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WHAT ARE THE PURCHASE MOTIVES FOR PLANT-DERIVED UNPROCESSED AND MINIMALLY PROCESSED FOOD IN POLAND?

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ABSTRACT: This article aimed to identify the purchase motives for plant-derived unprocessed and minimally processed foods (UMPF) by individual buyers in Poland, considering their gender and age, and to segment these motives. The research was conducted on a sample of n = 1,000 using a survey method, with the CATI technique. However, the study of UMPF purchase motives could include a sample of n = 875 respondents who purchase UMPF. Relevant explanations are provided in the executive summary and methodology. Data was subjected to quantitative analyses. The methods used were mean score analysis, comparative analysis, Pearson's chi2 independence test, V-Cramer's contingency coefficient, and exploratory factor analysis. Four research hypotheses were verified. As a result of the analyses, it was proven that three groups of motivators shape the motivation to purchase UMPF: health-promoting factors (of greatest importance), pragmatic factors (of moderate importance), and marketing factors (of least importance). In addition, both the gender and age of respondents were shown to significantly differentiate the motives for purchasing UMPF. The results of factor analysis, however, revealed different structures of latent factors determining purchase motivations according to gender and age, which made it possible to distinguish two main segments of consumers with similar hierarchies of motives: the first, including women and post-working-age people, and the second, including men and people of working age. The results obtained can be used to develop social campaigns to promote UMPF consumption.

KEYWORDS: purchase motives, unprocessed and minimally processed foods, plant-derived foods, demand, Poland

Introduction

Today, food systems (FSs) face challenges arising from the need to ensure consumer health on the one hand and maintain environmental health on the other (Chen & Antonelli, 2020). Consumers are linked to the socio-economic system, including FSs. Understanding consumers' food preferences can lead to healthier food consumption and help alleviate public health concerns. Consumers are also the starting point for building FSs, considering their influence on market needs, often decide what food will be produced (Fanzo et al., 2021). Hence, there is an apparent increase in researcher interest in consumer attitudes, motives, and behaviour in different markets, considering the impact of economic, social, demographic, cultural, and food changes that societies are currently experiencing. Industrial food production, including ultra-processed food (UPF), harms agriculture, threatening all dimensions of sustainable development (SD) and the FSs (Fardet & Rock, 2020). Therefore, attention is increasingly drawn to transforming the FSs to provide sustainably healthy and safe food. FSs affect human health, economic growth, and the environment (Fanzo et al., 2021). According to Karpyna et al. (2020), food environments are physical spaces where consumers interact with FSs to make purchasing and consumption decisions. Although there is growing interest worldwide, including in Poland, in sustainable consumption (SC) (Czernyszewicz et al., 2022), embedded in activities that enhance the quality of life and interaction with the environment, there are still many gaps that could improve the system. Indeed, research on the consumption and purchase motives of unprocessed or minimally processed foods (UMPF) enhances knowledge about healthy dietary choices and can be a component of implementing food policy changes to build consumer awareness, implement marketing activities that lead to increased consumption of this food category, and promote better dietary practices.. Mechanisms to help individuals change eating choices, with the aim of, among other things, increasing product consumption, include creating an environment for learning healthy preferences and stimulating food systems responses (Hawkes et al., 2015). Marketing activities based on understanding the purchasing motives for UMPF and promoting its consumption are part of such an environment. Ready-to-eat UMPF offers benefits for consumer welfare and public health systems, influencing the future of FSs and the environment. Thus, regulatory measures affecting the food environment, such as marketing activities, can help support food policies aimed at, e.g., increasing the appeal and consumption of UMPF.

The article aimed to identify the purchase motives for plant-derived UMPF among individual buyers in Poland, taking into consideration their gender and age, and to segment respondents according to their purchase motives. The research focused on packaged foods, such as salad mixes and other leafy vegetables, including rocket, lamb's lettuce, and plant sprouts, available at retail. To the best of our knowledge, this is the first study to analyse the purchase motives of this food category in Poland.

In pursuit of the research objective, the following research problem was set:

- What are the most common purchase motives for plant-derived UMP among individual buyers in Poland?
- Is there a correlation between individual buyers' purchase motives of plant-derived UMPF and the gender and age of respondents?
- What latent factors determine the motivations for purchasing plant-derived UMPF in the general population and among men and women, and people of working and post-working age?
- What are the segments of respondents in the plant-based UMPF market, based on gender and age of respondents?
- Four hypotheses were verified:
- H1: The motives for purchasing plant-derived UMPF are determined by various motivators, including those involving pro-health, pragmatic, and marketing motivation.
- H2: There is a statistically significant relationship between the motives for purchasing plant-derived UMPF and the gender of respondents.
- H3: There is a statistically significant relationship between the purchase motives of plant-derived UMPF and the age of respondents.
- H4: There is a difference in the structure of the latent factors shaping the motives for purchasing plant-derived UMPF in the respondent groups studied.

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An overview of the literature

Several systems are used to classify foods according to criteria related to processing, each using different criteria and metrics (Poti et al., 2015; Monteiro et al., 2016; Monteiro et al., 2019). However, according to the most commonly used NOVA system, considered by the WHO and the United Nations, among others, fresh and low-processed food plant-derived foods are included in group 1 – unprocessed or minimally processed foods (Monteiro et al., 2016). Unprocessed foods (or natural foods) of plant origin are the edible parts of plants (seeds, fruits, leaves, stems, roots) after separation from nature. Minimally processed foods are unprocessed foods that have undergone minimal industrial processing before purchase and consumption to extend shelf life and prolong storage. The production and consumption of UMPF is part of the trend of SC, due to many social and environmental aspects, mainly health benefits and positive environmental impacts. Nowadays, food as a public health topic is not defined solely as energy and nutrient intake, but considers all dimensions of food security, including utilisation, which refers to the consumption of safe food and choices (Ashby et al., 2016). People's motivation and behaviour towards food are influenced by a variety of factors, such as biological nutrient and energy needs, hunger, socioeconomic status, demographic variables, lifestyle, health factors, emotions, safety, convenience, food prices, nutritional knowledge, or ecology and political determinants (Liu et al., 2017; Leng et al., 2017; Bartkiene et al., 2019; Cînpeanu et al., 2019; Ferrão et al., 2020; Boustani & Guiné, 2020). The fast pace of modern life leads consumers to seek foods that are not only healthy and easy to prepare but also of high quality and safe (Zink, 1997; Sethi et al., 2020; De Corato, 2020; Pandey et al., 2020; Gomes et al., 2023). Fresh fruits and vegetables play a key role in providing consumers with nutritious and healthy foods (Wallace et al., 2020) and are good examples of UMPF, one of the main growth segments in the food retail industry (Valverde et al., 2010; Alzamora et al., 2016; Testa et al., 2021; Li et al., 2022). UMPF, such as mixed salads, combines the attributes of fresh and convenient foods. Maintaining good health and reducing the risk of many lifestyle diseases is essential through the consumption of this food. The consumption of commonly available highly processed foods (UPF) has been linked to, for example, the prevailing obesity pandemic and associated diseases (PAHO, 2015; Chen et al., 2020; Harb et al., 2023) or the development of depressive symptoms (Zheng et al., 2020; Godos et al., 2023). Consequently, UPF products are perceived as more motivating and appetising, and thus the purchaser shows a higher intention to consume than UMPF (Lemos et al., 2022). The consumption of UPF is higher among younger men, smokers, and physically inactive people (Nardocci et al., 2019), and their consumption decreases with age (Louzada et al., 2015). Hence, to promote sustainable consumption, including UMPF, which can play a prominent role in improving health and reducing the risk of many diseases. The UMPF concept, while convenient, involves simplifying the consumer's daily diet while preserving nutritional value through the absence or low content of preservatives and practicality in preparation. The market for this food category is growing due to its health benefits (Bansal et al., 2015; Sethi et al., 2020), which is, among other things, a result of increased consumer awareness of the benefits of increasing its consumption (Mascarello et al., 2015; Hung et al., 2017; Sethi et al., 2020; Moreb et al., 2021). These foods should be considered an important behavioural factor in disease prevention, especially in developed societies that are becoming older. Economic development, advances in medical science, and demographic changes are driving a steady increase in life expectancy, thus resulting in a change in the percentage of elderly people in the population. It is projected that by 2060, the proportion of people aged 60 and over in Poland will reach 32.6%, and the average life expectancy of women and men will be 85.1 and 78.6 years, respectively (GUS, 2023).

The motivation to study this topic stems from the fact that healthy eating is becoming an important and growing trend, including UMPF consumption. On the other hand, UPF consumption, supported by aggressive marketing campaigns, is also doing well. Widely available UPF, especially in urban food environments (Westbury et al., 2021), has significant negative impacts on societies' health, biodiversity, waste production, and greenhouse gas emissions, among others (Fardet & Rock, 2020; Seferidi et al., 2020). Hence, better knowledge and understanding of the motives behind the choice of UMPF can be important in making many decisions, from the perspective of producers, ranging from more efficient product development and marketing to the social and environmental perspective, i.e. planning more effective public policies affecting healthier eating habits of the population and environmental protection. Implementing education and nutrition campaigns to raise awareness

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of healthy food choices and better eating practices can also be used by public health organisations. According to Gutjar et al. (2015), environmental food signals influence consumer behaviour through the emotions they evoke. Hence, emotions can help to understand consumers' food choice experiences, and these, according to Bolha et al. (2021), can emerge through consumers' interaction with external (e.g., brand, marketing) and internal (e.g., sensory aspects of food) food attributes.

Research methods

The study was carried out as part of the project TANGO-IV-A/0019/2019 'Probiotic bacteria as a tool for extending shelf life and preserving consumer quality of low-processed foods', implemented in 2020-2021 at the University of Life Sciences in Lublin. To achieve the objectives of this article, part of the empirical research done in 2021, using a structured questionnaire as a tool to identify the market for plant-derived UMPF in Poland was used. The data collection method was the CATI (Computer Assisted Telephone Interviewing) survey method. Based on the questionnaire developed by the researchers, primary data was collected by an external contractor, i.e., the BIOSTAT Research and Development Centre. The choice of survey method was dictated by the greater likelihood of respondents providing answers, and telephone contact provided the most efficient way of reaching groups during the Sars-CoV-2 pandemic. Participants were informed that they agreed to participate in the survey and could withdraw if any of the questions proved too sensitive. However, since consumers' declarative sphere does not always coincide with their actual purchase decisions, the research sample was limited to those making household purchase decisions. The research was conducted on a sample of n=1000. The criterion was verified through the survey's inclusion question: "Do you make household purchasing decisions?". Another survey question, "Do you buy packaged low-processed foods of plant origin ready for consumption?" identified two groups of respondents, i.e., 875 people who buy this type of food and 125 people who do not buy this category of food. Therefore, a study of UMPF purchase motives could include a sample of n = 875 respondents who make household purchasing decisions and buy UMPF. A stratified random sampling was used, where the stratum was the province of residence. Proportions by gender were also taken into account (Figure 1).

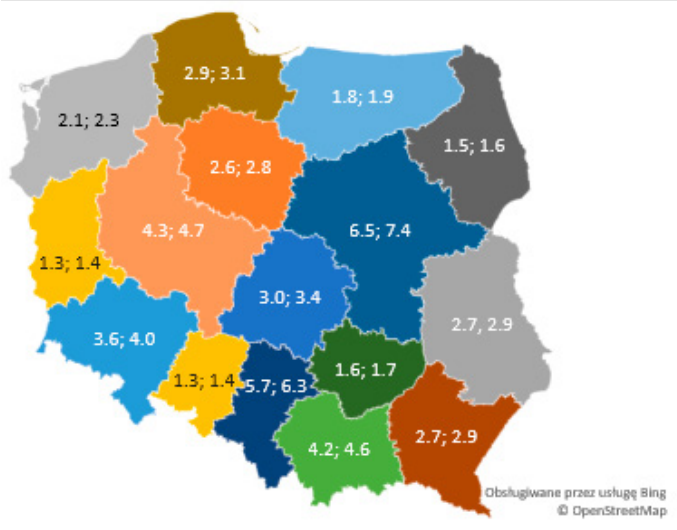

Figure 1. Geographical distribution of the research sample (n=1000, male; female in %)

Source: authors' work based on data developed by BIOSTAT Research and Development Center before the survey, based on data from the Central Statistical Office, using Bing GeoNames service, Microsoft, TomTom.

Two independent variables were included in the analyses: the gender and age of the respondents, and the dependent variable, which was the purchase motives for plant-derived UMPF. As part of the metric questions, respondents indicated their gender (in an open-ended question) and age category. The survey included 53.0% of women and 47.0% of men, as well as people classified into two age groups: productive (18-59/64 for women/men) and post-productive (over 60/65 for women/men). The survey included 69.2% of those of working age and 30.8% of those of post-working age. The age structure of the respondents correlated with the distribution of this characteristic in the Polish population in 2021. The percentage of people of working and post-working age was 59.1% and 22.5%, respectively (GUS, 2022). The differences in the structure of the respondents vs. the population were

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influenced by the survey methodology adopted, which excluded people aged 0-17, i.e., pre-working age, as the most frequent non-movers in household purchasing decisions. They were then asked to identify their purchasing motives for packaged plant-derived UMPF. To identify purchase motives, respondents were presented with a set of 16 product attributes, determined from the results of a cognitive-critical analysis of the literature, including (Prescott et al., 2002; Januszewska et al., 2011; Gravel et al., 2012; Renner et al., 2012; Leng et al., 2017; Schliemann et al., 2019; Vermeir et al., 2020; Duarte et al., 2021; Marty et al., 2021; Ogundijo et al., 2022) and based on the results of casual interviews conducted before the actual study among 12 women and 8 men, aged 18-64 years (which made it possible to meet the gender and age criterion assumption). Each product attribute was rated by respondents, in terms of its importance in their purchasing decision, on a 5-point Likert scale (1 – not important, 2 – not very important, 3 – hard to say, 4 – rather important, 5 – very important), the most commonly used psychometric tool in the social sciences (Joshi et al., 2015).

The primary data collected were subjected to quantitative analysis, i.e, the mean score analysis method, the comparative analysis method, Pearson's chi^2 independence test, V-Cramer's contingency ratio analysis method, and exploratory factor analysis were used. The analysis method of average results helps determine the typical (averaged) value of a given variable for the group under study. Through the comparative analysis method, similarities and differences in respondents' answers were identified. The chi^2 test was used to test a statistically significant relationship between the study variables, and the V-Cramer coefficient was used to determine the strength of the relationship between them (Brzeziński, 2021). Exploratory factor analysis was used to reduce the observable variables by transforming the mutually correlated system of observable variables into a new system of mutually uncorrelated but comparable variables. The extracted factors are assumed to go to a 'deeper' level of the reality under study and represent the underlying causes of the observable variables. This analysis was used to reduce the variables influencing the purchasing motives for plant-derived UMPF and to detect internal correlations between these variables. The principal components method was used to distinguish between factors. To determine the number of common factors (named principal components), the Kaiser criterion technique was used in four analyses (total population, women, men, productive age group) and the Cattell scatter criterion in one analysis (post-productive age group). The Kaiser criterion consists of leaving for further analysis only factors with eigenvalues greater than 1, and the Cattell criterion is those that lie on the 'slope' in the line graph, i.e. to the left of the factor scatterplot, together with the principal component from which the scatterplot starts (Panek, 2009). Each such factor explains a certain level of overall variability in the phenomenon under analysis, defined by a percentage of variance, which can be interpreted as a measure of its explanation. The factors were rotated using the Varimax method. Within individual factors, variables with the highest factor loadings were identified concerning a given factor i.e., variables with values of at least 0.7, the limit commonly accepted in the literature (Bedyńska & Cypryańska, 2007).

Statistical analysis of the data was performed using IBM SPSS Statistics Version. 9.0.

Results of the research

The results of the analysis indicate that the declared demand in Poland for plant-based UMPF is high, as 87.5% of the population purchased this type of food. Gender did not differentiate the demand for this type of food, while age was a differentiating factor. Plant-derived UMPF was purchased by 88.7% and 86.0% of women and men, respectively. Considering the age of respondents, the demand for this type of food decreases as the respondents' age increases. The most popular foods are mixed leafy vegetables, iceberg lettuce, and mixed lettuces, with 53.5, 47.1 and 45.5% of the Polish population purchasing them several times a month, respectively. Less popular, purchased on average several times a year, are products such as rocket, vegetable sprouts, and lamb's lettuce. Gender slightly differentiated responses regarding the frequency of UMPF purchases, with working-age Poles purchasing most frequently, regardless of product range. Among the 16 product characteristics examined for their influence on the purchasing decision, 5 concerned pro-health values (nutritional, pro-health, dietary values, richness in vitamins and minerals, enrichment with functional additives), 2 – organoleptic values (taste, fresh appearance), 3 – functional values (convenience and speed of food preparation, shelf life), 2 – packaging values (method of packaging, completeness of information on the pack-

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aging), 4 – market values (brand/producer, country of origin, price attractiveness, novelty on the market) (Table 1). All motives were related to positive associations with the product.

Table 1. Statistical characteristics of purchasing motives for plant-derived UMPF

Purchase motives	Indication %						S	V	Rank
	1	2	3	4	5				
nutritional benefits	0.5	2.5	8.6	49.4	39.0	4.24	0.749	0.176651	3
health-promoting qualities	0.6	2.2	6.8	49.4	41.1	4.28	0.733	0.171262	2.5
nutritional value	6.8	6.5	26.3	40.8	19.9	3.60	1.081	0.300278	13
richness in vitamins and minerals	0.6	1.6	8.0	46.7	43.1	4.30	0.732	0.17023	1
enrichment with functional additives	3.7	6.6	23.1	45.8	20.8	3.73	0.982	0.263271	11
flavor	0.7	1.6	6.9	51.0	39.8	4.28	0.719	0.167991	2.5
fresh appearance	2.6	7	21.5	49.8	19.1	3.76	0.930	0.247340	10
the convenience of meal preparation	1.7	5.6	18.5	55.1	19.0	3.84	0.854	0.222396	8
speed of preparation	1.3	5.6	17.2	57.0	19.0	3.87	0.826	0.213437	7
shelf life	1.7	4.5	15.9	55.7	22.2	3.92	0.842	0.214796	6
method of packaging	3.3	6.9	27.7	48.4	13.7	3.62	0.920	0.254144	12
complete information on packaging	2.2	4.2	13.6	51.4	28.6	4.00	0.888	0.22200	4
brand/producer	7.8	12.2	37.5	32.7	9.7	3.24	1.045	0.322531	14
country of origin	4.0	7.1	21.5	39.7	27.7	3.80	1.048	0.275789	9
price attractiveness	1.9	4.2	15.9	54.9	23.0	3.93	0.854	0.217303	5
novelty on the market	14.1	15.4	38.8	24.1	7.6	2.96	1.123	0.379392	15

The arithmetic mean for the above indicators ranged from 2.96 to 4.30. The main factors influencing purchasing decisions are the richness of vitamins and minerals, health, taste, and nutritional qualities of the product category surveyed. For these four variables, the mean values of the results were greater than 4.0, with the attribute richness of vitamins and minerals obtaining the highest mean of 4.30. The qualities indicated here are valued by approximately 90% of respondents, with a richness of vitamins and minerals being considered very important to the largest group, i.e., 43.1% of respondents. These results indicate that, in the market for plant-derived UMPF, purchasers make purchasing decisions, most often guided by health-promoting motives but also by taste.

The second group of factors influencing purchasing decisions for plant-derived UMPF is those with an average of 3.5 and 4.0. In this category are the variables: completeness of information on the packaging, price attractiveness, shelf life, speed of food preparation, convenience of food preparation, country of origin, fresh appearance, enrichment with functional additives, method of packaging, and dietary qualities. These motivators were crucial to less than ¼ of respondents. Thus, the average strength of motivation to purchase is due to factors related to the product's utility value and dietary value. The factors least likely to motivate the purchase of the product category under study were market novelty (=2.96) and brand/producer (=3.24). These motivators were important to under 10% of respondents (7.6 and 9.7%, respectively). This may indicate that the Polish market is not sensitive to innovation and marketing activities in the UMPF category. At the same time, given that the market is saturated with activities promoting mainly UPF, the relatively low importance of the marketing factor may be due to the lack of such messages in the UMPF market.

Purchase motivations for plant-derived UMPF in the general population are driven by three main motivators: pro-health, pragmatic, and marketing, with pro-health motivations being the most significant, pragmatic motivations being moderate, and marketing motivations being the least important. The results obtained fully support hypothesis H1, indicating that consumers' purchase motivation determinants are diverse.

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Comparing the purchase motives declared by women and men, as well as by people of working and post-working age (Table 2), the dominant role of pro-health motives in the purchase process of plant-derived UMPF was noted in all analysed groups. Despite some differences in the hierarchy of variables, the overall motivational pattern remains similar. A similar hierarchy of purchase motives was shown by respondents in the general population, women, and people of post-working age; in these groups, the leading positions are occupied by the richness of vitamins and minerals, health-promoting qualities, and taste, respectively. The hierarchy of motives among men and people of working age shows some similarity in these groups; taste was rated highest, ahead of health-promoting properties and richness in vitamins and minerals. In addition, a comparison of the arithmetic averages of the evaluation of purchase motives between men and women showed that women generally attributed greater importance to the analysed factors than men; in all cases, the averages were higher for this group. On the other hand, comparing perceptions of UMPF purchase motives between people of working and post-working age, it was noted that older respondents attributed greater importance to the 12 factors analysed compared to their younger counterparts. Younger respondents rated only four motives higher than older respondents: enrichment with functional additives, price attractiveness, fresh appearance, and speed of food preparation.

Table 2. Motivations for purchasing decisions for plant-derived UMPF vs. gender and age

	Women	Men	Differences in Women-Men averages	18-59/64 years	≥60/65 years	Differences in (18-59/64 years)-(≥60/65 years) averages	total	Rank
nutritional benefits	4.32	4.15	0.17	4.23	4.26	-0.02	4.24	3
health-promoting qualities	4.38	4.17	0.22	4.24	4.41	-0.17	4.28	2
nutritional value	3.81	3.37	0.44	3.58	3.66	-0.08	3.6	13
richness in vitamins and minerals	4.43	4.16	0.27	4.26	4.43	-0.16	4.30	1
enrichment with functional additives	3.86	3.60	0.26	3.79	3.55	0.25	3.73	11
flavor	4.36	4.18	0.19	4.28	4.28	-0.01	4.28	2
fresh appearance	3.84	3.66	0.19	3.77	3.72	0.05	3.76	10
the convenience of meal preparation	3.95	3.72	0.23	3.83	3.88	-0.05	3.84	8
speed of preparation	3.98	3.74	0.24	3.88	3.84	0.04	3.87	7
shelf life	3.99	3.85	0.14	3.90	3.99	-0.09	3.92	6
method of packaging	3.75	3.48	0.27	3.59	3.73	-0.14	3.62	12
complete information on packaging	3.75	3.48	0.27	3.59	3.73	-0.14	3.62	12
brand/producer	3.35	3.12	0.23	3.18	3.45	-0.27	3.24	14
country of origin	3.91	3.67	0.24	3.68	4.18	-0.50	3.8	9
price attractiveness	3.94	3.92	0.02	3.95	3.85	0.11	3.93	5
novelty on the market	3.02	2.88	0.14	2.89	3.15	-0.26	2.96	15

The next step of the analysis was to see if there was a relationship between the motives for purchasing UMPF and the respondents' gender (Table 3). This food was bought by 53.0% of women and 47.0% of men, which is consistent with the distribution of this characteristic in Poland. The result of the chi^2 test indicated that statistically significant correlations occurred for 13 motives and gender, except for the motives price attractiveness, shelf life, and newness on the market. All identified relationships were characterised by relatively low strength, with the V-Cramer coefficient ranging from 0.1 to 0.3.

The results obtained make it possible to verify H2 positively, indicating a statistically significant relationship between the motives for purchasing plant-derived UMPF and the gender of respondents

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for most of the analysed motives. This means that there are differences between men and women in their assessment of the importance of 13 of the 16 factors determining purchasing decisions in this product category.

Table 3. Purchase motives for plant-derived UMPF versus the gender of respondents

Purchase motives	chi² test	V-Cramer ratio	significance level 'p'
nutritional benefits	12.979	0.122	0.011
health-promoting qualities	21.374	0.156	0.001
nutritional value	38.045	0.209	0.001
richness in vitamins and minerals	30.931	0.188	0.001
enrichment with functional additives	17.488	0.141	0.002
flavor	16.085	0.136	0.003
fresh appearance	13.508	0.124	0.009
the convenience of meal preparation	16.375	0.137	0.003
speed of preparation	21.220	0.156	0.001
shelf life	9.009	0.610	0.101
method of packaging	20.069	0.152	0.001
complete information on packaging	20.498	0.153	0.001
brand/producer	14.453	0.129	0.006
country of origin	13.150	0.123	0.011
price attractiveness	5.422	0.079	0.247
novelty on the market	4.109	0.069	0.391

Statistically significant correlations between the motives for purchasing UMPF and the age of the respondents occurred for only 7 of the 16 motives ($p<0.05$): nutritional value, enrichment with functional additives, shelf life, method of packing, complete information on packaging, brand/producer, country of origin, novelty in the market (Table 4). All identified correlations were characterised by low strength, with the value of the V-Cramer coefficient being less than 0.3. The results obtained provided positive verification of H3, indicating a statistically significant relationship between the motives for purchasing plant-derived UMPF and the age of respondents for nearly half of the analysed motives. This means that there are differences between respondents of working and post-working age in their assessment of the importance of 7 of the 16 factors determining purchasing decisions in this product category.

Table 4. Purchase motives for plant-derived UMPF versus the age of respondents

Purchase motives	chi² test	V-Cramer ratio	significance level 'p'
nutritional benefits	10.971	0.112	0.027
health-promoting qualities a	12.356	-	-
nutritional value	5.124	0.077	0.275
richness in vitamins and minerals a	17.492	-	-
enrichment with functional additives	20.649	0.154	0.001
flavor a	4.095	-	-
fresh appearance	8.888	0.101	0.064
the convenience of meal preparation	6.589	0.087	0.159

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Purchase motives	chi² test	V-Cramer ratio	significance level 'p'
speed of preparation	8.488	0.099	0.075
shelf life	18.418	0.145	0.001
method of packaging	11.409	0.014	0.022
complete information on packaging	23.269	0.163	0.001
brand/producer	20.165	0.152	0.001
country of origin	47.019	0.232	0.001
price attractiveness	4.615	0.073	0.329
novelty on the market	16.022	0.135	0.003

[a] The conditions of the chi² test are not met, more than 20% of the cells have an expected abundance of less than 5.

To identify the optimal number of latent variables that explain the interrelationships between the purchase motives for plant-derived UMPF and to compare the structure of purchase motives of men and women and the age groups studied, exploratory factor analysis was carried out for the respondents as a whole and each of the two groups distinguished by the variable gender and age. The Cronbach's alpha method was used to test the reliability of the scale used in the research tool. The catalogue of motives for purchasing packaged plant-derived UMPF included 16 observed variables. The value of Cronbach's Alpha test was 0.832 for total respondents, 0.814 for women, 0.814 for men, 0.830 for men, 0.842 for working-age respondents, (for these three groups of respondents the Alpha is high $\alpha>0.08$), and 0.794 for post-working-age respondents (for this category the Alpha is acceptable, as $\alpha>0.07$), which proves the high reliability and high internal consistency of the scale (Bedyńska & Cypryanska, 2007).

For each group of respondents analysed, 4 factors were identified. In the case of total respondents, men and women, and those in the post-working age group, the separation was made based on the Kaiser criterion of selecting components with eigenvalues greater than 1; in the case of those in the working age group, it was made based on the Cattell's scatterplot criterion, i.e. factors that are to the left of the "factor scatterplot" on the line graph. In each case, they explained more than 54% of the total variation in the aspect under study (Tables 5 and 7).

The first factor included, for total respondents, 3 variables, for women, 4 variables, for men, 2 variables (Table 6), for working-age, 2 variables, and for post-working-age, 3 variables (Table 8) with a factor loading of at least 0.7. For total respondents, these were the product's health-promoting qualities variables, as well as the need to maintain physical health. For the categories of women and working age, the first factor included, in addition to health-promoting qualities, the variable of taste, indicating that for these categories, taste qualities are as important as health qualities. For men and people of working age, the first factor included 2 product attributes related to the market qualities surveyed, and novelty and brand/manufacturer.

The second factor, for total respondents, women and people of working age, related to the market properties of the product: in the case of the total, it included 2 variables (brand/manufacturer and newness to the market), in the case of women and people of working age, 1 variable – brand/manufacturer. For men and people of working age, it consisted of 3 variables relating to the product's health-promoting qualities (nutritional, health-promoting qualities, and vitamin and mineral richness).

The third factor, in all categories of respondents, consisted of 1 variable, indicating pragmatic product features. It included the convenience of meal preparation for total respondents, men, and post-working age. For women and working age, the speed of meal preparation.

The fourth factor, for total respondents, women, people of working and post-working age, consisted of 1 variable: price attractiveness; for men, it consisted of 2 variables: price and shelf life.

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Table 5. Hierarchy of factors according to their eigenvalues determined by the Kaiser criterion (total respondents, women, and men)

Factor	Own value			Cumulative own value			% of total own values (variance)			Cumulative % of own values		
	Total	Women	Men	Total	Women	Men	Total	Women	Men	Total	Women	Men
1	4.648	4.344	4.622	4.648	4.344	4.622	29.051	27.148	28.885	29.051	27.148	28.885
2	1.866	2.066	1.874	6.514	6.41	6.496	11.661	12.91	11.71	40.712	40.058	40.595
3	1.275	1.375	1.183	7.789	7.785	7.679	7.969	8.593	7.397	48.681	48.651	47.992
4	1.031	1.116	1.084	8.820	8.901	8.763	6.447	6.973	6.775	55.128	55.624	54.767

'Overall' – Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.873, greater than 0.7. Bartlett's sphericity test is significant (variables are statistically significantly related); chi^2 is 3582.913; and p = 0.001; 'Women' – KMO = 0.843; Bartlett's test of sphericity is significant; chi^2 is 1897.010; and p = 0.001; 'Men' KMO = 0.856; Bartlett's test of sphericity is significant; chi^2 is 1688.173; and p = 0.001.

Table 6. The hierarchy of established factors considers their intrinsic values according to the Kaiser criterion (total respondents, women, and men)

Variable	Factor											
	1			2			3			4		
	Total	Women	Men	Total	Women	Men	Total	Women	Men	Total	Women	Men
nutritional benefits	0.837	0.858	0.047	0.061	0.028	0.802	0.124	0.079	0.199	0.057	0.029	0.075
health-promoting qualities	0.779	0.780	0.250	0.275	0.215	0.809	-0.051	-0.079	-0.032	0.112	0.109	0.118
nutritional value	0.354	0.476	0.573	0.543	0.441	0.216	-0.066	0.003	-0.18	0.106	0.029	0.287
richness in vitamins and minerals	0.757	0.744	0.054	0.121	0.127	0.765	0.176	0.150	0.218	0.049	0.045	0.029
enrichment with functional additives	0.346	0.300	0.406	0.441	0.435	0.356	0.121	0.200	0.059	0.004	-0.16	0.210
flavor	0.679	0.739	-0.087	-0.056	-0.066	0.555	0.352	0.279	0.467	0.064	0.029	0.147
fresh appearance	0.121	0.103	0.295	0.246	0.205	0.092	0.603	0.668	0.497	0.093	0.029	0.271
the convenience of meal preparation	0.027	-0.030	0.187	0.181	0.207	0.067	0.711	0.679	0.719	0.249	0.354	0.09
speed of preparation	0.274	0.237	0.052	0.022	0.006	0.267	0.677	0.705	0.622	-0.009	0.030	-0.016
shelf life	0.131	0.101	0.271	0.270	0.203	0.179	0.134	0.236	-0.001	0.661	0.620	0.712
method of packaging	0.102	-0.022	0.552	0.596	0.663	0.231	0.404	0.327	0.358	-0.072	-0.091	0.039
complete information on packaging	0.383	0.331	0.507	0.559	0.591	0.463	0.175	0.129	0.156	0.090	0.078	0.130
brand/producer	-0.012	0.043	0.734	0.733	0.734	-0.041	0.127	-0.017	0.216	0.131	0.309	-0.003
country of origin	0.086	0.060	0.616	0.633	0.646	0.147	0.031	-0.022	0.046	0.045	0.066	0.030
price attractiveness	0.07	0.055	-0.083	-0.016	0.019	0.051	0.103	0.020	0.234	0.851	0.846	0.793
novelty on the market	-0.074	0.009	0.739	0.708	0.668	-0.107	0.162	0.185	0.136	0.099	0.128	0.072

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Table 7. The hierarchy of established factors considers their intrinsic values according to their eigenvalues determined by the Cattell criterion for those aged 18-59/64 and the Kaiser criterion for those ≥60/65

Factor	Own value		Cumulative own value		% of total own values (variance)		Cumulative % of own values	
	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years
1	4.851	4.123	4.851	4.123	30.317	25.771	30.317	25.771
2	1.975	1.784	6.826	5.907	12.345	11.149	42.662	36.919
3	1.239	1.612	8.065	7.519	7.744	10.077	50.406	46.996
4	0.976	1.159	9.041	8.678	6.101	7.246	56.506	54.243

'18-59/64 years' – KMO = 0.877; Bartlett's sphericity test is significant; chi^2 is 2976.139; and p = 0.001;
' ≥60/65 years' KMO = 0.795; Bartlett's sphericity test is significant; chi^2 is 824.744; and p = 0.001.

Table 8. Result of factor analysis of purchase motives for plant-derived UMPF (age 18-59/64 and ≥60/65 years)

Variable	Factor							
	1		2		3		4	
	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years	18-59/64 years	≥60/65 years
nutritional benefits	0.077	0.872	0.835	-0.007	0.117	0.107	0.067	0.109
health-promoting qualities	0.241	0.653	0.807	0.309	-0.002	-0.142	0.069	0.339
nutritional value	0.568	0.339	0.327	0.361	0.044	-0.180	-0.038	0.456
richness in vitamins and minerals	0.104	0.739	0.770	0.183	0.164	0.191	0.093	0.006
enrichment with functional additives	0.509	0.279	0.339	0.345	0.199	0.039	-0.112	0.305
flavor	-0.040	0.816	0.620	-0.087	0.409	0.202	0.138	-0.031
fresh appearance	0.307	0.172	0.104	0.091	0.538	0.603	0.168	0.110
the convenience of meal preparation	0.241	-0.086	0.051	-0.058	0.691	0.760	0.274	0.172
speed of preparation	0.047	0.101	0.292	0.068	0.732	0.659	-0.115	0.118
shelf life	0.292	0.107	0.151	0.041	0.079	0.237	0.649	0.695
method of packaging	0.674	0.229	0.099	0.344	0.259	0.598	0.006	-0.132
complete information on packaging	0.536	0.278	0.396	0.568	0.212	0.072	0.068	0.374
brand/producer	0.728	0.076	-0.040	0.767	0.102	0.154	0.193	0.058
country of origin	0.621	-0.082	0.132	0.682	0.016	-0.027	0.116	-0.079
price attractiveness	-0.027	-0.045	0.079	0.029	0.121	0.148	0.834	0.705
novelty on the market	0.745	0.071	-0.109	0.486	0.095	0.314	0.117	0.177

From a marketing point of view, the result of factor analysis plays an important role in identifying the key product characteristics considered by consumers in the purchase decision-making process, thus making it possible to associate the extracted factors with specific segments of individual buyers (Mojsiewicz et al., 2008). Table 9 indicates which groups of UMPF qualities were important for each customer categorisation. Clear differences were observed between men and women, as well as between those of working and post-working age. Among consumers of plant-based UMPF on the Polish market, two main segments can be distinguished, with an identical hierarchy of factors for the choice of this food category. The first is a women and post-working age segment, and the second is a

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men and working age segment. The hierarchy of UMPF selection factors in these segments was almost identical. Thus, the result of the factor analysis confirms H4: There is a difference in the structure of latent factors determining the motives for purchasing plant-derived UMPF among the analysed groups of respondents.

Table 9. Distinct consumer segments by groups of UMPF values

Groups of respondents	Factor			
	1	2	3	4
Total	HEALTH BENEFITS nutritional, health--promoting qualities, richness in vitamins and minerals	MARKET VALUES brand/producer, new on the market	PRAGMATIC QUALITIES convenience in meal preparation	ECONOMIC ADVANTAGES price attractiveness
Women	HEALTH AND SENSORY QUALITIES nutritional, health--promoting qualities, richness in vitamins and minerals, flavor	MARKET VALUES brand/producer	PRAGMATIC QUALITIES speed of food preparation	ECONOMIC ADVANTAGES price attractiveness
Men	MARKET VALUES brand/producer, new on the market	HEALTH BENEFITS nutritional, health--promoting qualities, richness in vitamins and minerals	PRAGMATIC QUALITIES convenience in meal preparation	ECONOMIC-PRAGMATIC QUALITIES price attractiveness, speed of food preparation
Working age	MARKET VALUES brand/producer, new on the market	HEALTH BENEFITS nutritional qualities health-promoting properties, rich in vitamins and minerals	PRAGMATIC QUALITIES speed of food preparation	ECONOMIC ADVANTAGES price attractiveness
Post-working age	HEALTH AND SENSORY QUALITIES nutritional value, taste, rich in vitamins and minerals	MARKET VALUES brand/producer	PRAGMATIC QUALITIES convenience in meal preparation	ECONOMIC ADVANTAGES price attractiveness

Discusion

Many authors have emphasised the need to improve the sustainability of the food system. According to Fardet and Rock (2020), the urgent implementation of regulations for the agro-industrial sector, including nutritional and environmental criteria, incentivises changes in consumers' eating behaviour towards healthy consumption. Consumption behaviour can be seen as a challenge and a necessity. Understanding consumer behaviour requires a multidisciplinary analysis, from many disciplines, including marketing and psychology, while the necessity to study consumer behaviour is because it influences the structure and dynamics of the food market, which in turn makes it necessary for various bodies to make decisions toward its sustainability (Duralia, 2023). The results of the analyses show a relationship between gender, age, and UMPF purchase motives. Considering these demographic characteristics, two basic market segments with almost identical purchase motives can be distinguished in the Polish market for plant-derived UMPF. The first segment includes women and people of post-working age, while the second segment includes men and people of working age. For the first segment, the health benefits of this product category are mainly important, while for the second segment, the product brand and market novelties are important. Consumers' expectations of food, among other things, the perception that it is healthy, are key determinants influencing their choice. According to Hagen (2020), healthy food is a product rich in nutrients, low in fat and calories, that is good for the body and generally healthy. However, according to Chan and Zhang (2022) and

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Motoki and Togawa (2022), consumers tend to rely on their intuition or beliefs to determine the healthiness of food, rather than on nutritional information. In the study population, health-related purchase motives were the main reasons for purchase. In addition, Goetzke et al. (2014) indicate that healthiness is one of the major factors influencing food purchasing behaviour, especially healthy foods. In the surveyed population, relatively weaker motivators for purchasing UMPF were market factors, including market novelty, brand, and price incentives. This may indicate that the Polish market is not as receptive to innovation and marketing activities in this product category, but probably lacks adequate promotional actions. Considering that the information provided to customers about risks, such as the negative impact of diet on health, has little effect on changing eating behaviour (Syme, 1986), it is the environmental rather than the individual approach to prevention that is more effective and practical through appropriate marketing activities. According to Duralia (2023), food policy facing problems caused by inadequate food consumption should focus on sustainable resource development and healthy lifestyles. Dimitrova et al. (2020) identify connections between knowledge, materialism, environmental influences, the promotion of SC, and the intention to maintain SC that can influence and lead to SC behaviour. In the study population, price incentives were also of low importance as a motivator for purchasing UMPF, which may indicate that customers choosing UMPF prioritise healthiness over price. Other researchers have observed that the perception of food as healthy is even positively correlated with the willingness to pay a higher price (Plasek & Temesi, 2019; Steinhauser et al., 2019).

The present study has limitations. Firstly, they were conducted during the SARS-CoV-2 pandemic, which may have distorted the results obtained. During this period, distancing measures and government blockades imposed new habits and lifestyles, affecting, among other things, eating habits (Rodríguez-Pérez et al., 2020; Di Renzo et al., 2020). According to Jerzyk et al. (2024), the pandemic influenced consumers' awareness of healthy eating, and the stress and constraints of the pandemic harmed the dietary quality of life. Using only two demographic characteristics as independent variables was also a limitation of the study. Future research on UMPF purchase motives may consider richer socio-demographic characteristics, as well as the influence of other aspects on consumption, such as attitudes toward UMPF, nutrition, and SC. As Nestorowicz et al. (2021) point out, more important than the demographic characteristics of consumers are their attitudes toward food and nutrition, as well as their motives for choosing different diets. Environmental risk perception and knowledge have a significant impact on concern, strongly influencing behavioural intentions, which in turn act as mediators of SC behaviour (Saari et al., 2021). Future research could also focus on analysing the effectiveness of marketing communication and messages in the UMPF market. Social media, for example, has a significant impact on change and influences end-user consumption behaviour, with various economies using social media platforms to persuade and influence public opinion (Ali et al., 2023).

Conclusions

Studying purchase motivations and segmenting food markets is one way to look for activities that influence food choices in society. The results indicate various motivations for purchasing plant-derived UMPF, including health-promoting, pragmatic, and market motivations. There is a statistically significant relationship between the motives for purchasing plant-derived UMPF and the gender and age of respondents. Differences in the structure of the latent factors forming the motives for purchasing plant-derived UMPF were also identified among different groups of respondents. According to Sidor and Roman (2020), awareness among Poles regarding healthy eating remains insufficient and requires attention to promote health, dietary choices, and other nutrition-related behaviours. The results obtained may be relevant for formulating nutrition policy actions in Poland, supporting marketing activities for education and promotion of healthy eating habits, including retail sales of healthy foods using knowledge of diagnosed homogeneous segments of the plant-based UMPF market in Poland. Indeed, nutrition, health, or environmental policies should be tailored to the preferences, socioeconomic, and demographic characteristics of the people they are intended to support, using mechanisms that yield the greatest effectiveness.

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The contribution of the authors

Conceptualisation, W.W.; literature review, W.W.; methodology, W.W.; formal analysis, A.G.; writing, W.W. and A.G.; conclusions and discussion, W.W.

The authors have read and agreed to the published version of the manuscript.

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JAKIE SĄ MOTYWY ZAKUPU ŻYWNOŚCI NIEPRZETWORZONEJ I MINIMALNIE PRZETWORZONEJ POCHODZENIA ROŚLINNEGO W POLSCE?

STRESZCZENIE: Celem artykułu była identyfikacja motywów zakupu żywności nieprzetworzonej i minimalnie przetworzonej (UMPF) pochodzenia roślinnego przez nabywców indywidualnych w Polsce, z uwzględnieniem ich płci i wieku oraz segmentacja tych motywów. Badania przeprowadzono na próbie n=1000, z zastosowaniem metody badań sondażowych, techniką CATI. Dane poddano analizom ilościowym. Wykorzystano metody analizy średnich wyników, porównawczą, testu niezależności chi^2 Pearsona, współczynnika kontyngencji V-Cramera oraz eksploracyjną analizę czynnikową. Główne motywatory zakupu tej kategorii żywności wśród polskich konsumentów miały charakter zdrowotny i organoleptyczny. Mniejszą siłę motywowania miała marka prodktu i innowacje oraz czynniki związane z użytkową wartością produktu, m.in. szybkość i wygoda przygotowania posiłków. Najsłabszym motywatorem zakupu była atrakcyjność cenowa produktów. Różnice dotyczące motywatorów zakupu zaobserwowano głównie między kobietami i mężczyznami oraz badanymi grupami wiekowymi. Na rynku wyodrębiono także jednorodne grupy odbiorców tej kategorii żywności.

SŁOWA KLUCZOWE: motywy zakupu, żywność nieprzetworzona i minimalnie przetworzona, żywność pochodzenia roślinnego, popyt, Polska

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