | 13.7% | 1.4% | 41.7% | 4.7% | 24.5% | 10.4% | 4.7% | 44.3% |
| Rarely | 0.7% | 5.0% | 1.4% | 0.0% | 7.2% | 0.0% | 8.5% | 1.9% | 0.0% | 10.4% |
| Never | 0.7% | 0.0% | 0.0% | 0.0% | 0.7% | 0.0% | 0.9% | 0.0% | 0.0% | 0.9% |
| Total | 13.7% | 49.6% | 33.1% | 3.6% | 100.0% | 12.3% | 58.5% | 24.5% | 4.7% | 100.0% |
| **Permanent market** | | | | | | | | | | |
| Very frequently | 0.0% | 6.5% | 2.2% | 0.0% | 8.6% | 2.8% | 10.4% | 3.8% | 0.9% | 17.9% |
| Frequently | 5.0% | 19.4% | 16.5% | 2.2% | 43.2% | 2.8% | 21.7% | 10.4% | 1.9% | 36.8% |
| Rarely | 8.6% | 21.6% | 13.7% | 1.4% | 45.3% | 5.7% | 26.4% | 9.4% | 1.9% | 43.4% |
| Never | 0.0% | 2.2% | 0.7% | 0.0% | 2.9% | 0.9% | 0.0% | 0.9% | 0.0% | 1.9% |
| Total | 13.7% | 49.6% | 33.1% | 3.6% | 100.0% | 12.3% | 58.5% | 24.5% | 4.7% | 100.0% |
| **Grocery store** | | | | | | | | | | |
| Very frequently | 5.0% | 5.8% | 4.3% | 0.0% | 15.1% | 2.8% | 9.4% | 0.0% | 0.9% | 13.2% |
| Frequently | 2.9% | 19.4% | 15.8% | 2.2% | 40.3% | 2.8% | 18.9% | 11.3% | 0.9% | 34.0% |
| Rarely | 3.6% | 22.3% | 10.8% | 0.7% | 37.4% | 4.7% | 30.2% | 11.3% | 1.9% | 48.1% |
| Never | 2.2% | 2.2% | 2.2% | 0.7% | 7.2% | 1.9% | 0.0% | 1.9% | 0.9% | 4.7% |
| Total | 13.7% | 49.6% | 33.1% | 3.6% | 100.0% | 12.3% | 58.5% | 24.5% | 4.7% | 100.0% |
| **Directly from the producer** | | | | | | | | | | |
| Very frequently | 2.2% | 5.0% | 2.2% | 0.0% | 9.4% | 0.0% | 5.7% | 2.8% | 0.9% | 9.4% |
| Frequently | 2.2% | 10.1% | 7.2% | 0.0% | 19.4% | 0.9% | 17.0% | 3.8% | 1.0% | 23.6% |
| Rarely | 3.6% | 26.6% | 16.5% | 2.2% | 48.9% | 8.5% | 33.0% | 12.3% | 0.9% | 54.7% |
| Never | 5.8% | 7.9% | 7.2% | 1.4% | 22.3% | 2.8% | 2.8% | 5.7% | 0.9% | 12.3% |
| Total | 13.7% | 49.6% | 33.1% | 3.6% | 100.0% | 12.3% | 58.5% | 24.5% | 4.7% | 100.0% |
| **Online store** | | | | | | | | | | |
| Very frequently | 0.0% | 0.7% | 1.4% | 0.7% | 2.9% | 0.0% | 2.8% | 0.9% | 0.0% | 3.8% |
| Frequently | 0.7% | 5.0% | 3.6% | 0.7% | 10.1% | 2.8% | 9.4% | 4.7% | 0.9% | 17.9% |
| Rarely | 5.0% | 24.5% | 11.5% | 1.4% | 42.4% | 3.8% | 25.5% | 11.3% | 1.9% | 42.5% |
| Never | 7.9% | 19.4% | 16.5% | 0.7% | 44.6% | 5.7% | 20.8% | 7.5% | 1.9% | 35.8% |
| Total | 13.7% | 49.6% | 33.1% | 3.6% | 100.0% | 12.3% | 58.5% | 24.5% | 4.7% | 100.0% |

FIGURE 2
Shopping patterns in terms of frequency and places of acquisition.

produced in weekends; (2) the percentage of those buying from the supermarket (from 50.4 to 44.3%) and grocery store (from 55.4 to 47.17%) decreased, while that of those that very frequently purchase from the permanent market increased (from 8.6 to 17.9%); (3) an increase of the respondents that rarely pick up from producers (from 48.9 to 54.7%) seemed to be registered, along with a decrease of those who never buy directly from them (from 22.3 to 12.3%), and an increase of those that frequently purchase locally (from 19.4 to 23.6%), all these changes showing that this type of market is growing, and that there is a higher consumer orientation toward local products, purchased directly from the producer, during the pandemic compared to the previous period; (4) the percentage of people who buy online (from 13 to 21.7%) increased, while the decline of those who say they never buy online (from 44.6 to 35.8%) was observed, which emphasizes the fact that the pandemic crisis was a positive driver for the digitalization of the shopping process.

In this respect, the first and probably the most important discussion seems to be related to the modified decision of consumers to buy more frequently from the large retail market (supermarket) in the working days during the COVID-19 pandemic, compared to the period before it. This new trend could determine a higher consumer orientation toward more sustainable acquisition decisions, including the ones regarding waste. Consequently, the sanitary crisis appears to have positive effects in terms of rethinking food-related shopping decisions.

Second, during the pandemic crisis, the acquisition trend with regard to food bought from online stores was positively influenced, registering some increase, especially in the working days, a result pointing out that the most frequent online shopping in Iasi County, Romania is not on weekends, as also confirmed by recent findings (GPeC, 2020, 2021).

Consequently, it was shown that people generally developed different personal protection strategies during the pandemic period, reacting in a responsible way to the risks imposed by the sanitary crisis. In this way, it was noticed the change shopping habit, especially on weekends and replaced by the one of buying more frequently during the working days. The implication of this changed habit concreted into the decongestion on the weekends, especially in the supermarkets, and a more equilibrated distribution across all days of the week. This change was adopted as a solution to avoid congestion and consequently, the risks of contamination that it implies could be maintained even after the crisis when the pandemic does not anymore represent a threat. This might be one example of routine transformation having on its basis an external powerful factor, possible to become a usual habit maintained over time. A similar protection strategy seemed to be the option to buy more frequently from the permanent markets and also to shop online. As mentioned in different studies (Jensen et al., 2021; Forster and Mundell, 2022), the concern about not contracting the virus while making in-person shopping remained and still influenced the shopper into the summer of 2020. Completing this perspective, Grashuis et al. (2020), based on a choice experiment for determining the manner in which online shopping attributes and COVID-19 conditions might

influence preferences for online grocery shopping, concluded that, when pandemic conditions subside, many online shoppers will choose to return to brick-and-mortar shopping. From this point of view, the unknown issue is in regard to the maintenance of the buying habits determined by the pandemic after it passed, a problem that could represent one interesting area of future research.

Moving on, as observed in Figure 3, during the sanitary crisis, some changes were also registered compared to the previous period, with regard to both contents of shopping baskets and waste.

As to the vegetable category, the percentage of respondents who stated that during the COVID-19 crisis purchased this type of products frequently increased (53.8% compared to 45.3%), while the percentage of those who purchased them rarely or never decreased (3.8% compared to 5.7%). These significant variations can be translated into more responsible purchasing behavior. As to the percentage of respondents who very frequently wasted fresh vegetables, it decreased from 5.0 to 4.7%, while the percentage of those who frequently wasted such products increased from 13.7 to 15.1%. With respect to the analysis of food waste in respondents' consumption, it is somehow normal that the amount of waste should increase during the pandemic period, once food consumption was mainly done at home through cooked food (Jribi et al., 2020). In the literature, it is well known that, during the pandemic, the consumption of cooked food increased (Borsellino et al., 2020; Wachyuni and Wiweka, 2020; Bakhsh et al., 2021; Gerritsen et al., 2021; Jaeger et al., 2021; Koletzko et al., 2021) and, along with it, the amount of waste (at least in the first part of the pandemic—the beginning of the year 2020) (Aldaco et al., 2020; Jribi et al., 2020). During this period, some consumers seem to attain a much better equilibrium in terms of food waste (Pappalardo et al., 2020; Iranmanesh et al., 2022), while others still do not even consider food waste a real problem in terms of economics, social, and environmental impacts (Pocol et al., 2020).

In the case of fruits, the results listed in Figure 3 indicated a slight decrease in persons who purchased fruits very frequently and frequently during the pandemic, compared to the previous period (90.5% compared to 94.3%). However, the percentage of those who waste this type of product very frequently and frequently significantly increased, from 15.1% in 2019 to 20.8% in 2020.

Regarding the supply of dairy products, the situation is similar to fruits, with a slight decrease registered in the percentage of those who purchased very frequently and frequently, from 92.1 to 88.7%. In terms of meat purchasing, the percentage of consumers purchasing it only rarely increased (from 21.6 to 29.3%), while the percentage of those who purchased it frequently decreased (from 51.8 to 38.7%). This reflects the trend of the middle segment of consumers who frequently eat meat, but not very frequently, toward more sustainable consumption, with reduced eating of fresh meat. In addition, as to the dairy products and meat categories, there was also a significant change in the behavior of respondents in terms of avoiding waste: a high increase in the percentage of respondents who stated that they never threw away these products (10.4% dairy and 8.1% meat products), along with a decrease of those declaring that discard them very frequently (3.1% for dairy products and 3.4% for meat). This change in behavior can also be attributed to the characteristics of the two product categories (i.e., lower perishability, the possibility of preservation, higher price, and the fact that they can represent a raw material for home-cooked food). Therefore, the trend toward more sustainable consumption can be once again mentioned.

## Food consumption

Within the specific analyzed context, i.e., Iasi County, Romania, our respondents also seemed to be open to supporting locally produced food, with a percentage of individuals declaring that they very frequently encourage the consumption of local food that increased in 2020 from 49.64 to 59.43% (Figure 4).

In addition, the percentage, equal to 0%, of the respondents that never encourage this type of consumption should be pointed out. In this way, it seems that, in our case, the activity of local producers is more significantly supported by consumers, constituting an important step toward sustainable consumption. It has to be emphasized that the local products within the investigated geographical area represent an important and distinctive type of products if compared to the certified ecological, traditional, or non-certified ones. In such a context, they are perceived as being different both by consumers and producers in terms of special awareness of the importance of belonging to a community and supporting local identity and economy to the detriment of official certification. In this way, local products represent a specific type of offer as an important contributor to the local economy of Iasi County. Accordingly, the findings from the literature are confirmed in our study (Butu et al., 2020; Jensen et al., 2021).

Paying attention to the general international circumstances, to observe the change registered with regard to organic acquisition in the analyzed context, in the period during COVID-19 compared to the period before it, should be of high interest. This happens especially in the context in which, as pointed out in the section dedicated to literature, organic food acquisition is an important pillar of sustainable consumption. The data provided in Figure 5, as well as the lower percentage of people declaring that they buy very frequently or frequently organic products during the period of COVID-19 compared to the one before it (from 41.73 to 35.85%), emphasize the lower orientation of consumers toward this type of products. Apparently, the behavior strategy toward

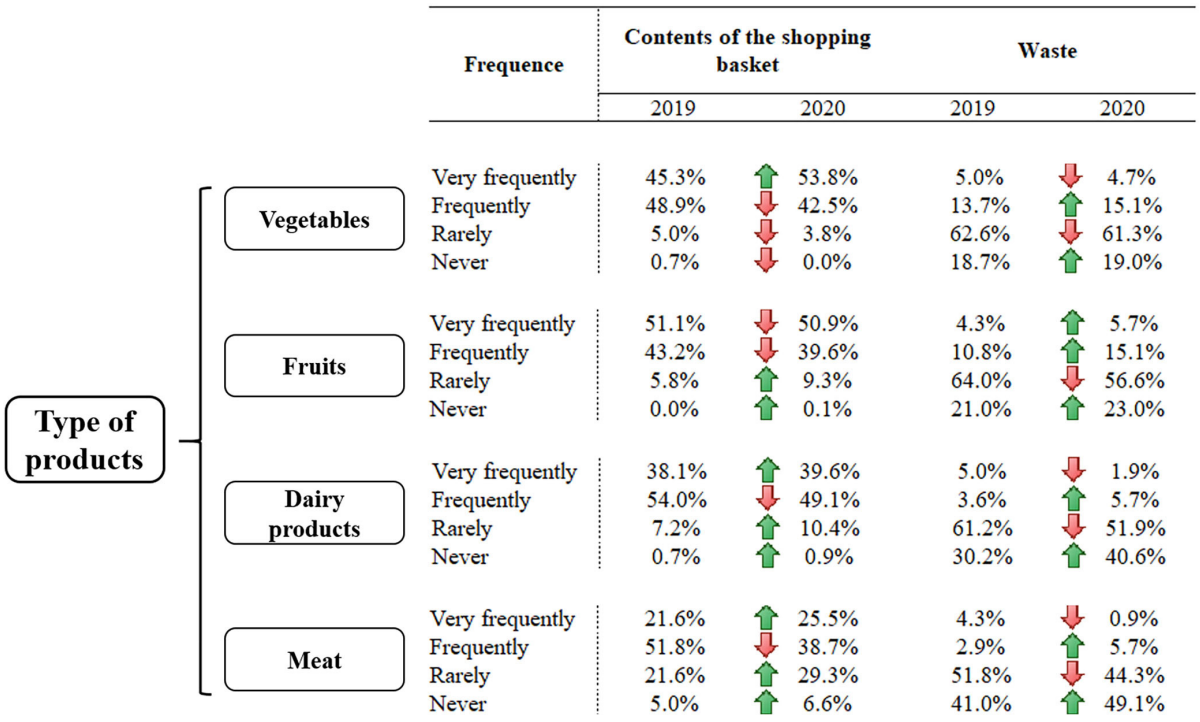



FIGURE 3
Shopping patterns in terms of the contents of the shopping basket and waste.

sustainable food consumption in terms of organic food seems to be discouraged by the pandemic crisis. However, if analyzing the other percentages of the last responses (rarely and never), a different perspective could be observed. In detail, the percentage of people that never tended to buy organic food in the period before COVID-19 decreased in the next period (from 11.51 to 10.38%). The same positive situation could be seen for the respondents that declare a rare acquisition of organic products (increasing, in 2020, from 46.76% in 2019 to 53.77%), which makes difficult the observation of a certain trend with regard to the pattern of buying organic products in the period during COVID-19, compared to the one before it.

The lack of a clear direction in terms of preferences for organic or even local food could be also evidenced—see Figure 6. It seems that the Romanian consumer is not very confident or not sufficiently informed in order to rationally choose organic or local food in the hypothetical situation in which the price is equal. Observing the approximately static image of the percentages recorded in 2020 and 2019, it seems that, in this case, the pandemic crisis had no effect on consumer options. For example, (1) in the case of organic products, only 34.53% in 2019 and 33.02% in 2020, or (2) in the case of local products, 37.41% in 2019 and 38.68% in 2020 stated that they would choose that type of food if the price is equal.

Table 2 lists the results of the associations between several variables at the level of each sample (i.e., 2019 and 2020), showing that the interest in the encouragement of local food consumption is significantly and positively associated with the purchasing of vegetables, fruits, and dairy products in 2019, and vegetables and fruits, respectively, in 2020.

Also, regarding the consumption of organic products, in 2020, besides the positive and significant association with the purchase of vegetables, as observed in 2019, the same type of associations can be identified in the case of fruits and dairy products. However, in general, no significant associations were identified between the encouragement of local food consumption and waste, on one hand, and between the consumption of organic products and waste, on the other.

## Discussions

Our study focused on three research questions that were mentioned in the introductory part of the paper. As intended from the beginning of this endeavor, the main contributions of the paper are related to the responses to these research questions. Accordingly, it was shown that the pandemic influenced the patterns of consumption in terms of shopping basket content and orientation toward organic and local food products in Iasi

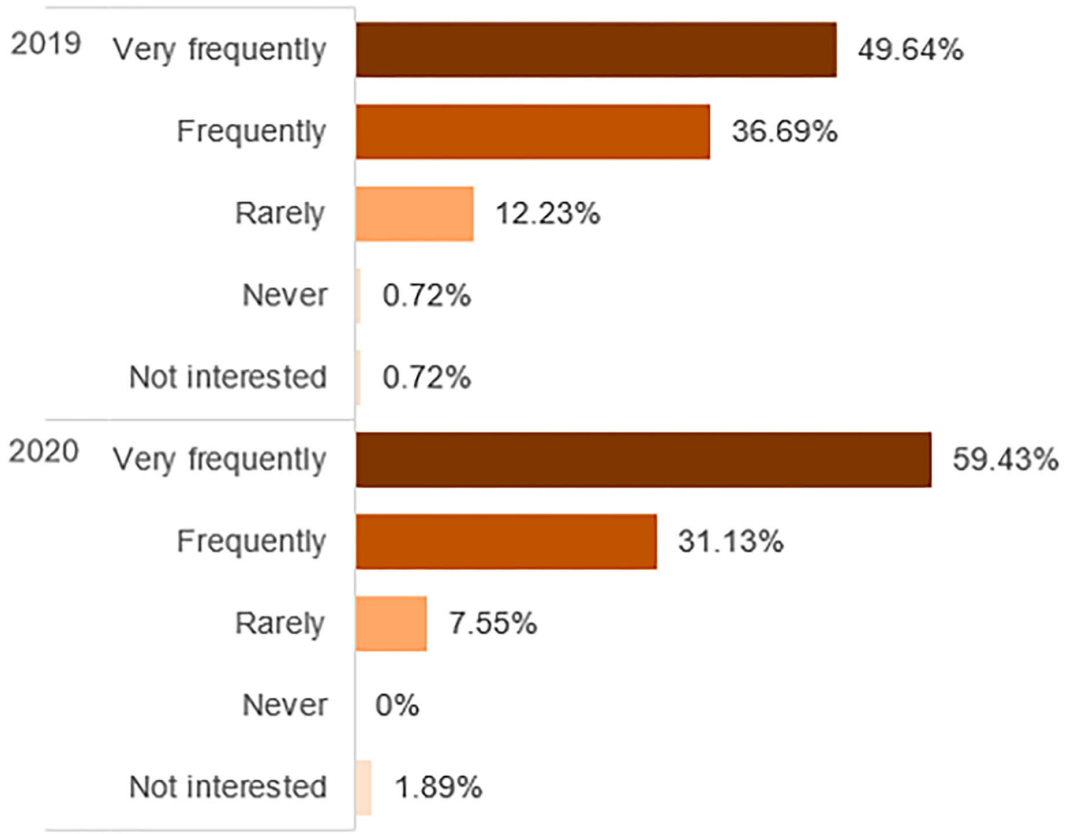



FIGURE 4
Local food consumption.

County but not necessarily in an expected way. For example, the behavior sustainable strategy implying consumption of organic food seems to be discouraged by the sanitary crisis, while the observation of a certain trend with regard to the pattern of buying organic products in the period during COVID-19 compared to the one before it proved to be difficult. However, important steps for what means sustainable consumption were also noticed. This is the case with local food, while the activity of local producers appears to be much more supported by consumers. In the same way, a slight change in the behavior of consumers of Iasi could be identified regarding the shopping basket, namely a higher orientation toward purchasing and less wasting of fresh vegetables, preferring to buy more often and throw away less during the COVID-19 crisis. Next, it was observed that the pandemic really affected the manner of acquisition in terms of frequency and places of buying. Accordingly, the tendency to shop more on working days and prefer open spaces, like food markets, compared to close ones, be they supermarkets or grocery stores could be noticed. These facts are accompanied by the fact that the process of buying online was significantly improved during the pandemic, with an increased openness for using digital tools among consumers. Additionally, significant and positive associations between the encouragement of local and organic food consumption and purchasing of vegetables and fruits in 2020 were evidenced.

Considering these main findings of our endeavor, this study could constitute a piece of support for the local producers that are encouraged to promote intensively their products in order to maintain the improvements regarding the customer demands obtained across the pandemic. Moreover, it also strengthens the importance of knowledge and awareness among consumers for improving the capacity of a correct product choice. This lack of know-how puts people in the situation of choosing a product with a lower quality even in a hypothetical situation in which the price is equal. Accordingly, this finding could represent a solid argument in terms of political initiatives for increasing the sustainable consumption concern and informing about the main directions for the following sustainability as a society as a whole, but also as a simple individual, as part of the entire system (e.g., what means a healthier diet, organic products, the benefits of local food, and different waste management strategies in the household).

As it was shown, the pandemic crisis determined different positive changes, while also emphasizing different vulnerabilities

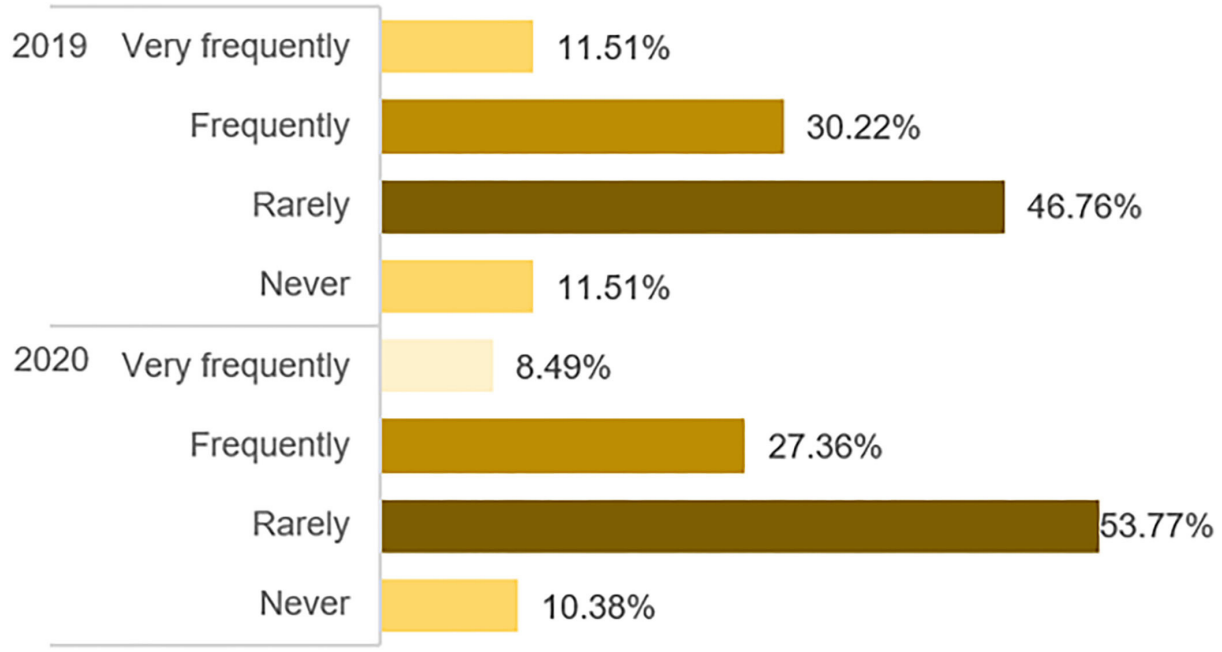



FIGURE 5
Organic food consumption.


FIGURE 6
Preferences for different types of food products when (hypothetically) the price is equal.

in terms of food consumption. The point is to learn from the lesson given by this special sanitary context for maintaining the improvements made as a consequence of it while correcting the weak points revealed in this period. This statement

TABLE 2 Associations between the shopping basket components and the orientations toward local and organic food.

| Types of food | Encouraging the consumption of local food | | Consumption of organic products | |
|---|---|---|---|---|
| | 2019 | 2020 | 2019 | 2020 |
| **Contents of the shopping basket** | | | | |
| Vegetables | 0.134 [0.082] * | 0.280 [0.002] | 0.094 [0.227] | 0.189 [0.030] |
| Fruits | 0.200 [0.008] | 0.244 [0.004] | 0.113 [0.162] | 0.232 [0.009] |
| Dairy products | 0.156 [0.046] | 0.045 [0.624] | 0.057 [0.452] | 0.170 [0.062] |
| Meat | 0.065 [0.398] | 0.058 [0.521] | 0.023 [0.774] | 0.067 [0.440] |
| **Waste** | | | | |
| Vegetables | −0.041 [0.592] | 0.129 [0.117] | 0.063 [0.386] | 0.009 [0.920] |
| Fruits | −0.041 [0.580] | 0.071 [0.404] | −0.019 [0.793] | 0.051 [0.569] |
| Dairy products | 0.026 [0.736] | 0.053 [0.549] | 0.049 [0.540] | −0.147 [0.088] |
| Meat | 0.013 [0.871] | −0.065 [0.474] | 0.064 [0.395] | −0.101 [0.248] |

*The values from the [] brackets represent the P-values for the coefficients of association.

could be one solid argument for future research, through which to put face to face the past and current figures for observing the differences in terms of keeping or not the major changes observed within the pandemic. However, some limits of our study should be taken into consideration: the relatively small sample of respondents; the questionnaire applied only in the case of one Romanian county; the analysis being fully qualitative based only on the consumers' points of view.

## Conclusion

Conversion to sustainable consumption has become a stringent societal necessity, in which consumers play an essential role. Food is among the very frequent things met on the shopping list. Moreover, the types of options made in this regard tend more and more to represent a kind of evidence or symbol for the economic and social status of individuals. In this respect, the orientation toward the environment is increasingly seen as a mark of the educational background. Accordingly, the complexity of food-related decisions makes them sensitive to diverse social, cognitive, affective, and environmental influences. It was observed that the COVID-19 pandemic represented such an important factor, with significant effects on sustainable consumption in the short, medium, and long run. In this context, some changes were expected, as effects of the presence of sanitary crisis, materialized in implicit new trends, be they provoked or amplified by it.

Accordingly, the main findings of this study aimed at emphasizing some of these transformations registered in Iasi County, during the pandemic crisis (August 2020), compared to the period before it (November–December 2019).

From a general perspective, the image of daily consumption has been changed, at least in regard to some specific aspects, due to the pandemic in the analyzed Romanian context. Firstly, the tendency of more shopping in the working days could be generally observed. In addition, this change of perspective could be completed by the fact that the consumers seemed to feel safer in open spaces, like the food markets, compared to close spaces, be they supermarkets or grocery stores. The process of buying online was significantly developed during the pandemic, and increased openness to use digital tools is being observed among consumers. In addition, small increases in the case of purchasing agri-food products directly from the producers during the pandemic were also recorded. Moreover, the final consumers focused more on promoting short supply chains and also on direct supply from local producers, especially in the case of vegetables, fruits, and dairy products.

Consequently, it was shown that people generally developed different personal protection strategies during the pandemic period, reacting in a responsible way to the risks imposed by the sanitary crisis. These changes in habits had, in their turn, some repercussions on the local level. For example, the tendency of shopping especially on weekends and replaced by the one of buying more frequently during the working days concreted into the decongestion on the weekends, especially in the supermarkets, and a more equilibrated distribution across all days of the week. This change, based on its clear benefits, could be maintained even when the pandemic does not anymore represent a threat.

Secondly, regarding the shopping basket, a slight change in the behavior of consumers of Iasi could be identified, namely their sense of responsibility for the purchase and waste of fresh vegetables, preferring to buy more often and throw away less during the COVID-19 crisis. Also, the trend

of the middle segment of consumers who frequently, but not very frequently eat meat moves toward more sustainable consumption, with a reduction in the consumption of fresh meat.

Thirdly, the activity of local producers is much more supported by consumers, which constitutes an important step for what means sustainable consumption, while the behavior strategy toward sustainable food consumption in terms of organic food seems to be discouraged by the pandemic crisis. However, it is difficult to observe a certain trend with regard to the pattern of buying organic products during the period of COVID-19 compared to the one before it. The fact that the Romanian consumer seems not very confident or is not sufficiently informed in order to rationally choose organic or local food, in the hypothetical situation in which the price is equal, could explain such a situation. This is why we do believe that the missing fact in this context is the appropriate information directed to the local consumer. It implies the necessity of educating the Romanian public on what really means sustainable consumption and why it is important to be achieved.

Our results also evidence significant and positive associations between the encouragement of local food consumption and purchasing of vegetables and fruits in 2020; while, regarding the consumption of organic products, in 2020, the same type of associations could be identified in the case of vegetables, fruits, and dairy products.

Based on the results of our study, the pandemic context seemed to be beneficial for determining people to embrace, consciously or not, a more open and positive consumption behavior based on the principles of sustainability as a guide to follow in their daily life, while the increased wariness and, consequently, the high accent put on assuring a good status of health constituting the main explanation for this change. The question is with respect to the maintenance of the buying habits determined by the pandemic after it passed, being possible to represent one interesting area of future research.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

I-SB, S-RU, CC, and LT: conceptualization, methodology, investigation, writing–original draft preparation, and writing–review and editing. CC: software. I-SB, S-RU, and LT: validation. S-RU, CC, and LT: formal analysis. I-SB and LT: data curation. S-RU and CC: visualization. I-SB: project administration and funding acquisition. All authors have read and agreed to the published version of the manuscript.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Publisher's note

# References


Abeliotis, K., Koniari, C., and Sardianou, E. (2010). The profile of the green consumer in Greece. *Int. J. Consum. Stud.* 34, 153–160. doi: 10.1111/j.1470-6431.2009.00833.x

Aldaco, R., Hoehn, D., Laso, J., Margallo, M., Ruiz-Salmón, J., Cristobal, J., et al. (2020). Food waste management during the COVID-19 outbreak: a holistic climate, economic and nutritional approach. *Sci. Total Environ.* 742, 140524. doi: 10.1016/j.scitotenv.2020.140524

Aschemann-Witzel, J., and Zielke, S. (2017). Can't buy me green? A review of consumer perceptions of and behavior toward the price of organic food. *J. Consum. Aff.* 51, 211–251. doi: 10.1111/joca.12092

Azzurra, A., Massimiliano, A., and Angela, M. (2019). Measuring sustainable food consumption: a case study on organic food. *Sustain. Prod. Consump.* 17, 95–107. doi: 10.1016/j.spc.2018.09.007

Bakhsh, M. A., Khawandanah, J., Naaman, R. K., and Alashmali, S. (2021). The impact of COVID-19 quarantine on dietary habits and physical activity in Saudi Arabia: a cross-sectional study. *BMC Public Health* 21, 1–10. doi: 10.1186/s12889-021-11540-y

Borsellino, V., Kaliji, S. A., and Schimmenti, E. (2020). COVID-19 drives consumer behaviour and agro-food markets towards healthier and more sustainable patterns. *Sustainability* 12, 8366. doi: 10.3390/su12208366

Brockway, P. E., Sorrell, S., Semieniuk, G., Heun, M. K., and Court, V. (2021). Energy efficiency and economy-wide rebound effects: a review of the evidence and its implications. *Renew. Sustain. Energy Rev.* 141, 110781. doi: 10.1016/j.rser.2021.110781

Brumă, I. -S., Vasiliu, C. D., Rodino, S., Butu, M., Tanasă, L., Doboș, S., et al. (2021). The behavior of dairy consumers in short food supply chains during COVID-19 pandemic in Suceava area, Romania. *Sustainability* 13, 3072. doi: 10.3390/su13063072

Bublitz, M. G., Peracchio, L. A., and Block, L. G. (2010). Why did I eat that? Perspectives on food decision making and dietary restraint. *J. Consum. Psych.* 20, 239–258. doi: 10.1016/j.jcps.2010.06.008

Butu, A., Brumă, I. S., Tanasă, L., Rodino, S., Dinu Vasiliu, C., Doboș, S., et al. (2020). The impact of COVID-19 crisis upon the consumer buying behavior of fresh vegetables directly from local producers. Case study: The quarantined area of Suceava County, Romania. *Int. J. Environ. Res. Public Health* 17, 5485. doi: 10.3390/ijerph17155485

Cairns, G. (2019). A critical review of evidence on the sociocultural impacts of food marketing and policy implications. *Appetite* 136, 193–207. doi: 10.1016/j.appet.2019.02.002

Chiffoleau, Y., and Dourian, T. (2020). Sustainable food supply chains: is shortening the answer? A literature review for a research and innovation agenda. *Sustainability* 12, 9831. doi: 10.3390/su12239831

Constantin, M., Beia, S. I., Dinu, M., Pătărlăgeanu, S. R., Petrariu, R., and Deaconu, M. E. (2021). Economic implications of food consumption behavior changes in romania during the covid-19 pandemic. *Sci. Papers Ser. Manag. Econ. Eng. Agric. Rural Dev.* 21, 287–292. Available online at: https://www.researchgate.net/publication/355175807_Economic_Implications_of_Food_Consumption_Behavior_Changes_in_Romania_During_the_COVID-19_Pandemic (accessed August 30, 2022).

de Faria Coelho-Ravagnani, C., Corgosinho, F.C., Sanches, F.L.F.Z., Prado, C.M.M., Laviano, A., and Mota, J.F. (2021). Dietary recommendations during the COVID-19 pandemic. *Nutr. Rev.* 79, 382–393. doi: 10.1093/nutrit/nuaa067

Dobernig, K., and Schanes, K. (2019). Domestic spaces and beyond: consumer food waste in the context of shopping and storing routines. *Int. J. Consum. Stud.* 43, 480–489. doi: 10.1111/ijcs.12527

Dolnicar, S., and Grün, B. (2009). Environmentally friendly behavior: Can heterogeneity among individuals and contexts/environments be harvested for improved sustainable management? *Environ. Behav.* 41, 693–714. doi: 10.1177/0013916508319448

Elms, J., De Kervenoael, R., and Hallsworth, A. (2016). Internet or store? An ethnographic study of consumers' internet and store-based grocery shopping practices. *J. Retail. Consum. Serv.* 32, 234–243. doi: 10.1016/j.jretconser.2016.07.002

FAO. (2010). "Definition of "Sustainable Diets." in *Proceedings of the International Scientific Symposium "Biodiversity and Sustainable Diets: United against Hunger"*. (Rome). 3–5.

Feldmann, C., and Hamm, U. (2015). Consumers' perceptions and preferences for local food: a review. *Food Qual. Pref.* 40, 152–164. doi: 10.1016/j.foodqual.2014.09.014

Field, C.B., and Barros, V.R. (2014). *Climate Change 2014–Impacts, Adaptation and Vulnerability: Regional Aspects*. New York, NY: Cambridge University Press.

Fioramonti, L., Coscieme, L., Costanza, R., Kubiszewski, I., Trebeck, K., Wallis, S., et al. (2022). Wellbeing economy: An effective paradigm to mainstream post-growth policies? *Ecol. Econ.* 192, 107261. doi: 10.1016/j.ecolecon.2021.107261

Forster, R., and Mundell, E. (2022). *As Tough COVID Summer Ends, Experts Warn Of a Tougher Fall, Winter*. Available online at: https://consumer.healthday.com/infectious-disease-information-21/coronavirus-1008/as-tough-covid-summer-ends-experts-warn-of-a-tougher-fall-winter-761058.html (accessed August 29, 2022).

Galanakis, C.M. (2020). The food systems in the era of the coronavirus (COVID-19) pandemic crisis. *Foods* 9, 523. doi: 10.3390/foods9040523

Gerritsen, S., Egli, V., Roy, R., Haszard, J., Backer, C. D., Teunissen, L., et al. (2021). Seven weeks of home-cooked meals: Changes to New Zealanders' grocery shopping, cooking and eating during the COVID-19 lockdown. *J. R. Soc. N. Z.* 51, S4–S22. doi: 10.1080/03036758.2020.1841010

Gojard, S., and Véron, B. (2018). Shopping and cooking: the organization of food practices, at the crossing of access to food stores and household properties in France. *Rev. Agric. Food Environ. Stud.* 99, 97–119. doi: 10.1007/s41130-018-0068-7

GPeC. *Raport GPeC E-Commerce România 2020*. (2020). Available online at: https://www.gpec.ro/blog/raport-gpec-e-commerce-romania-2020-cumparaturi-online-de-56-miliarde-de-euro-in-crestere-cu-30-fata-de-2019 (accessed September 12, 2022).

GPeC. *Raport GPeC E-Commerce România 2021*. (2021). Available online at: https://www.gpec.ro/blog/raport-gpec-e-commerce-romania-2021-cumparaturi-online-de-62-miliarde-de-euro-in-crestere-cu-10-fata-de-2020?fbclid=IwAR0Vp8g3lU-_SyVElVXkLpSSbWDaicxV6rEDeE-5u38Jt2gDxmMwFuHLrfs (accessed September 12, 2022).

Grashuis, J., Skevas, T., and Segovia, M.S. (2020). Grocery shopping preferences during the COVID-19 pandemic. *Sustainability* 12, 5369. doi: 10.3390/su12135369

Haghjou, M., Hayati, B., and Pishbahar, E. (2020). "Factors Affecting Consumers' Awareness of Pesticides-Free Fruits and Vegetables," in *The Economics of Agriculture and Natural Resources*. (Singapore: Springer). 125–139.

Hartmann, C., and Siegrist, M. (2017). Consumer perception and behaviour regarding sustainable protein consumption: a systematic review. *Trends Food Sci. Technol.* 61, 11–25. doi: 10.1016/j.tifs.2016.12.006

Hatmanu, M., Cautisanu, C., and Iacobuta, A.O. (2022). On the relationships between CO2 emissions and their determinants in Romania and Bulgaria. An ARDL approach. *Appl. Econ.* 54, 2582–2595. doi: 10.1080/00036846.2021.1998328

Health Council of the Netherlands. (2011). *Guidelines for a Healthy Diet: The Ecological Perspective*. Available online at: https://www.tabledebates.org/research-library/health-council-netherlands-guidelines-healthy-diet-ecological-perspective (accessed September 3, 2022).

Held, B., and Haubach, C. (2017). The additional costs of organic food products - a basket of goods-based analysis differentiated by income. *Manag. Rev.* 28:6—61. doi: 10.5771/0935-9915-2017-1-6

Hemmerling, S., Hamm, U., and Spiller, A. (2015). Consumption behaviour regarding organic food from a marketing perspective—a literature review. *Org. Agric.* 5, 277–313. doi: 10.1007/s13165-015-0109-3

Hoek, A. C., Luning, P. A., Stafleu, A., and de Graaf, C. (2004). Food-related lifestyle and health attitudes of Dutch vegetarians, non-vegetarian consumers of meat substitutes, and meat consumers. *Appetite* 42, 265–272. doi: 10.1016/j.appet.2003.12.003

Hoogland, C. T., de Boer, J., and Boersema, J. J. (2005). Transparency of the meat chain in the light of food culture and history. *Appetite* 45, 15–23. doi: 10.1016/j.appet.2005.01.010

Hughner, R. S., McDonagh, P., Prothero, A., Shultz, C. J., and Stanton, J. (2007). Who are organic food consumers? A compilation and review of why people purchase organic food. *J. Consum. Behav.* 6, 94–110. doi: 10.1002/cb.210

Iftimoaei, C. *Repere sociodemografice privind județul Iași, studiu introductiv la Anuarul Statistic al Județului Iași 2021*. (2022). Available online at: https://iasi.insse.ro/wp-content/uploads/2022/04/AnuarIasi2021.pdf (accessed September 12, 2022).

IISD. (1994). *Oslo Roundtable on Sustainable Production and Consumption; The International Institute for Sustainable Development*. New York, NY: International Institute of Sustainable Development.

Intergovernmental Panel on Climate Change. (2014). *Climate Change 2014 Mitigation of Climate Change*. Cambridge: Cambridge University Press.

Iranmanesh, M., Ghobakhloo, M., Nilsashi, M., Tseng, M.L., Senali, M.G., and Abbasi, G.A. (2022). Impacts of the COVID-19 pandemic on household food waste behaviour: a systematic review. *Appetite* 176, 106127. doi: 10.1016/j.appet.2022.106127

Jaeger, S.R., Vidal, L., Ares, G., Chheang, S.L., and Spinelli, S. (2021). Healthier eating: covid-19 disruption as a catalyst for positive change. *Food Qual. Prefer.* 92, 104220. doi: 10.1016/j.foodqual.2021.104220

Jansson, J., Marell, A., and Nordlund, A. (2009). Elucidating green consumers: a cluster analytic approach on proenvironmental purchase and curtailment behaviors. *J. Euromark.* 18, 245–267. doi: 10.9768/0018.04.245

Jensen, K.L., Yenerall, J., Chen, X., and Yu, T.E. (2021). US consumers' online shopping behaviors and intentions during and after the COVID-19 pandemic. *J. Agric. Appl. Econ.* 53, 416–434. doi: 10.1017/aae.2021.15

Jribi, S., Ben Ismail, H., Doggui, D., and Debbabi, H. (2020). COVID-19 virus outbreak lockdown: What impacts on household food wastage? *Environ. Dev. Sustain.* 22, 3939–3955. doi: 10.1007/s10668-020-00740-y

Jungbluth, N., Tietje, O., and Scholz, R.W. (2000). Food purchases: impacts from the consumers' point of view investigated with a modular LCA. *Int. J. Life Cycle Assess.* 5, 134–142. doi: 10.1007/BF02978609

Khamis, H. (2008). Measures of association: How to choose? *J. Diagn. Med. Sonogr.* 24, 155–162. doi: 10.1177/8756479308317006

Koletzko, B., Holzapfel, C., Schneider, U., and Hauner, H. (2021). Lifestyle and body weight consequences of the COVID-19 pandemic in children: Increasing disparity. *Ann. Nutr. Metabol.* 1:1–3. doi: 10.1159/000514186

Lang, T., and Barling, D. (2013). Nutrition and sustainability: an emerging food policy discourse. *Proc. Nutr. Soc.* 72, 1–12. doi: 10.1017/S002966511200290X

Lanzini, P., and Thøgersen, J. (2014). Behavioural spillover in the environmental domain: an intervention study. *J. Environ. Psychol.* 40, 381–390. doi: 10.1016/j.jenvp.2014.09.006

Laureati, M., Jabes, D., Russo, V., and Pagliarini, E. (2013). Sustainability and organic production: How information influences consumer's expectation and preference for yogurt. *Food Qual. Prefer.* 30, 1–8. doi: 10.1016/j.foodqual.2013.04.002

Lea, E. J., Crawford, D., and Worsley, A. (2006). Consumers' readiness to eat a plant-based diet. *European J. Clin. Nutr.* 60, 342–351. doi: 10.1038/sj.ejcn.1602320

Macdiarmid, J. I. (2014). Seasonality and dietary requirements: will eating seasonal food contribute to health and environmental sustainability? *Proc. Nutr. Soc.* 73, 368–375. doi: 10.1017/S0029665113003753

MacGregor, J., and Vorley, B. (2006). *Fair Miles? The Concept of 'food Miles' Through a Sustainable Development Lens*. Available online at: https://www.iied.org/11064iied (accessed September 11, 2022).

Marcuă, L., Popescu, A., Tindeche, C., Smedescu, D., and Marcuă, A. (2021). Food security of the European Union and the influence of Covid-19. *Sci. Papers Ser. Manag. Econ. Eng. Agric. Rural Dev.* 21, 383–392.

Morley, A. (2021). Procuring for change: an exploration of the innovation potential of sustainable food procurement. *J. Clean. Prod.* 279, 123410. doi: 10.1016/j.jclepro.2020.123410

Mullee, A., Vermeire, L., Vanaelst, B., Mullie, P., Deriemaeker, P., Leenaert, T., et al. (2017). Vegetarianism and meat consumption: a comparison of attitudes and beliefs between vegetarian, semi-vegetarian, and omnivorous subjects in Belgium. *Appetite* 114, 299–305. doi: 10.1016/j.appet.2017.03.052

Paciarotti, C., and Torregiani, F. (2021). The logistics of the short food supply chain: a literature review. *Sustain. Prod. Consump.* 26, 428–442. doi: 10.1016/j.spc.2020.10.002

Pappalardo, G., Cerroni, S., Nayga Jr, R.M., and Yang, W. (2020). Impact of COVID-19 on household food waste: the case of Italy. *Front. Nutr.* 291:1–9. doi: 10.3389/fnut.2020.585090

Plessz, M., Dubuisson-Quellier, S., Gojard, S., and Barrey, S. (2016). How consumption prescriptions affect food practices: assessing the roles of household resources and life-course events. *J. Consum. Cult.* 16, 101–123. doi: 10.1177/1469540514521077

Pocol, C.B., Pinoteau, M., Amuza, A., Burlea-Schiopoiu, A., and Glogoveţan, A.I. (2020). Food waste behavior among Romanian consumers: a cluster analysis. *Sustainability* 12, 9708. doi: 10.3390/su12229708

Reisch, L., Eberle, U., and Lorek, S. (2013). Sustainable food consumption: an overview of contemporary issues and policies. *Sustain. Sci. Pract. Policy* 9, 7–25. doi: 10.1080/15487733.2013.11908111

Singh, K. (2007). *Quantitative Social Research Methods*. London: Sage Publications.

Sorrell, S., Gatersleben, B., and Druckman, A. (2020). The limits of energy sufficiency: a review of the evidence for rebound effects and negative spillovers from behavioural change. *Energy Res. Soc. Sci.* 64, 101439. doi: 10.1016/j.erss.2020.101439

Tate, K., Stewart, A. J., and Daly, M. (2014). Influencing green behaviour through environmental goal priming: the mediating role of automatic evaluation. *J. Environ. Psychol.* 38, 225–232. doi: 10.1016/j.jenvp.2014.02.004

Ulman, S. R., Mihai, C., Cautisanu, C., Brumă, I. S., Coca, O., and Stefan, G. (2022). Environmental wellbeing in the context of sustainable development: evidence from post-communist economies. *Front. Environ. Sci.* 10, 1027352, doi: 10.3389/fenvs.2022.1027352

Verain, M. C., Dagevos, H., and Antonides, G. (2015). Sustainable food consumption. Product choice or curtailment? *Appetite* 91, 375–384. doi: 10.1016/j.appet.2015.04.055

Verain, M. C., Sijtsema, S. J., and Antonides, G. (2016). Consumer segmentation based on food-category attribute importance: the relation with healthiness and sustainability perceptions. *Food Qual. Prefer.* 48, 99–106. doi: 10.1016/j.foodqual.2015.08.012

Vermeir, I., and Verbeke, W. (2006). Sustainable food consumption: Exploring the consumer "attitude–behavioral intention" gap. *J. Agric. Environ. Ethics* 19, 169–194. doi: 10.1007/s10806-005-5485-3

Vermeir, I., Weijters, B., De Houwer, J., Geuens, M., Slabbinck, H., Spruyt, A., et al. (2020). Environmentally sustainable food consumption: a review and research agenda from a goal-directed perspective. *Front. Psychol.* 11, 1603. doi: 10.3389/fpsyg.2020.01603

Voinea, L., Popescu, D.V., Bucur, M., Negrea, T.M., Dina, R., and Enache, C. (2020). Reshaping the traditional pattern of food consumption in romania through the integration of sustainable diet principles. A qualitative study. *Sustainability* 12, 5826. doi: 10.3390/su12145826

Wachyuni, S.S., and Wiweka, K. (2020). The changes in food consumption behavior: a rapid observational study of COVID-19 pandemic. *Int. J. Manag. Innov. Entrep. Res.* 6, 77–87. doi: 10.18510/ijmier.2020.628

Waxman, A. (2004). WHO Global Strategy on Diet, Physical Activity and Health. *Food Nutr. Bull.* 25, 292–302. doi: 10.1177/156482650402500310

Willer, H., Trávníček, J., Meier, C., and Schlatter, B. (2022). *The World of Organic Agriculture. Statistics and Emerging Trends*. Bonn: IFOAM - Organics International and FiBL.