Value seeking, health-conscious or sustainability-concerned? Profiling fruit and vegetable consumers in Euro-Mediterranean countries

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Abstract

Purpose – The aim of this study was to investigate consumer preferences and profile their food-related lifestyles, as well as to identify consumer groups with similar attitudes/behaviours in the Euro-Mediterranean fruit and vegetable market.

Design/methodology/approach – A structured questionnaire was designed drawing from the food related lifestyles instrument and including other factors relevant to fruit and vegetable consumer preferences. The data were collected in an online survey with 925 participants in France, Greece, and Italy. A principal component analysis was conducted to interpret and examine consumers' fruit and vegetable related lifestyles.

In addition, a cluster analysis was performed to identify different consumer segments, based on the core dimensions of the food-related lifestyle approach.

Findings – In each country, three primary consumer segments were distinguished. Health-conscious individuals were predominant in France and Greece, while quality-conscious consumers were prevalent in Italy. These classifications were determined considering various factors such as purchase motivation, perception of product quality, health concerns, environmental certifications, and price sensitivity.

Originality/value – The food-related lifestyle approach has been adapted instrument to create a customised survey instrument specifically designed to capture the intricacies of fruit and vegetable consumer preferences and priorities in three Euro-Mediterranean Countries.

1. Introduction

In today's fast-paced world, consumers are confronted with numerous choices regarding their dietary preferences and habits. One of the most crucial elements of a healthy diet is the consumption of fruit and vegetable (F&V), which are abundant in essential nutrients and play a vital role in preventing chronic diseases (Wallace *et al.*, 2020). Despite widespread awareness of the importance and benefits of F&V consumption, actual intake often falls short of recommended daily standards (Harris *et al.*, 2023). Recommended guidelines suggest a minimum of 400 grams (equivalent to five servings) of F&V per day to prevent chronic diseases and maintain overall well-being (European Commission, 2024). It is noteworthy that in Europe, adult consumption is only half the recommended daily amount, and in the United States, it's merely 6–8% (EUROSTAT, 2022a). Generally, F&V consumption tends to be higher in southern European countries such as Italy and Spain, where the Mediterranean diet places a strong emphasis on these food groups, while consumptions is often lower in northern European countries (Stea *et al.*, 2020).

These circumstances have prompted both governmental and non-governmental organisations to advocate for increased F&V consumption due to their nutritional benefits. In numerous countries, initiatives to promote healthy eating, coupled with public awareness campaigns, have resulted in a notable rise in F&V consumption (Küçük *et al.*, 2023). In this context, small and medium-sized enterprises (SMEs) play a pivotal role as they contribute to the availability and accessibility of fresh food (Demmler, 2020). Despite these encouraging efforts, the emergence of new lifestyles and the widespread availability of convenient food options present challenges that can impede progress in promoting healthy diets (Brouwer *et al.*, 2021). Therefore, it is imperative for SMEs to align their strategies with prevailing health-conscious consumer trends and governmental initiatives. Such alignment is crucial to ensuring a meaningful and positive impact on the dietary habits of the population.

Today's diverse lifestyles have led to a significant gap in our understanding of how consumers' dietary styles influence food group choices and behaviours (Thøgersen, 2017). Eurostat's findings confirm this diversity of eating styles, especially when differences between genders and different levels of education and income are taken into account (EUROSTAT, 2022b). Today's eating styles are influenced by a variety of factors, including food insecurity (Rizk *et al.*, 2023), food scandals (Rieger *et al.*, 2016), sustainability issues in food production (Allen and Prosperi, 2016; Liu and McCarthy, 2023), environmental pollution (Pink *et al.*, 2022), and ethical concerns (Fanzo, 2015).

In addition, various crises in recent years, particularly the COVID-19 pandemic and the war in Ukraine, have had a noticeable impact on the diversity of food consumption patterns. The pandemic has heightened health awareness and led some consumers to favour foods that support the immune system and overall well-being. This has led to an increased interest in diverse, nutrient-rich foods such as fruits, vegetables and whole grains (Borsellino *et al.*,

2020). Furthermore, the conflict in Ukraine has caused significant disruption in the distribution of food both domestically and globally. Ukraine, a major supplier of wheat, corn, and oilseeds, which are among the most important staple foods, is currently facing supply uncertainties due to the war (Mamonova *et al.*, 2023). The ongoing conflicts, which affect both the supply and prices of food, are therefore disrupting stable eating habits and affecting the cultural diversity of diets (Grunert *et al.*, 2023). People may have to get used to an unfamiliar environment and have difficulty accessing familiar ingredients and culinary traditions they are used to Leal Filho *et al.* (2023). These factors have therefore led to changes in consumer behaviour and can significantly influence the way people approach their diet and interact with food groups (Monterrosa *et al.*, 2020).

Among the approaches used in the literature to assess these issues, dietary lifestyle has gained prominence in the concept of food related lifestyles (FRL). FRL provides a comprehensive tool for examining the complex interplay between individuals' values, beliefs, attitudes, and behaviours in relation to food choices (Grunert, 2006). This tool categorises consumers based on their attitudes toward food purchasing, preparation, and consumption, where each group may have a different lifestyle or behaviour toward certain food segments (Jang *et al.*, 2011). Therefore, consumer segmentation helps marketers and policy makers categorise purchasers based on their attitudes towards food, allowing for more effective and targeted marketing strategies.

In this study, we analyse consumers' behaviours and attitudes towards F&V consumption and provide a research contribution with a customised survey to investigate their F&V preferences. In fact, the FRL is a general instrument that is not geared towards a specific food category. The development of a specialised FRL instrument allows for an effective assessment of consumer behaviour by including specific behavioral and attitudinal elements related to the purchase and consumption of F&V. Accordingly, we adopted a FRL instrument specifically adapted for F&V that includes the factors of consumption habits of F&V, health concerns – confidence in the safety of F&V, and important information about these products. Customised survey instruments are valuable tools in research, allowing researchers to collect targeted and meaningful data that aligns with their study objectives (Maugliani and Baldi, 2023). The customised survey conducted in this research aligns with two main objectives, such as examining consumer preferences and profiling their lifestyles related to F&V.

In addition, as a novelty in the segmentation of F&V consumers, this study also considers environmental (Rosa *et al.*, 2022) and social (especially ethical) (Hogrefe and Bohnet-Joschko, 2023) concerns as dimensions of sustainability, which are taken into account when creating profiles of F&V consumers. This endeavour aims to profile F&V consumers, providing valuable insights into their different preferences and priorities in terms of purchasing behaviour and lifestyle. This finding may be of interest to market players, in particular SMEs in the Mediterranean agri-food sector, which are currently struggling to assess the market potential of health-oriented products and develop appropriate business strategies to effectively exploit this potential.

In addition, it is pointed out that, on the one hand, the Mediterranean countries have a significant share of the global supply of F&V (Mrabet *et al.*, 2020). The Mediterranean countries account for 10% of global F&V production. However, the share in the European countries is high, so that F&V production in the European Mediterranean countries accounts for around 51% of total F&V production in Europe (FAO, 2021). On the other hand, the Mediterranean diet, known for its emphasis on F&V, and for its health benefits and has generated a great deal of interest in Mediterranean F&V worldwide (Sikalidis *et al.*, 2021). With this in mind, we have selected France, Greece, and Italy as study areas. This choice is based on a mix of cultural, dietary, and economic factors that make this region unique and relevant for our study of F&V preferences. The reminder of the article is organised as follows: Section 2 addresses the theory around FRL concepts and the literature studies that have been

conducted on these concepts, identifying research gaps and building on them to present the research contribution of this study; the methodology section presents the survey process and data analysis techniques that were used to achieve the objectives; the results describe the cluster analysis and consumer segmentation in the three countries; the discussion includes some of the key findings of the study, limitations, and recommendations for future research.

2. Theoretical background

Lifestyle research was first developed by Lazer (1963), and makes an important contribution to consumer segmentation by highlighting the influence of general lifestyle on consumer behaviour, preferences, and choices (Akkaya, 2021). The relationship between lifestyle and food has been a topic of interest for researchers and marketers for several decades (Silchenko and Askegaard, 2020). In the early 1990s, there was a growing awareness of lifestyle factors that influence food choices (Brunsø and Grunert, 1995; Grunert, 1993). Researchers, developed survey instruments using the FRL approach, to investigate the relationship between lifestyle and food-related behaviours and preferences (Kim et al., 2018).

During these years, the lifestyle associated with food, such as the Mediterranean diet, also became popular. Originating from Southern Italy, Greece, and Spain, the Mediterranean diet became popular in the 1960s due to its health benefits, better weight control, and overall well-being compared to Northern Europe and North America (Sikalidis et al., 2021).While the basic principles of the Mediterranean diet remain unchanged, there are regional differences in terms of what is consumed and how it is prepared. Differences can even vary from north to south within a country. These differences can be attributed to factors such as geography, climate, cultural practices, and local agricultural products (Dernini and Berry, 2015). In France, for instance, the Mediterranean diet in the south can contrast with the more butter and cream-based cuisine in the north (Gerber, 2016). Italian cuisine also varies greatly from region to region. In northern Italy, butter and rice are the main ingredients, while in southern Italy, olive oil and pasta are the main ingredients (Dolcini et al., 2024). The Greek lifestyle also emphasises vegetables, including leafy greens and tomatoes, as the regional differences of the Greek climate, terrain and local traditions contribute to different culinary profiles (Panagou et al., 2013).

The FRL approach draws on sociology, psychology, and marketing to examine how individuals construct their identities and social roles through their food-related choices and practices (Grunert et al., 2011). The FRL approach enables a consistent segmentation of the food market in different countries and the assessment of consumers' attitudes towards certain foods and their consumption preferences (Pérez-Cueto et al., 2010). This instrument is defined as a tool for grouping consumer purchases and consumption in terms of food quality, health, taste, and freshness (Buckley et al., 2007). This instrument is commonly used in food consumer segmentation, e.g. fruit (Ahmadi Kaliji et al., 2022; Montero-Vicente et al., 2019), milk and dairy products (Haas et al., 2016), fish (Stancu et al., 2022), beverages (Yeo et al., 2020), meat (Hoek et al., 2004), and edible insects (Verneau et al., 2020) (Table 1). It usually includes five different components of purchasing, namely food quality, preparation method, consumption, and purchase motivation (Montero-Vicente et al., 2019). These factors can be considered as a practical tool for a deeper breakdown and can also be modified to analyse the food market (Fang et al., 2013; Wycherley et al., 2008).

Previous research has shown that people's food preferences and lifestyles are diverse and can change over time due to factors such as cultural influences, health considerations, and personal experiences (Chen, 2009; Monterrosa et al., 2020). To understand and target specific consumer groups, marketers often resort to segmentation that differ by social, demographic and attitudinal characteristics (Jang et al., 2011). However, with FRL, it is not always easy to identify distinct segments, as each person may have a unique combination of preferences and

Authors (year)	Title	Study area	Case study on specific product	Sample size	Main findings	Research limitation/suggestions for future studies
Wycherley et al. (2008)	Speciality food orientation of food related lifestyle segments in Great Britain	United Kingdom	Foods in general	1,037	The segments of adventurous, rational, carefree, snacking, conservative and uninvolved consumers with different specialities and interests in food specialities were identified	Despite the reduction in the number of items in the FRL tool and the creation of the relevance items, it is still necessary to consider the items associated with the respective food in order to determine the segments more precisely
Dimech et al. (2011)	Attitudes of Maltese Consumers Towards Quality in Fruit and Vegetables in Relation to Their Food-Related Lifestyles	Malta	Fruit and Vegetables	881	Taking into account five factors related to the subjective nature of quality, differences between consumers, intangible dimensions, the information environment and price, four different segments were identified: hedonistic; bargain-oriented, adventurous and traditional households. These segments show differences in their views and attitudes towards the quality of fruit and vegetables	The authors used a reduced version of the FRL instrument and were unable to assess changes in FRL over time and the possible emergence of new segments
Haas et al. (2016)	Attitudes and Preferences of Kosovar Consumer Segments Toward Quality Attributes of Milk and Dairy Products	Kosovo	Milk and Dairy Products	300	Using a simplified version of the FRL tool revealed three distinct consumer segments: the conservative consumer, the socially conscious food enthusiast, and the information-seeking eco- conscious consumer	This study has some limitations, in particular the focus on large urban areas, which precludes a direct transfer of the conclusions to rural areas. In addition, a reduced version of the FRL instrument was used in the study, so it is necessary to use the full FRL on a comparable consumer sample to ensure consistency and reproducibility of the results

(continued)

Table 1.
Literature review on the application of FRL tools in the segmentation of food consumers

Authors (year)	Title	Study area	Case study on specific product	Sample size	Main findings	Research limitation/suggestions for future studies
Montero-Vicente et al. (2019)	Characterisation of fresh fruit consumption in Spain based on food-related lifestyle	Spain	Fruit	500	The segments total indifference, little time for cooking, cooks and preference for natural products and unconcerned consumers were analysed and characterised. These segments showed remarkable differences in the criteria for buying and eating fresh fruit	It is crucial to adopt a modular strategy by using an updated and reduced version of the original FRL tool that includes elements related to sustainability, food waste, nutritious diets and social responsibility. In addition, it is useful to validate the FRL segmentations with empirical means and establish links between the segmentation criteria and responses to marketing factors
Verneau et al. (2020)	Assessing the Role of Food Related Lifestyle in Predicting Intention towards Edible Insects	Italy, Denmark	Edible Insects	300	Based on the identified consumer segments categorised as uninvolved, carefree, conservative, rational and adventurous consumers, the main differences between consumers were highlighted and some of them were more inclined to include insects in their daily diet	A tool that specifically addresses an important aspect of the literature on inedible insects, such as disgust, is currently lacking. The relationship between FRL, perceived behavioral control, and disgust needs to be further explored
Yeo et al. (2020)	Food-related lifestyle segmentation and beverage attribute' selection: toward understanding of sugar-reduced beverages choice	Korea	Beverage	1,000	The consumer groups were divided into rational, value-seeking, and careless consumers on the basis of the FRL, who had different preferences in terms of product quality/hygiene and sensory characteristics when selecting beverages	The main limitation of this study arises from the limited ability to generalise results from consumer panels to the population as a whole, as these panels were obtained exclusively from an online research company

(continued)

Table 1.

Authors (year)	Title	Study area	Case study on specific product	Sample size	Main findings	Research limitation/suggestions for future studies
Brunso et al. (2021)	Core dimensions of food-related lifestyle: A new instrument for measuring food involvement, innovativeness and responsibility	Denmark, Hungary, Australia, United States, United Kingdom, New Zealand	Foods in general	3,396	The authors introduced some new key elements of the instrument, which were validated for their cross-cultural applicability in the FRL instrument. This approach led to the identification of five distinct segments, foodies, moderates, adventurous, uninvolved and conservatives consumers	While the development of the new FRL tool was based on data from six countries, further studies in different regions are needed to better validate its cross-cultural applicability
Ahmadi Kaliji et al. (2022)	Fruit-related lifestyles as a segmentation tool for fruit consumers	Kosovo	Fruit	300	Based on the FRL tool, four different consumer segments were identified: carefree, adventurous, conservative and functional consumers, taking into account the consumption behaviour of fruit as well as their attitudes towards health, quality, taste and safety	The revised FRL was not revised according to the standard procedure for scale design. Future studies need to develop a more robust instrument that takes into account more relevant factors to assess lifestyle in relation to fruit in the future
Stancu et al. (2022)	European consumer segments with a high potential for accepting new innovative fish products based on their food-related lifestyle	Spain, France, Germany	Fish products	1,500	They identified five consumer segments: foodies, adventurous, responsible, moderate, conservative and uninvolved consumers. The segments differed mainly in their psychographic profile and their intention to buy new aquaculture fish products	The study relied on self-reporting, which may lead to bias and may not accurately reflect actual behaviour

Source(s): Table by authors

Table 1.

behaviours (Vermeir *et al.*, 2020). On the one hand, food choices can vary greatly depending on context (Wongprawmas *et al.*, 2021). A person's lifestyle may differ when eating out, cooking at home, or looking for quick snacks. It is important to understand how context influences choices. For example, a person may have a health-conscious lifestyle when it comes to snacks, while they like to eat comfort food on special occasions (Jakše and Pinter, 2022). In addition, consumers are increasingly considering ethical and environmental factors when making food choices (van Bussel *et al.*, 2022). The consideration of ethical (e.g. animal welfare, labour practises, and fair trade) and environmental (e.g. deforestation, water scarcity and pollution, chemical pesticides, greenhouse gas emissions) aspects in food choices is due to a combination of reasons, including increased awareness, health concerns, accessibility of information, and changing societal values (Marty *et al.*, 2022). Eco-labels and certifications play an important role in addressing environmental, social and ethical lifestyle aspects of food consumption (Gorton *et al.*, 2021). These certifications serve as a guarantee for consumers and provide information about the production, sourcing and distribution of their food (Majer *et al.*, 2022). In this way, consumers can make better informed and more conscious purchasing decisions (Isabel Sonntag *et al.*, 2023). Voluntary sustainability standards and certifications such as organic, fair trade, GMO-free and sustainability seals have become widely recognised symbols that indicate compliance with certain standards and practices. They provide valuable information to consumers and help them understand the types of products they are considering. However, the effectiveness of these standards and certifications depends on how much consumers trust them and understand the certification process, the information presented and the associated criteria (Rupprecht *et al.*, 2020). Several research studies suggest that consumers approach claims about environmentally friendly products, and associated symbols, such as those for organic food, with a level of scepticism. This scepticism was found in studies by Cho and Taylor (2020), Janssen and Hamm (2011), and Kreczmańska-Gigol and Gigol (2022).

Some studies have focused on F&V using the FRL instrument and have suggested that applying this theoretical approach to F&V consumption can provide insights into the multiple aspects that promote or hinder the integration of F&V into consumers' lives (Ahmadi Kaliji *et al.*, 2022). For instance, Montero-Vicente *et al.* (2019) segmented consumers' habits and purchasing criteria for fresh fruit in Spain by FRL. The segments they described showed significant differences in the purchase and consumption criteria for fresh fruit such as fruit flavour, geographical origin, product information, brand, and healthy attributes. In addition, Dimech *et al.* (2011) investigated how Maltese consumers' lifestyles influence their perceptions of F&V quality attributes, considering five aspects of subjectivity of quality, intangible dimensions, consumer differences, information environment, and price. They identified four clusters of hedonistic, bargain seeker, adventurous, and traditional households (Table 1).

According to the literature, the FRL is a general instrument that does not focus on a specific food category (Brunsø *et al.*, 2021). Some items, such as interest in cooking and cooking methods, do not fit the study of fresh fruit or specific vegetables consumption. The development of an FRL instrument allows the measurement of consumer behaviour to understand and influence it by including specific behavioral and attitudinal items related to the purchase and consumption of fresh F&V. Accordingly, Ahmadi Kaliji *et al.* (2022) proposed a modified FRL instrument specifically for fruit that included the factors of information about fruit, labels and brands, reasons for choosing a fruit store, fruit consumption habits, perceptions of quality and taste, health concerns, and confidence in the safety of fruit.

This article aims to fill the above-mentioned gaps in the literature by shedding light on the relationship between consumers' FRL and their F&V consumption. While numerous studies have examined food choices and lifestyle factors, there is little research that explicitly focuses on how these factors interact to influence individual F&V choice behaviour. The use of a

modified FRL instrument for F&V also attempts to address the gap associated with standard scaling procedures. Identifying these research gaps is critical to developing targeted interventions that can promote healthier diets and improve public health outcomes.

3. Research method

3.1 Survey procedure

The data was collected online in June 2023 via Qualtrics (www.qualtrics.com), an online survey platform. The consumer panel participants were recruited in collaboration with a market research agency (www.toluna.com) providing a cross-national online panel in France, Greece, and Italy. Toluna manages a diverse panel of individuals who have chosen to participate in surveys and research studies. Participants are recruited from various demographic groups to ensure a balanced representation of the population. A number of considerations played a role in the selection of countries for this study, such as the research objectives derived from the main project and the availability of data. France, Greece, and Italy stand out as geographically and culturally diverse European countries. Studying consumers in different regions with different cultural backgrounds provides a valuable opportunity to gain insights into the diversity of dietary habits and preferences. These three countries are known for their Mediterranean diet, characterised by the consumption of abundant F&V (EUROSTAT, 2022a).

The questionnaire was developed in English and then translated into the official languages of each target country and was available in early June 2023. The back-translation approach was used to validate the translated questionnaire (Aiello *et al.*, 2020; Epstein *et al.*, 2015). First, the source text was drafted in English and then translated into target languages (French, Greek, and Italian) by the authors using automatic translation software (www.deepl.com). Then the authors translated the local language back into English and the latter version of the questionnaire was compared with the former one. Care was taken to ensure that the translators paid close attention to context and cultural nuances during the translation process.

The survey was initially conducted as a pre-test or soft launch with 100 completed questionnaires, and after minor errors were corrected, the final lunch was conducted. The average time to complete the questionnaire was reported as 15–20 min. In connection with the online procedure and due to the filter and control questions mentioned in section 3.2 (questionnaire design) or due to refusal to answer all questions, some participants were excluded from the survey. This number was different in the three countries surveyed. 62 participants were excluded from the survey in France, 78 participants in Greece and 84 participants in Italy. After thorough data cleaning and validation, the final analysis included a total of 270 participants in France, 344 participants in Greece and 311 participants in Italy. The sample size was determined using Cochran's sampling formula (Cochran, 1977), with a 95% confidence level. We then used a quota strategy to ensure a representative distribution of respondents based on key demographic factors, including demographic characteristics (Futri *et al.*, 2022). Quotas were set based on the target population so that we could gain meaningful insights from a balanced and comprehensive sample.

Ensuring the representativeness of an online survey sample is a challenge, as the people who participate in online surveys are often younger and have a higher level of education compared to the general population (Grewenig *et al.*, 2023). To counteract this bias, quotas for gender, age and education were set based on the population characteristics in the target countries. Table 2 provides an overview of the demographic data of the participants and shows an almost even gender distribution. In Italy and France, the participation rate of women was higher than that of men, with 55% of women and 45% of men in Italy, and 54% of women and 46% of men in France. In Greece, on the other hand, the number of male participants was higher (54%) than that of women (46%). Respondents in all three countries surveyed were more likely to be in the

	Definitions	France	Greece	Italy
Gender	Male	45.6	54.1	45.3
	Female	54.4	45.9	54.7
Age (years old)	18–29	24.1	16.6	18.0
	30–39	11.1	16.3	11.9
	40–49	12.2	19.8	19.6
	50–59	21.1	29.7	22.8
	Over 60	31.5	17.7	27.7
Education	Elementary school	2.2	0.6	4.2
	High school	48.1	42.4	78.8
	University and/or above	49.6	57.0	17.0
Children in family (numbers/years old)	0–5 years old	14.6	19.8	11.5
	6–10	11.6	15.5	15.1
	11–13	12.5	15.9	16.6
	over 13	61.3	48.8	56.8

Source(s): Table by authors

50–59 and 40–49 age group. Differences were also found in the frequency of responses between the countries surveyed, particularly in relation to education level and family size.

3.2 Questionnaire design

The structure of the questionnaire included multiple-choice questions, Likert matrix questions with some items each, and some open-ended questions. A seven-point Likert scale was used in this study. 7-point scales correlate more strongly with observed significance levels than 5-point scales and were reported by respondents to be the most accurate to use (Lozano *et al.*, 2008). Responses referred to the Likert scale to measure agreement, which was reported as "strongly disagree-1" to "strongly agree-7".

Aa a customised survey, we designed set of questions based on FRL instrument that are tailored to meet our specific objectives (Figure 1).

The aim of the customised survey is to examine various elements. The survey was structured into three main sections or blocks, each addressing different aspects essential for investigating consumer F&V preferences and profile their food related lifestyles. These sections encompass objectives and general information, including socio-demographic characteristics and some screening questions; habits and preferences related to F&V consumption; and enquiries concerning perceived information on F&V packaging and levels of price-consciousness.

Filter and control questions were aimed at determining whether the participants were the main decision-makers in their household regarding the purchase of F&V (participants who stated "No, I am not" were excluded from the survey). We also asked, how often they buy F&V? (participants who purchase less than once a week/never were excluded from the survey), as these participants may not have enough experience or knowledge to provide meaningful insights into our research objectives. To ensure that participants buy F&V in short food supply chains (SFSCs), they were also asked where the F&V they buy most often come from. Participants were assigned to the SFSC quota when they selected the options "local market" and "online + local products".

In the following, the questionnaire was further divided into some sections based on modified FRL instruments, including consumption habits of F&V, questions about necessity, advantage, acceptance and importance of regular consumption of F&V (Dorce *et al.*, 2021); Purchase motives with questions about the benefits of consuming F&V (Harvard Chan, 2022);
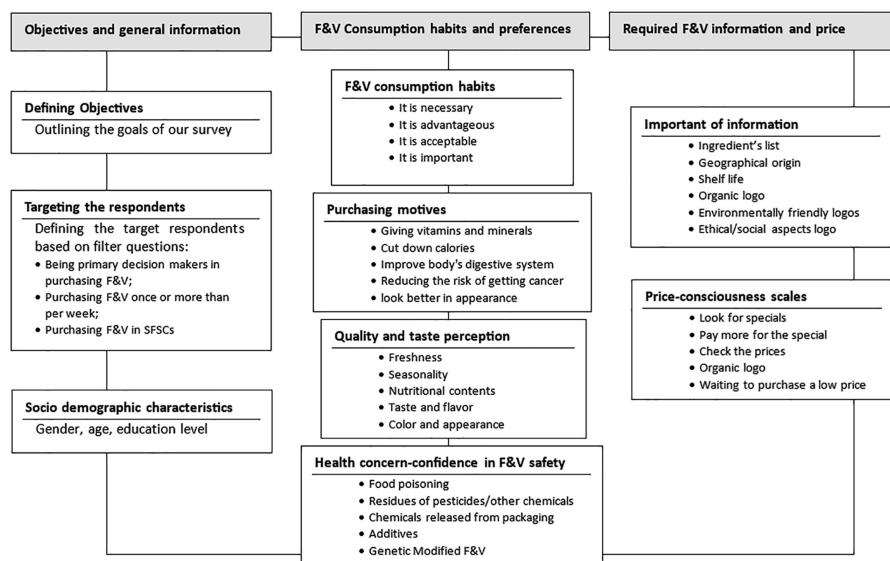
Source(s): Figure by authors

Quality and taste perceptions (Sacchi, 2018); Health concerns – confidence in the safety of F&V (van der Vossen-Wijmenga *et al.*, 2022); Important information about F&V (Ricci *et al.*, 2018); and Price consciousness – questions related to scale (Ahmadi Kaliji *et al.*, 2022). To ensure the validity of the questions in the questionnaire, the questions were first compared with existing theories and literature in the field.

Both the questionnaire administered to the survey participants and the dataset including their responses are provided as supplementary materials.

3.3 Statistical analysis

The Statistical Package for the Social Science (SPSS version 27) was used to analyse the data.

To check the validity of the questions in the questionnaire, the techniques such as factor analysis were used to examine the underlying factors and items of each question, with scores above 0.40 considered meaningful (Yeo *et al.*, 2020).

First, the relevant statistics (mode and standard deviation) were used to describe the variables. Before the cluster analysis, the results of the Kaiser-Meyer-Olkin Measure (KMO) (Kaiser, 1974) and Bartlett's (Bartlett, 1954) tests are checked. These two tests are used to assess the suitability of the data for factor analysis and to determine whether the variables in the dataset are suitable for extracting the underlying latent factors. A high KMO value (above 0.6 or 0.7) and a significant Bartlett's test indicate a data set with variables that are well-suited for factor analysis (Kaiser, 1974).

In the cluster analysis, respondents were segmented using a combination of Principal component analysis (PCA) with Varimax rotation and Kaiser normalisation (Kaiser, 1974). The items of the PCA analysis with a factor loading below 0.40 commonality (Yeo *et al.*, 2020) and an eigenvalue less than or equal to 1 (Kaiser criterion) were excluded. The internal reliability of the individual factors was assessed using Cronbach's alpha (Cronbach, 1951). After identifying valid factors, a cluster analysis was used to identify market segments based on the adapted FRL consumer instrument. Hierarchical cluster

analysis (Gere, 2023) with Ward linkage (Ward, 1963) by FRL factor value was performed for the consumer segments. In hierarchical clustering, a tree-like structure of clusters, called a dendrogram, is created by iteratively merging or splitting clusters based on similarity or distance measures (Halkidi, 2018). This method is more suitable for ordinal Likert-scale data as it does not rely on the assumption of continuous data or the use of mean values (Agresti, 2010). Instead, it uses appropriate measures of similarity or distance that are suitable for ordinal data.

In addition, Kruskal-Wallis test (Kruskal and Wallis, 1952) was used to check the differences in the responses on the Likert scale between the clusters,. The p-value indicates whether there is a significant difference in the answers on the Likert scale between the clusters.

4. Results

4.1 Principal component analysis

The results of the consumer clustering are presented separately for each country, France, Greece, and Italy. First, the results of the KMO and Bartlett's tests are presented as described in Table 3. According to the results of the KMO and Bartlett's tests, the data were suitable and appropriate for a factor analysis.

The results of the factor analysis for the consumers are presented in Table 4. Based on the factor loading, the eigenvalue, and Cronbach's alpha, all 29 items for France can be grouped into six significantly different factors of the scales consumption habits of F&V, purchase motives, quality and taste perception, health concern-confidence in the safety of F&V, important of information about F&V, and Price-consciousness scales. For Greece, three items on colour and appearance of F&V from Factor 3 (quality and taste perception), look for specials and pay even more for the special F&V from Factor 6 (Price-consciousness scales) were excluded from the cluster analysis. As in France, the 29 items in Italy can also be divided into significantly different factors.

4.2 Cluster analysis

4.2.1 Consumer clusters in France. After the PCA and the identification of valid items for each factor for use in the cluster analysis, the results are presented separately for each country. The French cluster analysis resulted in three clusters based on the factors obtained from the PCA in Table 5. Three clusters were obtained by hierarchical cluster analysis with Ward linkage as the optimal number of clusters. The results are given as the value of the mode and its frequency in parentheses.

Cluster 1, referred to as "value seeking" consumers, comprises around 21% of the sample (N = 56). This group scored consistently high on various criteria compared to the other segments. These consumers prioritised value for money in their purchasing decisions by balancing price with product/service features, benefits and quality. The results show that they paid careful attention to price even when buying low-cost F&V. They were motivated by the benefits of consuming F&V and value quality, taste, food safety and information such as

	France	Greece	Italy
KMO measure of sampling adequacy	0.909	0.890	0.917
Bartlett's test (approx. Chi-square)	4790.683	5123.109	5357.399
Sig	0.000	0.000	0.000

Source(s): Table by authors

Factors	France Factor loading	France Eigen value	France Cronbach's α	Greece Factor loading	Greece Eigen value	Greece Cronbach's α	Italy Factor loading	Italy Eigen value	Italy Cronbach's α
Factor 1: F&V consumption habits		10.87	0.83		9.34	0.83		10.93	0.91
1.1. Regularly purchasing F&V is necessary	0.82			0.80			0.86		
1.2. Regularly purchasing F&V is advantageous	0.82			0.69			0.78		
1.3. Regularly purchasing F&V is acceptable	0.77			0.70			0.80		
1.4. Regularly purchasing F&V is important	0.86			0.76			0.88		
Factor 2: purchasing motives		3.56	0.86		3.04	0.83		2.72	0.85
2.1. Giving more vitamins and minerals	0.65			0.56			0.52		
2.2. Helping to cut down calories	0.61			0.73			0.76		
2.3. Helping to improve body's digestive system	0.62			0.56			0.78		
2.4. Reducing the risk of getting cancer	0.73			0.78			0.78		
2.5. Helping to look better in appearance	0.62			0.78			0.67		
Factor 3: quality and taste perception		1.59	0.82		1.73	0.77		1.64	0.87
3.1. One of the criteria for choosing F&V is freshness	0.60			0.69			0.42		
3.2. Seasonality of F&V is important to me	0.60			0.61			0.42		
3.3. Nutritional contents of F&V are important to me	0.46			0.51			0.46		
3.4. The taste and flavor of F&V influences my choice	0.64			0.61			0.51		
3.5. The color and appearance of F&V influence my shopping choice	0.72			0.31			0.41		
Factor 4: health concern-confidence in F&V safety		1.28	0.86		1.54	0.83		1.48	0.85
4.1. Paying attention to the food poisoning when buying F&V	0.68			0.69			0.65		

(*continued*)

Table 4.
Exploratory and
confirmatory factor
analysis for consumers

Table 4.

Factors	France Factor loading	France Eigen value	France Cronbach's α	Greece Factor loading	Greece Eigen value	Greece Cronbach's α	Italy Factor loading	Italy Eigen value	Italy Cronbach's α
4.2. Caring about residues of pesticides/other chemicals	0.69			0.61			0.73		
4.3. Caring about chemicals released from F&V packaging	0.75			0.51			0.77		
4.4. Paying attention to the additives	0.66			0.61			0.74		
4.5. Likely to purchase non-genetic modified F&V	0.53			0.69			0.63		
Factor 5: important of F&V information		1.06	0.85		1.24	0.88		1.17	0.88
5.1. Ingredients list (nutrition or vitamin facts)	0.62			0.76			0.77		
5.2. Geographical origin	0.56			0.57			0.49		
5.3. Shelf life	0.68			0.75			0.73		
5.4. Presence of the organic logo	0.84			0.79			0.77		
5.5. Presence of environmentally friendly production logos	0.79			0.84			0.78		
5.6. Presence of ethical/social aspects logo	0.70			0.78			0.77		
Factor 6: price-consciousness scales		1.04	0.51		1.19	0.44		1.14	0.60
6.1. When I buy F&V, I really look for specials	0.53			0.35			0.50		
6.2. I'm willing to pay even more for the special F&V	0.58			0.39			0.55		
6.3. I check the prices, even when I am buying inexpensive F&V	0.58			0.56			0.65		
6.4. I often wait to purchase F&V, so I can get them on low price	0.79			0.78			0.81		

Source(s): Table by authors

Factors and items	Cluster 1 (20.7%) n = 56	Cluster 2 (64.1%) n = 173	Cluster 3 (15.2%) n = 41	Kruskal-Wallis H
Factor 1				
Item 1.1	7 (87.5)#	7 (57.8)	5 (56.1)	98.92*
Item 1.2	7 (87.5)	7 (57.2)	5 (63.4)	94.23*
Item 1.3	7 (80.4)	7 (46.2)	5 (53.7)	86.91*
Item 1.4	7 (86.0)	7 (59.5)	5 (56.1)	98.45*
Factor 2				
Item 2.1	7 (91.1)	7 (50.9)	5 (51.2)	106.76*
Item 2.2	7 (83.9)	7 (33.5)	5 (53.7)	87.97*
Item 2.3	7 (92.9)	7 (42.2)	5 (51.2)	110.52*
Item 2.4	7 (87.5)	6 (32.4)	5 (41.5)	84.91*
Item 2.5	7 (89.3)	7 (32.9)	5 (51.2)	92.59*
Factor 3				
Item 3.1	7 (92.9)	7 (46.8)	5 (43.9)	99.71*
Item 3.2	7 (82.1)	7 (54.3)	5 (56.1)	88.76*
Item 3.3	7 (76.8)	6 (38.2)	5 (43.9)	90.80*
Item 3.4	7 (89.3)	7 (54.3)	5 (46.3)	107.33*
Item 3.5	7 (66.1)	6 (37.6)	5 (51.2)	40.39*
Factor 4				
Item 4.1	7 (76.8)	6 (28.3)	5 (48.8)	84.45*
Item 4.2	7 (82.1)	6 (31.8)	5 (43.9)	91.88*
Item 4.3	7 (82.1)	6 (28.9)	5 (58.5)	86.53*
Item 4.4	7 (91.1)	7 (32.4)	5 (53.7)	92.28*
Item 4.5	7 (80.4)	6 (36.4)	5 (48.8)	102.23*
Factor 5				
Item 5.1	7 (48.2)	5 (28.9)	5 (41.5)	77.43*
Item 5.2	7 (76.8)	7 (30.6)	5 (39.0)	76.12*
Item 5.3	7 (66.1)	5 (29.5)	5 (43.9)	81.73*
Item 5.4	7 (57.1)	6 (27.7)	5 (36.6)	52.97*
Item 5.5	7 (62.5)	5 (31.8)	5 (48.8)	93.23*
Item 5.6	7 (46.4)	4 (29.5)	5 (48.8)	80.59*
Factor 6				
Item 6.1	6 (55.4)	6 (35.3)	5 (41.5)	71.45*
Item 6.2	6 (62.5)	6 (26.0)	4 (41.5)	56.45*
Item 6.3	7 (71.4)	6 (32.9)	5 (40.0)	87.18*
Item 6.4	5 (39.3)	3 (21.4)	5 (46.3)	13.32*

Note(s): # Results are presented as mode and its frequency in parentheses
*Highly significant as $p < 0.001$
Test result for assessing the independence of clusters: F = 70.539, significant as $p < 0.001$
Source(s): Table by authors

Table 5.
Cluster analysis for
France consumers

geographical origin and shelf life. In addition, information related to sustainability, such as the presence of green production and ethical/social logos was important to these consumers, who can also be described as sustainability advocates.

Almost two-thirds of participants (64%, N = 173) in the second cluster gave high priority to buying F&V regularly, assigning high values to motives such as seasonality, taste and flavour of F&V and health-related factors such as trust in the safety of F&V, avoidance of additives, preference for non-GMO options and concern about pesticide residues. This group, referred to as "rational" or "health-conscious" consumers, made their F&V decisions based on logical reasoning and value food safety and quality. Product

information, including geographical origin, was particularly important to them in their decision-making.

The third cluster with the fewest consumers (n = 41, 15.2%) is referred to as "budget-conscious" consumers as they gave the lowest scores for the items compared to the other two clusters. The mode scores for the items were 5 (somewhat agree). This means that they did not place much importance on quality, safety, and information when purchasing F&V. Those who were not willing to pay even more for special F&V and check prices even when buying inexpensive F&V.

This study examined socio-demographic characteristics across different consumer segments. Kruskal-Wallis tests indicated no significant differences in gender, age, or education levels among segments. Overall, all three groups had a slightly higher proportion of women, with the "value-seeking" cluster having more proportion of women than the "budget-conscious" cluster. Additionally, the "budget-conscious" and "value-seeking" clusters exhibited higher average ages, and education levels were higher in the "value-seeking" and "health-conscious" clusters compared to "budget-conscious" consumers.

4.2.2 Consumer clusters in Greece. The cluster analysis of Greek consumers based on the PCA factors revealed three clusters (Table 6). Cluster 1, which accounts for about 20% of the sample (N = 68), consists of "value-seeking" consumers. Similar to French consumers, they prioritised most products, emphasising the regular purchase of F&V to improve vitamin intake and digestive health, while also considering the importance of the price-consciousness scale with other items. This group valued nutritional content and seasonality over freshness and taste in terms of quality perception. For safety reasons, they preferred GMO-free products and were concerned about pesticide residues. Geographical origin and the organic logo were key pieces of information for them, while ethical or social logos were less important.

The second group, which makes up the majority of participants (49%, N = 169), can be classified as "health-conscious" consumers who prioritised the quality of F&V and attach importance to food safety. They paid particular attention to additives, were concerned about pesticide residues and were suspicious of chemicals that could leak from the packaging of F&V. These consumers attached more importance to the geographical origin of products than to other information about F&V. Cluster 3, comprising 107 people (31% of the sample), is often referred to as "budget-conscious" consumers, as they scored lower on the items, particularly in terms of the importance they attached to information about F&V. Nevertheless, they valued regular F&V purchases.

Similar to the clusters in France, no significant differences were found in the demographic variables of Greek consumers. The general characteristic is that the men to women ratio was higher in the clusters and that those concerned about health were mostly highly educated and between 50 and 59 years old.

4.2.3 Consumer clusters in Italy. The results of the cluster analysis of Italian consumers are shown in Table 7. Cluster 1, comprising 33% of the sample (N = 104), represents "value-seeking" consumers who prioritised regular consumption of F&V due to recognised benefits such as increased vitamin intake and improved digestive health. Their key quality criteria included seasonality and concern about additives and chemical emissions from packaging. These consumers actively sought information about the geographical origin of their products.

Cluster 2, referred to as "quality conscious", accounts for 39% of the sample (N = 122) and includes consumers who were very committed to buying F&V regularly. They focused on purchasing vitamins and minerals and place the highest importance on freshness, seasonality, overall quality and taste. Their purchasing behaviour involved careful consideration of factors such as shelf life, which aligned with their perception of freshness and higher quality.

Factors and items	Cluster 1 (19.8%) n = 68	Cluster 2 (49.1%) n = 169	Cluster 3 (31.1%) n = 107	Kruskal-Wallis H
Factor 1				
Item 1.1	7 (76.5)	6 (45.6)	5 (30.8)	52.69*
Item 1.2	7 (54.4)	6 (43.2)	5 (29.0)	61.49*
Item 1.3	7 (69.1)	6 (48.5)	6 (33.6)	66.70*
Item 1.4	7 (85.3)	6 (49.1)	6 (40.2)	72.46*
Factor 2				
Item 2.1	7 (98.5)	7 (52.1)	7 (41.1)	63.83*
Item 2.2	7 (73.5)	7 (40.2)	6 (30.8)	62.21*
Item 2.3	7 (91.2)	7 (49.1)	6 (43.0)	74.56*
Item 2.4	7 (77.9)	6 (46.2)	4 (26.2)	77.19*
Item 2.5	7 (83.8)	6 (43.8)	5 (32.7)	82.33*
Factor 3				
Item 3.1	7 (58.3)	7 (48.5)	6 (34.6)	53.64*
Item 3.2	7 (80.9)	6 (46.2)	6 (43.9)	46.21*
Item 3.3	7 (86.8)	6 (52.7)	6 (37.4)	90.68*
Item 3.4	7 (72.1)	6 (50.9)	6 (36.4)	42.69*
Factor 4				
Item 4.1	7 (51.5)	6 (46.2)	5 (28.0)	77.53*
Item 4.2	7 (85.3)	6 (47.3)	5 (32.7)	114.75*
Item 4.3	7 (76.5)	6 (47.9)	5 (31.8)	120.71*
Item 4.4	7 (83.8)	6 (55.6)	5 (32.7)	135.62*
Item 4.5	7 (89.7)	6 (41.4)	4 (30.8)	90.80*
Factor 5				
Item 5.1	7 (47.1)	6 (35.5)	4 (31.8)	115.86*
Item 5.2	7 (61.8)	6 (47.3)	5 (33.6)	105.35*
Item 5.3	7 (55.9)	6 (46.2)	4 (32.7)	136.48*
Item 5.4	7 (57.4)	6 (36.7)	4 (34.6)	159.88*
Item 5.5	7 (50.0)	6 (36.7)	4 (31.8)	162.04*
Item 5.6	6 (41.2)	4 (30.2)	4 (26.2)	134.29*
Factor 6				
Item 6.3	6 (66.2)	6 (47.3)	5 (38.3)	65.50*
Item 6.4	7 (29.4)	6 (27.8)	4 (26.2)	14.97*

Note(s): *Highly significant as $p < 0.001$
Test result for assessing the independence of clusters: F = 58.719, significant as $p < 0.001$
Source(s): Table by authors

Table 6.
Cluster analysis for
Greek consumers

Cluster 3, referred to "budget-conscious" consumers (about 27% of the sample, N = 85), as they gave the lowest scores for quality and taste perception and health concern-confidence in the safety of F&V compared to the other two clusters.

In this clustering, no significant differences were found in the demographic variables, and the overall demographic composition was similar to France, with the difference that in Italy the "value-seeking", and "quality-conscious" consumers had a higher level of education than the "budget-conscious" consumers.

5. Discussion
The cluster analysis revealed different segments among consumers of F&V (Figure 2). There are consumers who rank first in the various criteria with prioritise optimal value in their

Factors and items	Cluster 1 (33.4%) n = 104	Cluster 2 (39.2%) n = 122	Cluster 3 (27.3%) n = 85	Kruskal-Wallis H
Factor 1				
Item 1.1	7 (77.9)	6 (41.8)	5 (27.1)	87.60*
Item 1.2	7 (69.2)	6 (41.0)	5 (28.2)	105.43*
Item 1.3	7 (64.4)	6 (43.4)	6 (31.8)	90.97*
Item 1.4	7 (74.0)	7 (45.1)	6 (31.8)	86.41*
Factor 2				
Item 2.1	7 (83.7)	7 (51.6)	7 (32.9)	67.19*
Item 2.2	7 (67.3)	6 (37.7)	5 (30.6)	79.84*
Item 2.3	7 (75.0)	6 (45.9)	6 (35.3)	107.89*
Item 2.4	7 (68.3)	6 (32.0)	4 (35.3)	90.45*
Item 2.5	7 (70.2)	6 (42.6)	6 (32.9)	81.65*
Factor 3				
Item 3.1	7 (73.1)	7 (45.9)	6 (28.2)	51.45*
Item 3.2	7 (77.9)	7 (50.0)	7 (28.2)	69.22*
Item 3.3	7 (68.3)	6 (52.5)	5 (38.8)	104.23*
Item 3.4	7 (75.0)	6 (50.8)	6 (28.2)	85.43*
Item 3.5	7 (58.7)	6 (45.1)	6 (32.9)	71.79*
Factor 4				
Item 4.1	7 (54.8)	6 (36.9)	5 (29.4)	109.74*
Item 4.2	7 (60.6)	6 (42.6)	5 (27.1)	94.37*
Item 4.3	7 (68.3)	5 (32.8)	4 (27.1)	118.21*
Item 4.4	7 (72.1)	6 (42.6)	5 (27.0)	108.30*
Item 4.5	7 (64.4)	6 (39.3)	5 (27.2)	72.65*
Factor 5				
Item 5.1	6 (40.4)	5 (36.9)	4 (30.6)	96.03*
Item 5.2	7 (50.0)	6 (41.8)	5 (45.9)	97.38*
Item 5.3	7 (43.3)	6 (49.2)	5 (34.1)	78.62*
Item 5.4	6 (48.1)	6 (45.1)	4 (38.8)	128.73*
Item 5.5	6 (46.2)	6 (43.4)	4 (43.5)	151.25*
Item 5.6	6 (39.4)	5 (39.3)	4 (41.2)	105.01*
Factor 6				
Item 6.1	6 (45.2)	5 (38.5)	4 (37.6)	65.37*
Item 6.2	6 (40.4)	6 (39.3)	4 (32.9)	62.55*
Item 6.3	6 (46.2)	6 (41.0)	5 (25.9)	49.31*
Item 6.4	6 (24.0)	4 (27.9)	4 (36.5)	14.19*

Note(s): *Highly significant as $p < 0.001$
Test result for assessing the independence of clusters: F = 88.825, significant as $p < 0.001$
Source(s): Table by authors

Table 7.
Cluster analysis for Italian consumers

purchases, carefully balancing price with product features, benefits and quality. In particular, the so-called "Value-seeking" consumers meticulously evaluate the price points, even for low-priced F&V This result is consistent with the findings of Yeo *et al.* (2020) on sugar-reduced beverages. However, we explored unique aspects of F&V consumption that may not necessarily reflect findings from other product categories. For example, consumers surveyed value quality, taste, and food safety, taking into account factors such as geographical origin and shelf life. This is in line with the wider literature emphasising the importance of these factors in consumer decision-making (van der Vossen-Wijmenga *et al.*, 2022). However, the notable inclination of this consumer group towards sustainability, expressed in an interest in
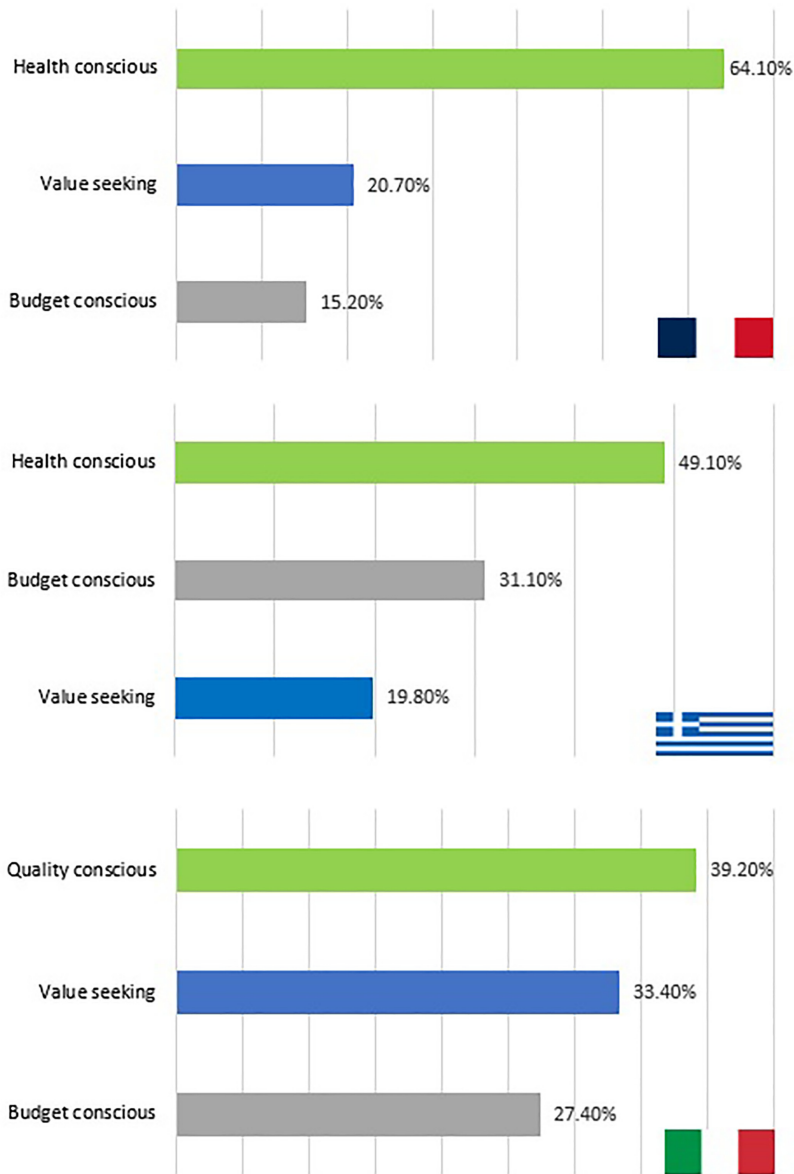
Source(s): Figure by authors

eco-friendly production logos and ethical aspects, adds a new layer that may not have fully explored in previous research related to cluster analysis. In this case, there is a link between awareness of environmental sustainability and consideration of ethical factors. In other words, those who are environmentally conscious are also likely to care about ethical considerations (Sacchi, 2018).

However, the importance attached to each sustainability dimension varies according to personal values and priorities (Jia *et al.*, 2023; Wongprawmas *et al.*, 2021). Notably, according to our results, French consumers prioritised both aspects of sustainability, but there is an emerging trend where the environmental logo is more important than the ethical logo. This trend can also be observed in other European countries, including Greece and Italy, indicating a shared commitment to environmental awareness. Consumers around the world are increasingly aware of the environmental impact of their choices and prefer products with eco-friendly certifications, in line with the general drive to minimise the environmental footprint of consumer behaviour (Nygaard, 2023).

The multi-layered approach that can be observed among "value-seeking" consumers goes beyond traditional economic considerations. It reflects a commitment to well-being and a heightened awareness of the social and environmental impact of their consumption choices. While this aspect is not entirely absent from the existing literature, it is perhaps more pronounced and integral in the context of F&V consumption than previously thought. As consumers navigate this complexity, it becomes increasingly difficult to recognise the true value of products. Companies and the food system, aware of these consumer preferences, can exploit the ambiguity of terms such as "eco-friendly" and "ethical." This raises concerns about greenwashing and the deliberate manipulation of consumer perceptions (Nygaard, 2023).

In contrast to the value-seeking segment, consumers did not value quality, safety or information when buying F&V, and those who were not willing to spend more money or compare prices for specific products, even when buying inexpensive F&V, had a lower number of participants compared to other clusters in the countries categorised as "budget-conscious" consumer clusters. Nevertheless, they did place significance on regular F&V purchases in Greece. These consumers for whom various factors such as quality and taste perception and health concerns were less important have been labelled as careless consumers (Ahmadi Kaliji *et al.*, 2022; Yeo *et al.*, 2020) and indifferent consumers (Montero-Vicente *et al.*, 2019) in other studies.

The apparent lack of interest in quality and safety among these "careless" or "indifferent" consumers poses a challenge for the food industry. Traditional measures of consumer behaviour may not apply to this subgroup, requiring a re-evaluation of marketing strategies and industry practices. Even though these companies try to communicate the quality, safety, and health benefits of their products, this segment seems immune to such messages. The food system must therefore address the challenge of effectively reaching and influencing this unconventional consumer group. In doing so, the industry needs to rethink its messaging, packaging, and overall approach to ensure that even the most disinterested or less discerning consumers are adequately informed and guided in their choices.

Two clusters of consumers in France and Greece were identified as "health conscious," while consumers in Italy were categorised as "quality-conscious". These lifestyles are consistent with the Mediterranean diet, which is known for its health benefits, food quality, and overall well-being (Sikalidis *et al.*, 2021). Although this finding is consistent with the results of other studies on health conscious consumers (Kim *et al.*, 2018), the results of this study are more specific to this product due to the specific characteristics of F&V, such that health conscious consumers emphasised factors such as seasonality, taste and health-related concerns in their purchasing decisions. They also prioritised factors such as avoidance of additives, preference for non-GMO products, and concern about pesticide residues. In similar studies, these consumers were categorised as functional and rational, focusing on logical thinking and food safety (Ahmadi Kaliji *et al.*, 2022; Yeo *et al.*, 2020). In particular, consumers in this segment placed a high value on information about the geographical origin of F&V, highlighting the importance of clear labelling for healthier and more sustainable food choices in the future.

Consumers in France and Greece were mainly health-conscious, focused on seasonality, taste and safety and were concerned about additives, preferred GMO-free products and were concerned about pesticide residues. This finding is consistent with Statista's recent research in Europe on attitudes towards food, as most European respondents such as French and Greek respondents (around 60%) said they actively seek out healthy food (Statista, 2023). Following coronavirus pandemic, it is a logical consequence that preferences are shifting more towards healthy foods (Borsellino et al., 2020). Ahmadi Kaliji et al. (2022) and Yeo et al. (2020) classified these consumers as functional, logical thinkers with specific goals and as rational consumers who highly value food safety. These consumers also emphasise the importance of knowing the geographical origin of F&V in their decision-making process, highlighting the need for transparent labelling.

In Italy, a group of consumers focused on freshness, seasonality, overall quality and taste and rates these factors higher than others, the so-called quality-conscious consumers. They pay very close attention to information such as shelf life in order to fulfil their perception of freshness and quality. Their purchasing behaviour reflects their commitment to health-conscious and high-quality food choices, which may lead them to pay a premium for F&V that meet their strict standards. The reason for this could be the cultural importance that Italian consumers place on quality, especially when it comes to F&V. Italy has a rich culinary tradition and Italian consumers place a high value on quality food for cultural reasons. The group's focus on freshness, seasonality, overall quality and taste could be influenced by cultural values that prioritise these aspects of food (Bonaiuto et al., 2021; Selvaggi et al., 2023). However, the challenge lies in the way companies and the food system present the information, which can help consumers trying to make an informed choice. Transparent and accurate labelling is essential to support consumers in their quest for healthier and higher quality food (Jansen et al., 2023).

Various studies have categorised consumers based on their attitudes and preferences regarding quality, e.g. adventurous fruit consumers (Ahmadi Kaliji et al., 2022) and those with a preference for fresh fruit (Montero-Vicente et al., 2019). A subset of consumers with a strong inclination towards fruit stores emphasises factors related to quality and taste perception, reflecting a commitment to values associated with the quality of fruit for daily consumption. These discerning consumers not only value the visual appeal of fruit, but also the sensory experience, i.e. touching, smelling, tasting and visually assessing the fruit they buy. In addition, this group is generally well informed about the origin and cultivation methods of their products and values transparency in the supply chain (Miguel et al., 2023). For them, the selection, preparation and enjoyment of F&V is more than just a matter of nutrition; it is part of a lifestyle where quality and taste are of paramount importance. However, consumer choice comes with numerous challenges posed by companies and the food system. Ambiguous labelling, sophisticated marketing tactics and insufficient transparency in the supply chain contribute to confusion and make it difficult for consumers to make informed choices that align with their values. The complexity of the modern food environment requires consumers to be vigilant and aware so that they can align their choices with their preferences and values.

6. Conclusion
The aim of this study was to investigate consumer preferences and characterise their FRL, with their groups exhibiting similar attitudes and behaviours. The adapted FRL instrument retained the original structure but included refinements to provide a deeper understanding of consumers' F&V purchasing decisions, particularly in the context of the Mediterranean diet. By combining various factors derived from separate items, we investigated consumer preferences in different F&V segments. Through an investigation using advanced cluster analysis techniques, we were able to identify different consumer groups in three European

Mediterranean countries: "value-seeking", "health-conscious", "quality-conscious" and "budget-conscious" consumers. These classifications were based on factors such as purchase motivation, perception of product quality, health concerns, importance of environmentally friendly certifications, ethical considerations, and price sensitivity. These findings are consistent with the principles of the Mediterranean diet, which emphasises whole and unprocessed foods such as F&V and appeals to consumers who are concerned with both quality and health when making food choices. This analysis provided an insight into the different preferences and priorities of consumers in these three Euro-Mediterranean countries.

6.1 Implications for research and practice

The research expands theoretical knowledge in various areas, particularly in F&V consumer behaviour. The customised survey in this study can serve as a valuable tool for future researchers aiming to explore nuanced aspects of F&V consumption patterns, preferences, and underlying motivations among diverse consumer groups. This approach not only enhances the understanding of consumer behaviour but also facilitates the identification of key drivers and barriers influencing F&V intake. In addition, the research contributes to market segmentation by addressing different elements and creating consumer profiles based on their preferences and priorities. This has the potential to refine existing segmentation theories and could even encourage the development of new frameworks tailored to the intricacies of the F&V market. Research into different consumer characteristics in the Mediterranean region, with a particular focus on France, Greece, and Italy, can provide insights that can enrich both academic discourse and practical applications in the sector.

Regarding practical implications, the results make a strong case for developing customised marketing strategies that address the unique preferences of each segment. Once segments are identified, relevant companies can tailor their marketing strategies to the preferences and motivations of each group. This can include developing tailored messages, images and channels specific to each segment. For example, for value-seeking consumers, highlighting the cost-effectiveness of F&V compared to other snack options can be compelling. For health-conscious consumers, on the other hand, it may be more effective to emphasise the nutritional benefits and disease prevention aspects. In addition, the study highlights the role of perceived product quality and the importance of certifications in consumer choice, which have an impact on product development, quality assurance and marketing especially, for consumers in the study area, who attach great importance to the Mediterranean diet. The impact of perceived product quality and certifications on consumer choice is of great importance for research, especially in the context of public health initiatives such as the Mediterranean diet. It is important to develop and implement consumer education programs to raise awareness of the role of certifications in ensuring product quality, especially for the Mediterranean diet. In addition, perceived product quality can influence adherence to the Mediterranean diet and the development of quality assurance protocols that meet consumer expectations. In this context, collaboration with food industry stakeholders is also needed to understand their views on certification and product quality improvement in the context of mentioned diet. In this regard, the relevant companies and SMEs should improve perceived quality and communicate certifications to attract health-conscious consumers. For instance, they should provide detailed nutritional information, highlight the health benefits of certain F&V and promote their role in a balanced diet for quality and health-conscious consumers. SMEs have a significant impact on the food industry, especially on SFSCs. This is mainly due to the fact that many SMEs focus on supplying local or specific markets.

Environmental and ethical considerations also influence consumer decision-making, with sustainability and ethical responsibility at the forefront. The nuanced balance between these factors may vary, but the collective emphasis on sustainability and ethical responsibility

remains a driving force in shaping consumer preferences and purchasing behaviour. These findings offer valuable insights for organisations and policy makers seeking to meet the values and priorities of consumers in these regions, and demonstrate the importance of aligning their product offerings and communication strategies with environmental and ethical standards.

In the end, to promote a healthier society, a transparent and ethical framework for the dissemination of information on healthy eating must be established. By enforcing strict controls on advertising messages in the food industry, we can ensure that consumers are not unduly influenced or misled. In this way, people will be protected from misleading marketing practices, enabling them to make informed choices about their dietary habits and ultimately contributing to better overall wellbeing.

6.2 Limitations and opportunities for future research
Although this study improves our understanding of the relationship between consumers' dietary styles and their F&V consumption preferences, it has its limitations and paves the way for future research. First, the study, which focuses on three European Mediterranean countries, may not be universally applicable, necessitating investigation across a broader cultural and socioeconomic spectrum. Second, while the segmentation of consumers' into four groups is valuable, future research could explore the dynamics of the segments, including subcategories and transitions over time, in more detail. Real-world examples could include longitudinal studies tracking individuals' dietary habits and how they move between segments due to lifestyle changes, providing valuable information for designing more effective and targeted public health interventions.

Furthermore, the finding that a modified FRL instrument is required provides an opportunity for further investigation. Future studies should assess the validity and reliability of the instrument in different contexts, such as urban and rural areas, and with different socioeconomic characteristics. For example, researchers could investigate the successful adaptation of the instrument in low-income communities to demonstrate its effectiveness in capturing dietary preferences in different cultural and socioeconomic settings. In addition, a study demonstrating the successful implementation of a culturally sensitive measurement tool in a developing country could highlight its practicality and necessity. Such examples not only support the case for further research, but also provide tangible evidence of the impact and applicability of refined instruments in real-life scenarios. This careful testing and validation of measurement tools not only helps to improve existing methods, but also to develop more robust frameworks for future studies. Ultimately, this will lead to a more comprehensive understanding of consumer dietary habits and enable the formulation of better-informed and culturally sensitive public health strategies worldwide.

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Supplementary materials

The supplementary material for this article can be found online at https://amsacta.unibo.it/id/eprint/7612/

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