
Article

Sustainable Foods: Consumer Opinions and Behaviour towards Organic Fruits in Poland

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Abstract: By producing high quality food with a low environmental impact, organic farming plays an essential role in developing sustainable food systems. Over time, consumer interest in organic food is systematically growing, which results in a generally positive attitude towards organic products. Many studies that are devoted to analysing organic food consumers' behaviour aim to generalise the studied trends to the population of a given country or region. Given the varying rates of organic market development between countries, there is a need for more narrowly focused research, which could more profoundly facilitate local development of organic market. The aim of this study was to investigate the opinions of Polish consumers about organic fruit and to identify the socioeconomic and sociodemographic determinants of the propensity to choose and purchase organic fruit. Respondents were recruited via a market research agency using a consumer access panel. To collect responses, a formal, structured questionnaire was developed and distributed using the CAWI method. The general acceptance of price increases for organic apples amounts to less than around 30% (89% of responses). The effect of income and package size tend to interact with regard to the purchase preference of apples ($p < 0.001$). The highest frequency of organic fruit purchases were indicated for physical stores, in particular supermarkets (5.35 times/month, 95%CI). A relationship between willingness to consume organic fruits and the self-described economic situation ($p = 0.005$), as well as true household income ($p = 0.007$), has been shown. A relationship between the frequency of organic fruit purchases and the number of household members ($p = 0.006$), as well as number of household members under the age of 18 ($p = 0.011$), has also been shown. Marketing techniques for organic products should emphasize family welfare and be directed at younger consumers, especially at retail outlets where customers are most likely to buy them, namely physical supermarkets, local grocery stores and discount stores.

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1. Introduction

Over the past decades, scientific evidence has accumulated indicating a number of negative health effects resulting from the consumption of food products containing synthetic pesticide and fertiliser residues [1,2]. This applies to both producers and consumers.

Concerns in this area have driven the development of safer production systems to meet the growing demand while minimising the negative long-term side-effects, such as negative impacts on health and environmental sustainability [3]. The resulting organic production system is becoming more widespread due to increasing consumer awareness of the importance of the quality of the products consumed for health. The organic farming

system, regulated at the EU level by Regulation (EU) 2018/848 of the European Parliament and of the Council on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007 [4], takes a strict approach prohibiting the use of synthetic chemicals for plant protection, plant fertilisation, feed enrichment and food processing. The described regulations also prohibit the use of excessive synthetic veterinary drugs.

The main objective of the organic farming system is to create a product of value to the consumer while minimising the negative environmental impact of the production, processing and pollution. And indeed, as numerous studies indicate, organic food has less contamination with pesticides [5–10], heavy metals [10], antibiotic residues [11], is safer for the environment and is richer in selected nutrients such as antioxidants and vitamins [12–17], minerals [18] and n-3 polyunsaturated fatty acids [19–21], including CLA (conjugated linoleic acid) [21].

The rapid growth of organic production is particularly relevant to the market for organic fruit and vegetables, which enjoys one of the highest demands among organic products [22] due to, among other things, the growing popularity of vegetarianism, the widespread use of fruit and vegetables in food processing and the probably greater consumer awareness of the differences in production processes between organic and conventional plant systems relative to livestock production [23].

Poland has a great potential to develop organic farming due to the environmental conditions and the high production potential of the agri-food sector. The share of organic farming in the global agricultural area accounts for approximately 3.5% of the total farmland, with approximately 19,000 farms with this profile and 509,000 hectares covered by organic certification. The demand for organic food in the domestic market is constantly growing, but the sale of organic food is still of marginal importance in the total value of food sales. It is estimated that the organic food market accounts for 0.5% of the value of the national food market. The market for this food in Poland is one of the most dynamically developing, and yet organic food is still a niche category. The best-selling organic products in Poland are fruits and vegetables. There is also a growing share of consumers who regularly buy organic food, as well as an increasing number of consumers declaring that they buy organic food at least once a week. The main motives for purchasing these products are health care and the belief that organic food is safe and free from pesticide residues. The most common buyers of organic food are women, people aged 36–45 and families with children [24,25].

The dissimilarity of organic and conventional production systems is associated not only with differences in the health impacts on consumers but also with differences in aspects of price, availability or increased need for reliability in terms of product quality [26–28], which in turn may have a negative impact on sales of organic products. Therefore, various factors related to the purchasing behaviour of consumers of organic and conventional products, such as environmental values, availability and either egoistic or altruistic motives, are becoming a frequent focus of research [29–33].

In a review article by Huo et al. (2024) [34], the main theoretical frameworks used to study consumer purchase behaviour in the context of organic food were presented. This framework proposes various variables from different perspectives, such as anthropology, social psychology and ethics, to explain consumer issues. Of the 51 studies reviewed, the theory of planned behaviour (TPB) was used most frequently. In other words, organic food consumption was mainly studied within the framework of the theory of planned behaviour, which states that attitudes, subjective norms and perceived behavioural control explain intentions and concomitant purchasing behaviour [35]. For example, one of the studies included in Huo et al.'s 2024 review [36] examined the role of trust in organic products in purchasing behaviour using the theory of planned behaviour (TPB) as a theoretical framework. Trust plays an important role because consumers are unable to verify that food has actually been produced according to the procedures recommended for organic production. Therefore, trust can help explain both purchase intention and purchase

behaviour. The results of the study for both organic foods in general and fresh organic fruit and vegetables were similar in that trust was positively related to attitude and subjective norm and indirectly to intention and behaviour. The results highlighted the importance of people's trust in organic produce as an important antecedent that enhances TPB-based psychosocial processes.

The research described here may enable understanding of the mechanisms influencing the purchase of organic food by consumers and may also be the basis for taking actions to optimise marketing strategies.

Many studies are devoted to analysing the relationship between sociodemographic and socioeconomic factors and the purchasing behaviour of organic food consumers [37–41]. In a significant number of such studies, the aim is to generalise the trends studied to the global population. Nevertheless, studies in this area are often based on representative samples from specific countries [42–44].

Given the varying rates of organic market development between countries, as well as the different demographic and economic structures between them, the need for more narrowly focused research in this area seems justified. This will make it possible to characterise more country-specific relationships that can be effectively used to develop the market for organic products, especially in these locations. Despite numerous studies dedicated to analysing the relationship between socioeconomic and sociodemographic factors and the purchasing behaviour of consumers of organic products in Poland [45,46], they do so in general context of organic food products. There is still a lack of research focusing on a specific category of organic products, such as fruit. Due to the high demand for these products in the organic sector, such research could make a significant contribution to the development of the organic market in Poland.

Therefore, the aim of this study was to investigate the opinions of Polish consumers about organic fruit and to identify the socioeconomic and sociodemographic determinants of the propensity to choose and purchase organic fruit in this group. This involves answers to the questions about dependencies between the average prices of purchased fruits and consumer age, along with purchasing preferences depending on package size and consumers' financial situations.

Based on studies of the Polish population [47,48], three working hypotheses were formulated:

1. Polish consumers are willing to pay no more than 20% more for organic fruit than for conventionally produced fruit;
2. The biggest barrier for all consumers is the price of organic fruit;
3. The most frequent purchasers of organic fruit are wealthier households and those with a higher number of people under 18 years of age.

2. Materials and Methods

A representative survey was conducted among Polish consumers to obtain the most important factors that may lead to more frequent purchasing and consumption of organic fruits as products recommended in the daily diet and to better understand consumers' motivations in deciding to buy such products and not others. These are very important issues in the context of market development and consumption of organic food in Poland. Respondents were recruited through an agency with a consumer access panel (Bilendi group). We used quota sampling, which ensured that the sample was representative for the Polish population in terms of age and gender. We did not approach participants under 18. Additionally, participants were screened based on their responsibility for household food shopping and consumption of the respective product category. If participants indicated that they were either never responsible for food shopping or generally do not consume fresh apples, they were not able to participate the survey as they did not represent the respective target group. Due to the use of quota sampling, the chance was not the same for all participants, as it was not a completely random selection. However, within the

people eligible for the quotas, the selection was not targeted but random. The chance of inclusion in the sample was therefore equally high for all those eligible for quotas.

A total of 513 respondents were recruited to complete the survey questionnaire. Data collection lasted from 27 May to 20 June 2022. To collect responses, a formal, structured questionnaire was developed and distributed via CAWI. At the beginning of the questionnaire, an informed consent form was displayed to the study participants. The study participants were informed about the anonymity of the study, its goals and objectives and their rights. In order to begin the study, respondents had to familiarise themselves with this information and then confirm their familiarity with the study's objectives and procedures, declare their legal capacity to participate in the study and their ability to consent to participate in the study, provide consent to participate voluntarily in the study with an understanding of the possibility of withdrawal at any stage, and provide consent to the processing of personal data with a statement regarding their understanding of how any data will be used for research purposes. Without confirming the above points, study participants could not proceed to the next research stages, which included the questionnaire.

The questionnaire was divided into two parts. The first part focused on sociodemographic characteristics. The second part focused on consumption habits and preferences for fresh fruit. The first part of the questionnaire concerned demographic data, such as the number of persons in the household, the number of persons under 18 in the household, employment status, education, age, gender, total household income and self-described economic situation. The next part dealt with general questions about consumption habits and preferences for fresh fruit, such as "How often do you buy fruit?", "How often do you buy organic fruit?" and "What size package of apples do you prefer when buying organic apples?". For measuring this a seven-point Likert-type scale was used. This quite large (step-by-step) spectrum of choices offers independence for a respondent to pick the "exact" one [29]. The data from the organic fruit purchase frequency question were "question scales" with increasing frequency of consumption from "Never" to "Several times a week". The seven original categories of organic fruit purchase frequency were transformed into semi-quantitative data that logically reflected the increasing intensity of the trait, using a transformation to numbers and expressing fruit purchase frequency as multiples/week, considering 52 weeks per year, as shown in Table 1.

While developing research instruments, we relied upon established scales from peer-reviewed, reputable journals [43,49–52]. The questionnaire was presented to other consumer behaviour researchers to provide an expert review of the survey. Additionally, it was validated by our business partner to ensure face validity. This validity check did not only include the measures and survey flow but also linguistic features. Since established scales from the literature were used [53], expert validity was ensured. In addition, the reliability of the measurements was empirically tested after the survey.

Respondents were divided into groups of organic and non-organic fruit consumers based on the questions: "Can you imagine eating organic fruit?". All potential respondents were first asked to read and confirm the informed consent guidelines before completing the rest of the survey. The full survey questionnaire is attached as an appendix to this manuscript. Data were analysed using R version 4.3.1 and RStudio [54,55] (a language and environment for statistical computing), using the packages "tidyverse" [56] and "agricolae" [57]. Data were tested for normality of distribution and heterogeneity of variance using the Shapiro–Wilk test and Levene's test. Data that did not meet the above assumptions were analysed using non-parametric tests. The Kruskal–Wallis test was conducted to examine differences in the price paid per kilogram of apples according to the age of the respondents, for which post hoc tests were conducted using Fisher's criterion of least significant difference with the Bonferroni correction as a correction method. A two-factor ANOVA was conducted to analyse the effect of income and pack size on purchase preferences for organic apples, for which a Tukey's HSD test was conducted to compare the mean score between groups. Chi-square tests were used to assess independence between the factors analysed and organic fruit purchasing behaviour. For expected group sizes

below assumptions, Yates' correction was applied. The significance level determined in the study was set at $\alpha = 0.05$.

Table 1. Indicators for conversion of fruit purchase frequency categories in the survey.

Purchase Frequency Categories in the Survey	Weekly Frequency (Times/Week)
A couple of times per week	2
Once per week	1
A couple of times per month	0.375
Once/twice per month	0.05
Once per three/six months	0.027
Once per six/eleven months	0.019
Once per year	0
Never	0

3. Results

3.1. Study Participants

Table 2 presents the full characteristics of the respondents. It shows the structure of the study group, categorised by three age ranges representative of young adults (20–39 years), middle-aged adults (40–59 years) and old adults (60+ years).

The survey included 513 respondents. Most of them were employed and had secondary education. The respondents were characterised by different economic situations and different incomes. It is worth noting that most respondents had no children under the age of 18, declared a secondary level of education and were employed.

Table 2. Participant characteristics.

	Age		Total (n)	Proportion of
	20–39	40–59	60+	Total (%)
Number of Respondents	197	201	115	513 100
Gender				
Male	81	117	60	258 50
Female	116	84	55	255 50
Number of Household Members				
1	9	15	19	43 8
2	39	42	60	141 28
3	59	71	25	155 30
4	56	48	5	109 21
5+	34	25	6	65 13
Number of Household Members Under the Age of 18				
0	89	93	102	284 55
1	67	63	7	137 27
2+	41	45	6	92 18
Education				
Primary	15	7	1	23 5
Secondary	112	131	65	309 60
Higher	70	63	49	182 35
Employment Status				
Employed	135	179	34	348 68
Student	43	0	0	43 8
Not working	19	22	81	122 24
Self-described Economic Situation				
Above average	65	63	48	176 34
Average	70	66	31	167 33
Below average	62	72	36	170 33

Household Brutto Income ¹					
PLN < 4000	79	59	37	175	34
PLN 4000–8000	76	85	56	217	42
PLN > 8000	42	57	22	121	24

Explanatory note: ¹ The official exchange Euro rate for income according to Narodowy Bank Polski (National Bank of Poland) during the survey period was 45,756.

3.2. Determinants and Motivators of Organic Fruit Purchase

Table 3 shows the motivations that would lead respondents to buy organic apples more often. Lower price was the most frequently selected reason among respondents. The second most frequently indicated reason, also with a significantly higher number of votes compared to other answers, was better availability of these products in the shops. The least frequently indicated potential reason for purchasing organic apples was the greater availability of information on the benefits of eating organic fruit. Among the reasons mentioned by respondents in the “other” category, the most frequently mentioned reason was the use of non-plastic packaging, which would not have a negative impact on the quality of the food product.

Table 3. Respondents’ declared motivations for buying organic apples more often (multiple choice).

Reason to Buy Organic Apples More Often	Number of Indications	Proportion of Indications (%) <i>n</i> = 1539	Proportion of Respondents (%) <i>n</i> = 513
Lower price	405	26.3	79
Better availability	316	20.5	62
Better display at point of sale	214	13.9	42
More attractive/convenient packaging	208	13.5	41
Greater promotion of organic fruits	194	12.6	38
Greater accessibility to information on the benefits of organic fruits	187	12.2	36
Other	15	1	3

Table 4 shows the results on the relationship between socioeconomic/sociodemographic factors and willingness to purchase organic fruit. Both self-assessed economic situation ($p < 0.01$) and total household income ($p < 0.01$) had a significant effect on willingness to purchase organic fruit. A lower propensity to purchase organic fruit was observed among those whose economic situation was below average. Furthermore, this propensity was dependent on and increased with total household income. No significant relationship was found with other selected variables ($p > 0.05$). Those with a higher household income and those who described their economic situation as average or above average were more likely to buy organic fruit compared to those who described their economic situation as bad. Those with primary education and those living alone were least likely to buy organic fruit. Table 5 shows the results on the association between socioeconomic and sociodemographic factors and the frequency of organic fruit purchases. Of the variables included in the tests, only two factors had a significant effect on the frequency of organic fruit purchases—both the number of total household members ($p < 0.01$) and the number of minors in the household ($p = 0.01$). A trend towards increased frequency for organic fruit purchases was observed among households characterised by a higher number of members—both overall and those under 18 years of age.

Table 4. Relationship between socioeconomic factors and desire to consume organic fruits.

Sociodemographic and Socioeconomic Factors		Willingness to Consume Organically Produced Fruits (Proportion and Number of Respondents)			χ^2 p-Value
		All	Yes	No/Not Sure	
Gender	Male	%	50	80	20
	Male	No	258	206	52
	Female	%	50	80	20
	Female	No	255	205	50
Age	20–39	%	38	80	20
	20–39	No	197	157	40
	40–59	%	39	79	21
	40–59	No	201	159	42
Education	60+	%	23	83	17
	60+	No	115	95	20
	Primary	%	5	61	39
	Primary	No	23	14	9
Number of Household Members	Secondary	%	60	81	19
	Secondary	No	308	248	60
	Higher	%	35	82	18
	Higher	No	182	149	33
Number of Household Members	1	%	8	67	33
	1	No	43	29	14
	2	%	28	84	16
	2	No	141	118	23
Number of Household Members Under the Age of 18	3	%	30	78	22
	3	No	155	121	34
	4	%	21	82	18
	4	No	109	89	20
Number of Household Members Under the Age of 18	5+	%	13	83	17
	5+	No	65	54	11
	0	%	55	79	21
	0	No	284	224	60
Employment Status	1	%	27	81	19
	1	No	137	111	26
	2+	%	18	83	17
	2+	No	92	76	16
Self-Described Economic Situation	Employed	%	68	80	20
	Employed	No	348	277	71
	Student	%	8	88	12
	Student	No	43	38	5
Household Income	Not Working	%	24	79	21
	Not Working	No	122	96	26
	Above Average	%	34	82	18
	Above Average	No	176	144	32
Household Income	Average	%	33	86	14
	Average	No	167	144	23
	Below Average	%	33	72	28
	Below Average	No	170	123	47
Household Income	PLN <4000	%	34	73	27
	PLN <4000	No	175	127	48
	PLN 4000–8000	%	42	83	17
	PLN 4000–8000	No	217	180	37
Household Income	PLN >8000	%	24	86	14

	No	121	104	17
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Table 5. Relationship between socioeconomic factors and organic fruit buying frequency.

Sociodemographic and Socioeconomic Factors		Purchase Frequency of Organic Fruits (Proportion and Number of Respondents)								χ^2 p-Value
		All	1	2	3	4	5	6	7	
Gender	Male	%	50	8	31	19	10	4	19	9
	Male	No	258	21	79	48	26	10	49	25
	Female	%	50	8	31	21	13	5	13	9
	Female	No	255	21	80	53	32	14	32	23
Age	20–39	%	38	13	27	21	10	7	13	9
	20–39	No	197	26	54	42	20	13	25	17
	40–59	%	39	5	36	16	11	4	18	10
	40–59	No	201	9	72	33	23	8	36	20
Education	60+	%	23	6	29	23	13	3	17	9
	60+	No	115	7	33	26	15	3	20	11
	Primary	%	5	4	26	22	4	9	22	13
	Primary	No	23	1	6	5	1	2	5	3
Education	Secondary	%	60	9	32	19	10	3	17	10
	Secondary	No	308	28	98	58	30	11	52	31
	Higher	%	35	7	30	21	15	6	13	8
	Higher	No	182	13	55	38	27	11	24	14
Number of Household Members	1	%	8	5	14	12	16	7	23	23
	1	No	43	2	6	5	7	3	10	10
	2	%	28	8	27	21	11	3	19	11
	2	No	141	11	38	29	16	4	27	16
Number of Household Members	3	%	30	7	37	17	14	3	12	10
	3	No	155	10	58	27	21	5	19	15
	4	%	21	8	34	20	7	9	17	5
	4	No	109	9	37	22	8	10	18	5
Number of Household Members	5+	%	13	15	31	28	9	3	11	3
	5+	No	65	10	20	18	6	2	7	2
Number of Household Members Under the Age of 18	0	%	55	6	26	20	14	4	19	11
	0	No	284	18	75	56	40	12	53	30
	1	%	27	9	38	19	9	7	8	9
	1	No	137	12	52	26	13	10	11	13
Employment Status	2+	%	18	13	35	21	5	2	18	5
	2+	No	92	12	32	19	5	2	17	5
	Employed	%	68	9	31	19	10	5	16	10
	Employed	No	348	30	109	65	36	18	56	34
Self-Described Economic Situation	Student	%	8	7	30	28	16	7	5	7
	Student	No	43	3	13	12	7	3	2	3
	Not Working	%	24	7	30	20	12	3	19	9
	Not Working	No	122	9	37	24	15	3	23	11
Self-Described Economic Situation	Above Average	%	34	7	37	20	14	6	11	5
	Above Average	No	176	13	65	36	24	10	20	8
	Average	%	33	10	29	20	9	5	16	11
	Average	No	167	17	49	34	15	8	26	18
Household Income	Below Average	%	33	7	26	18	11	4	21	13
	Below Average	No	170	12	45	31	19	6	35	22
	PLN < 4000	%	34	9	25	19	8	5	19	15
	PLN < 4000	No	175	15	43	34	14	8	34	27
Household Income	PLN 4000–8000	%	42	9	35	19	13	5	14	5
	PLN 4000–8000	No	217	19	76	42	28	11	30	11

PLN > 8000	%	24	7	33	21	13	4	14	8
	No	121	8	40	25	16	5	17	10

1—A couple of times per week, 2—Once per week/A couple of times per month, 3—Once/twice per month, 4—Once per three/six months, 5—Once per six/eleven months, 6—Once per year, 7—Never.

Table 6 shows the willingness of respondents to purchase organic apples according to the price differences compared to conventional fruit present on the market. As the price increases, the proportion of consumers willing to pay for an organic product decreases.

Table 6. Willingness to pay more for organic fruits.

How Much More Over the Price of Conventional Apples Would You Be Willing to Pay for Organic Apples?	Number of Indications	Proportion of Respondents (%) <i>n</i> = 513
10%	303	59
20%	154	30
30%	42	8
40%	8	2
50% and more	6	1

3.3. Purchasing Behaviour and Preferences of Consumers in the Studied Group

Table 7 gives an insight into the distribution of different types of organic fruit consumers among different categories of fruit consumers, characterised by different frequencies of fruit purchase. The distribution of fruit consumers changes in favour of those more likely to consume organic fruit as the overall frequency of fruit consumption in the groups increases.

Figure 1 shows the frequency of fruit purchases in selected sales channels. There is an apparent discrepancy between the frequency of purchases in physical and online shops. The latter are less frequently chosen by consumers as fruit purchasing channels.

The following sales channels had the highest frequency of fruit purchases, starting with the most common: physical supermarkets (5.35 times/month, 95% CI [5.08, 5.63]), local grocery shops (4.64 times/month, 95% CI [4.37, 4.91]), discount supermarkets (4.54 times/month, 95% CI [4.27, 4.80]), physical hypermarkets (4.18 times/month, 95% CI [3.91, 4.45]) and weekly/regular markets (3.67 times/month, 95% CI [3.41, 3.93]).

Table 7. Differences within organic fruit consumption frequencies among specified categories of fruit buyers.

	Fruit Consumers						Categories and proportions of respondents within them
	6 0.2%	4 0.8%	3 5%	2 39%	1 55%	Total 100%	
Organic Fruit Consumers	7	0	50	15.4	10.4	7.5	9.3
	6	100	50	38.5	20.3	9.6	15.8
	5		0	3.8	7.5	3	4.7
	4		0	23.1	29.2	22.1	24.8
	3			19.2	16.3	23.2	20.1
	2				16.2	20	17.3
	1					14.6	8

1—A couple of times per week, 2—Once per week/A couple of times per month, 3—Once/twice per month, 4—Once per three/six months, 5—Once per six/eleven months, 6—Once per year, 7—Never.

The least frequently used sales channels were online channels such as online direct sales channels, online supermarkets and online hypermarkets. Figure 2 shows the differences in the frequency of organic fruit purchases among consumers of selected fruits.

There is a noticeable increase in the frequency of the purchase of organic fruit among consumers who buy fruit less frequently in general.

The group of consumers of apples (as the most frequently purchased fruit) had the lowest average frequency of purchase of organic fruit. Among the groups of consumers of less frequently purchased fruit, such as currants, the average frequency of purchase of organic fruit increased.

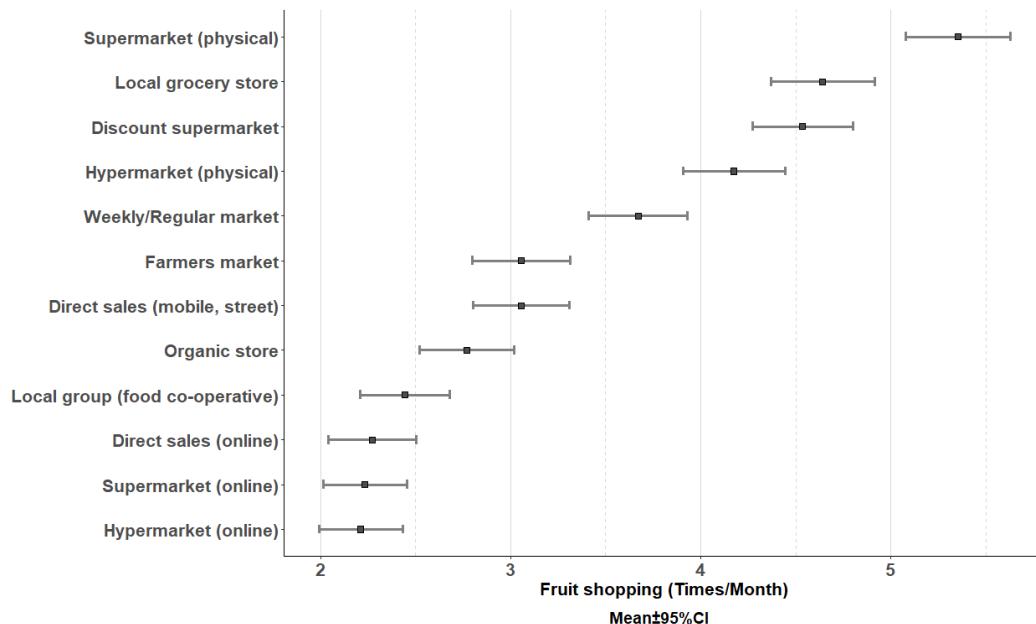


Figure 1. Monthly fruit purchase frequencies for selected sales channels.

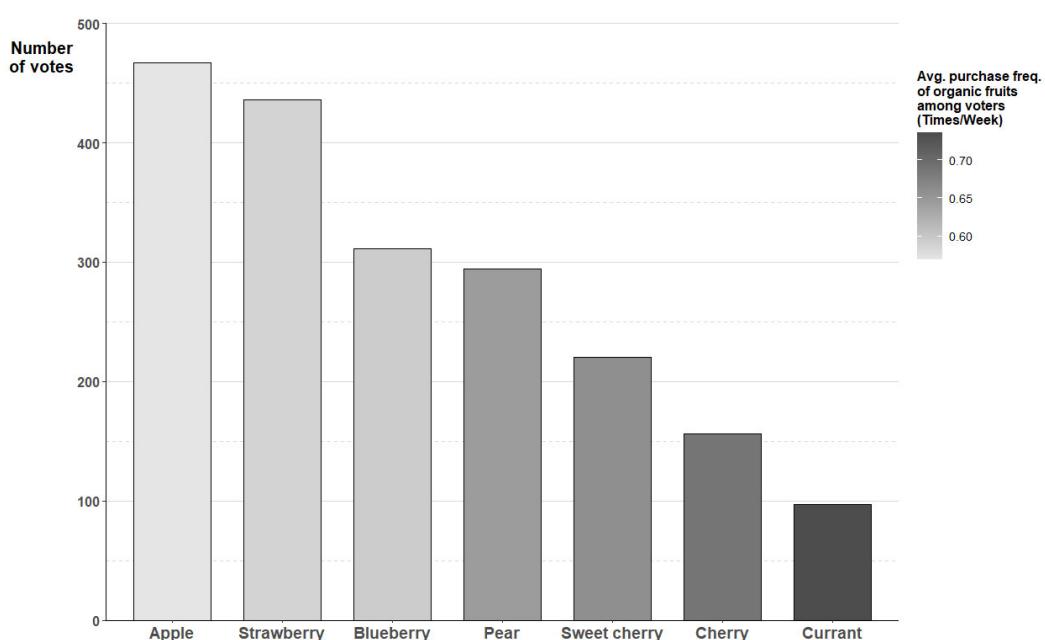


Figure 2. Frequency of purchase of selected fruit species along with the average frequency of purchase of organic fruits among the respondents.

Figure 3 graphically shows the mean prices paid per kilogram of apples, together with their 95% confidence intervals, according to the age of the respondents as well as their gender. Significant differences were found in the medians ($\chi^2 = 21.091$, $p < 0.001$, $df = 2$) between the three categories of participants. The youngest respondents (young adults (20–39 years)) paid the most for the apples and less was paid by middle-aged adults (40–

59 years) and old adults (60 years). There was no statistically significant difference between the last two age groups. These results are quite surprising, as younger respondents usually have less money at their disposal. A two-way ANOVA was used to analyse the effects of income and package size on purchase preferences for organic apples, as shown by the interaction plot in Figure 4. There was a statistically significant interaction between the effects of income and package size ($F(12, 3570) = 2.752, p < 0.001$). A simple main effects analysis showed that income ($p = 0.024$), as well as package size ($p < 0.001$), had a statistically significant effect on purchase preferences for organic apples. One-kilogram apple packs were the most preferred form of packaging among all the groups studied. The more the proposed packaging differed in size, the less it was preferred in each group (Figures 5 and 6).

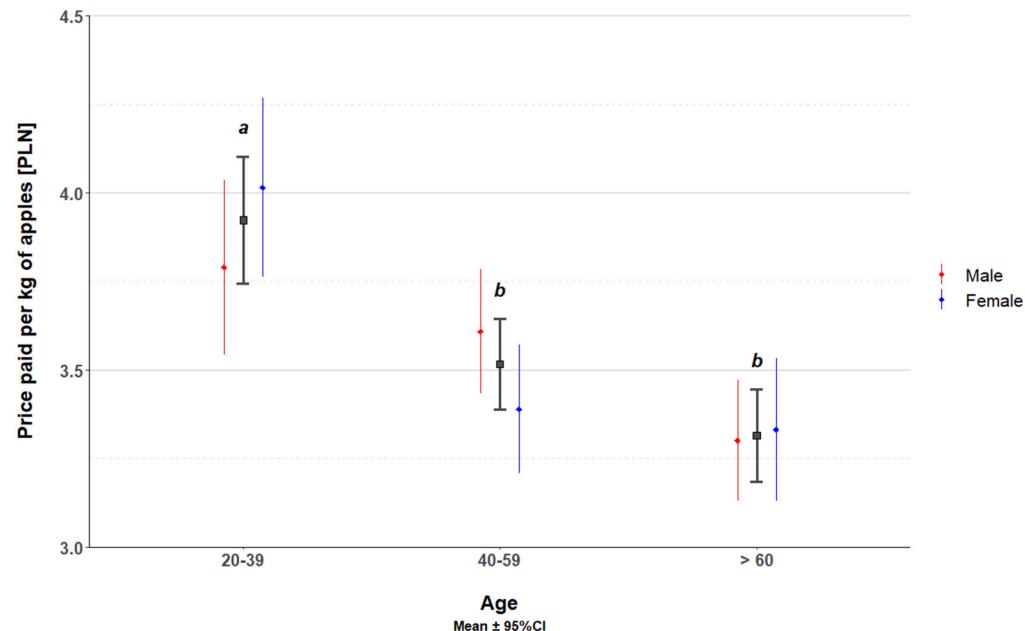


Figure 3. The impact of age on the average price paid for a kilogram of apples. Difference in letters indicate groups with statistically significant differences in medians.

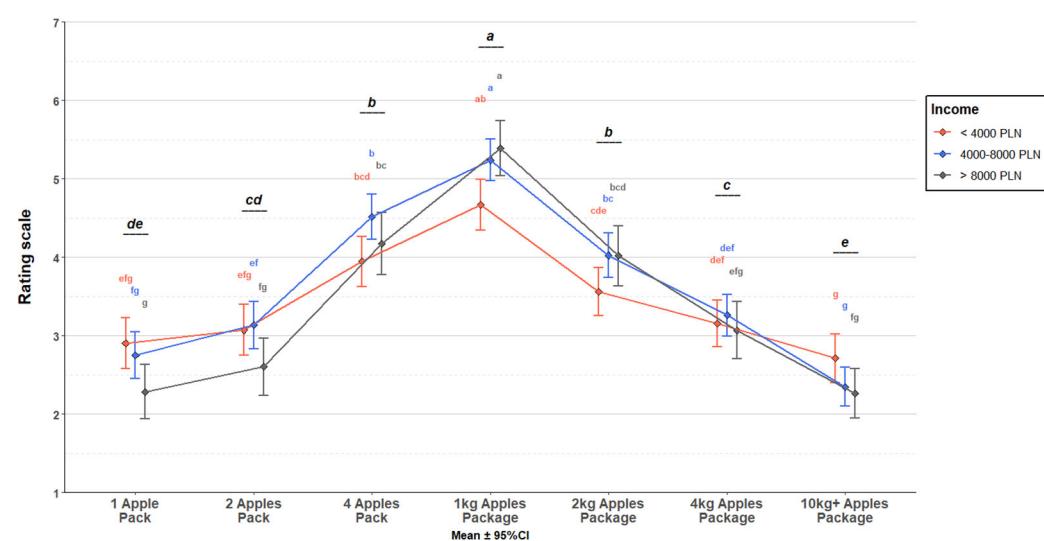


Figure 4. Interaction plot showing differences in the preference of organic apple purchasing. Small letters indicate differences between all groups. Larger letters indicate differences in mean rating between different packaging sizes.

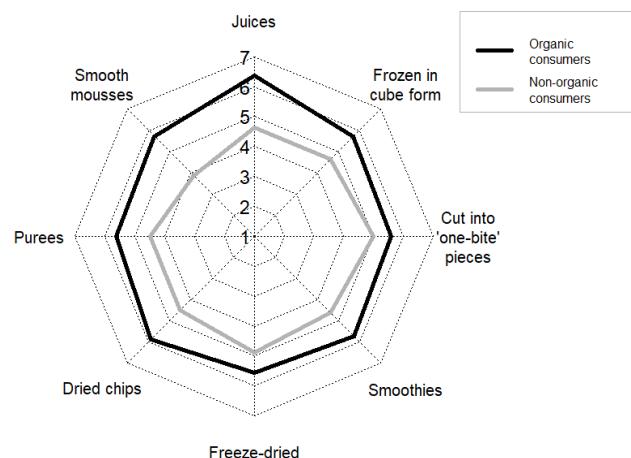


Figure 5. Preferences of organic vs. non-organic food consumers for buying different apple products.

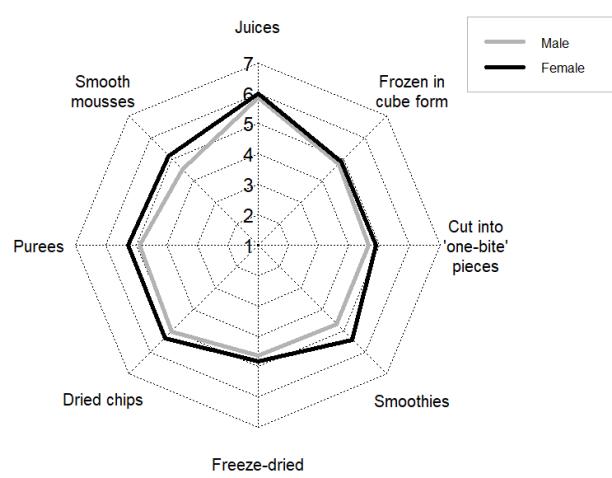


Figure 6. Women's versus men's preferences for buying different apple products.

Figure 7 shows that young respondents (20–39) most prefer a variety of apple products and the middle-aged (40–59) and the oldest (60+) the least. All of them most prefer juices, and the young almost equally prefer smoothies and smooth mousses. the same products, on the other hand, are least preferred by the oldest consumers. These results can be used to target different age groups of consumers.

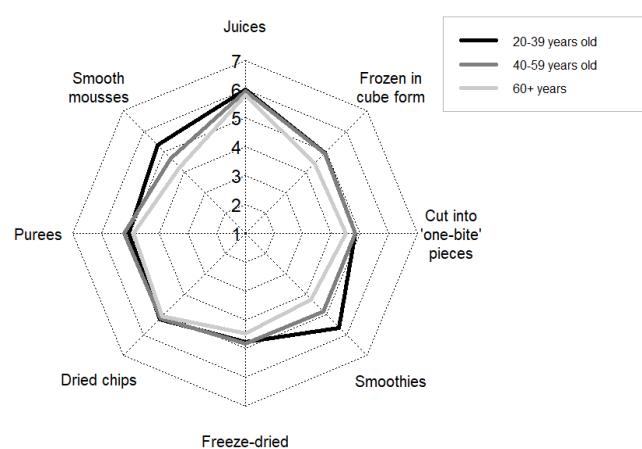


Figure 7. Preference of organic apple products according to the age of respondents.

Figure 8 shows that for the poorest respondents, a lower price for these fruits (understandable) and better packaging (less understandable) would be of the greatest importance. For the richest respondents, on the other hand, greater promotion through media and better availability would be of greatest importance. This is quite understandable. For this group, better packaging is of the least importance.

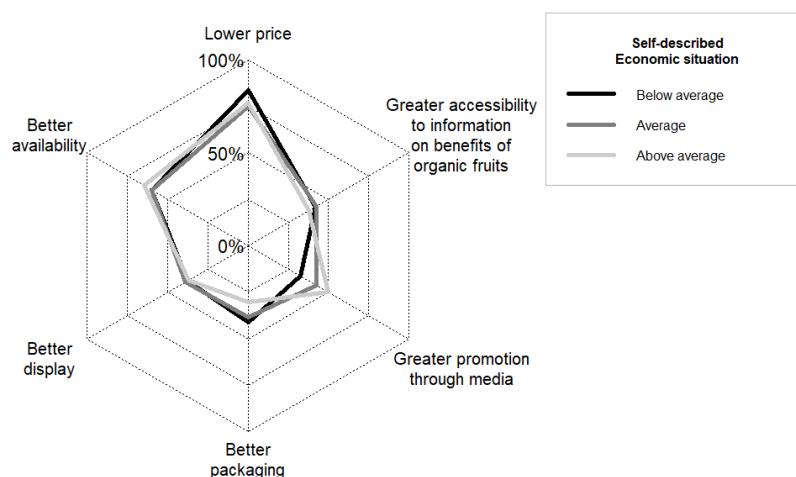


Figure 8. The relationship between the self-described economic situation and the factors that motivate more frequent purchasing of organic fruit.

For the oldest respondents, a lower price for the fruit would be of the greatest importance, and also much better packaging. For the youngest respondents, on the other hand, the opposite is true—a lower price would mean the least and better packaging the most. The middle-aged group has opinions in the middle of these two groups (Figure 9).

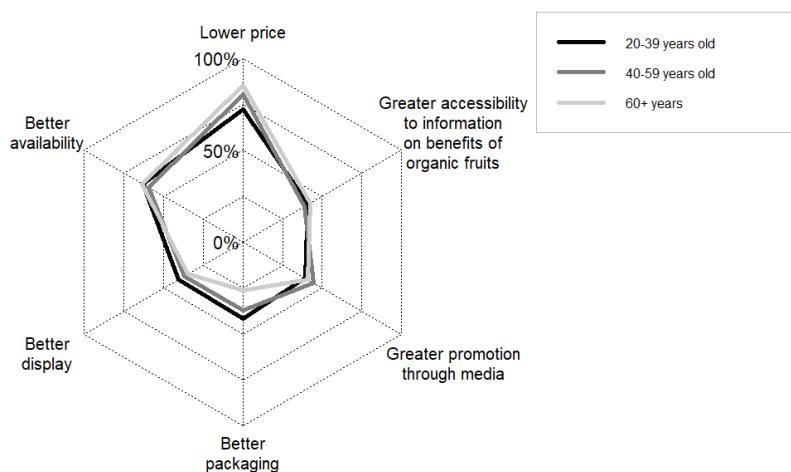


Figure 9. The relationship between the age of respondents and the factors that motivate more frequent purchasing of organic fruit.

Figure 10 shows that for organic food consumers, the most important factors motivating them to buy more organic fruit would be greater promotion in the media and better packaging. Non-organic consumers point to lower prices and better exposure as the most important factors. These differences are not surprising and show the different attitudes of the two groups of consumers toward organic fruit.

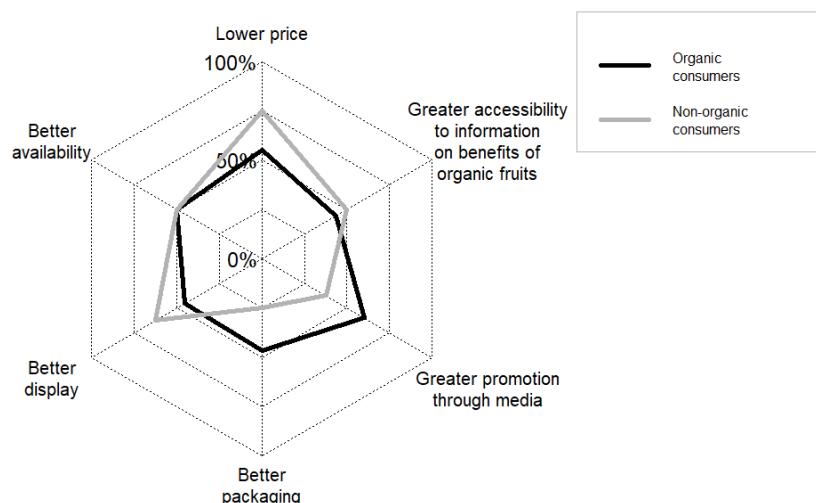


Figure 10. The relationship between the organic vs. non-organic food consumers regarding the factors that motivate more frequent purchasing of organic fruit.

4. Discussion

The purpose of this study was to analyse the purchasing behaviour and preferences of Polish consumers toward the dynamically developing but well-defined branch of the organic fruit market. This made it possible to recognise the current profile of Polish organic fruit consumers and to select aspects of organic fruit marketing that would optimise the development of this sector of organic production. Relationships between variables belonging to the group of socioeconomic and sociodemographic factors and the frequency and propensity to purchase organic fruit were also determined.

On the basis of the research previously carried out, this study initially poses three working hypotheses, which we will attempt to verify below on the basis of our findings.

The first hypothesis was that Polish consumers are willing to pay no more than 20% more for organic fruit than for conventionally produced fruit. Our results showed that 59% of respondents are willing to pay 10% more for organic apples, while 30% of respondents are willing to pay 20%. Thus, hypothesis one was confirmed in our study.

To date, very few studies have been conducted on the market characteristics of organic fruit consumers in the Polish population. The only study in Poland similar to ours was conducted by Kaczorowska et al. (2018) [58]. Data collected using the CAWI method among 286 urban residents in the Mazowieckie Voivodeship showed that 22% of apple buyers and 30% of banana consumers chose a product with the European organic production logo as the most desirable. Half of each group expressed a willingness to pay a higher price for organic produce and this was mainly a 10% increase over the price of organic apples. Respondents accepting high prices for organically certified fruit were young people aged 19–34 (49%), mostly women (69%), with at least a second-level university education (55%), declaring an average (55%) or a good or very good financial situation (37%) [58]. The results obtained in the present study were therefore consistent with those obtained by Kaczorowska et. al. (2018). The difference is that the study by Kaczorowska et al. concerned only the Mazowieckie Voivodeship and a smaller number of respondents, whereas our study concerned the whole of Poland and twice as many respondents.

Also, the study by Kułyk and Michalowska (2019), already mentioned in the Introduction, showed that an acceptable price difference is in the range of 5–10% [47].

Bryła (2018) examined the determinants of Poles' willingness to pay a higher price for organic food compared to conventional products but without going into specific product groups [59]. In a multiple regression model, the author found that the willingness to pay a higher price for organic food products increases with: (1) household size; (2) belief in the higher quality of organic products; (3) acceptance of the higher price of organic

products; (4) being guided by quality labels; (5) attaching importance to the universality of organic products; (6) purchasing organic food over the Internet; (7) regional ethnocentrism in the organic food market; and (8) frequency of purchasing organic food products abroad. In contrast, it decreases as the importance of price as an attribute of food products increases. According to the report on organic farming in Poland by Źakowska-Biemans (2022), price remains the main barrier to purchasing organic food. However, a significant proportion of consumers are willing to spend more on organic fruit and vegetables (69%), eggs (54%), meat (49%) and dairy products (45%) [24].

In contrast, a study by Pawlak et al. concerned retailers' opinions on the prospects for selling organic fruit and vegetables in Lublin (south-eastern Poland) [60]. More than half of the retailers believed that sales of organic fruit and vegetables in Lublin should increase in the next few years. The most important determinants of this growth were considered by the respondents to be a reduction in the prices of these products and the expansion of campaigns promoting organic food. As the main reason for not extending the assortment of shops with domestic organic fruit and vegetables, the retailers surveyed pointed to the limited availability of the offered items from suppliers. Other reasons were the high prices of these raw materials and the lack of space at the back of the shop to store them. The present study sheds some new light on the issue of the low availability of organic fruit in Polish shops, but it concerns only one city in Poland, so it is difficult to draw far-reaching conclusions.

Our second hypothesis states that the biggest barrier for all consumers is the price of organic fruit. Our results showed that this is not an entirely true statement. We showed that the lower price of organic fruit would be the biggest incentive for older consumers (60+), those with the weakest economic condition (below average) and consumers who do not buy organic food (non-organic consumers). In contrast, for consumers who are relatively well-off, young (20–39 years old) and who regularly buy organic food, a lower price would not be the greatest motivation to buy organic fruit. Such a motivation for them would be greater promotion in the media, organic (better) packaging and greater availability of organic fruit in shops, as well as better display. Thus, hypothesis two was only partially confirmed by us.

The price difference between organic and conventional fruit is one of the main obstacles to the spread of this type of product worldwide, as confirmed in this study and those by other researchers [61,62]. The results of the study presented here clearly indicate the growing reluctance of consumers to accept increasing price differences. Most respondents indicated the possibility of paying 10% more ($n = 303$) and 20% more ($n = 154$) compared to market prices. The general acceptance of price increases for organic apples differs by around 20% compared to conventional apples. The price gap has also been confirmed in other studies [48]. In a Chilean study by Cerda et al. 2012, the Fuji variety, organic production methods, the apples being sweet and the lowest price were the apple attributes that led consumers to purchase apples. However, price and variety were much more important for consumer choice and behaviour than the production method and taste. Nevertheless, a positive willingness to pay an extra 20–30% (CLP 130) for a kilo of organic apples and a greater preference for organically produced apples over conventional apples was shown [63]. This seems reasonable and justifiable on the part of consumers but poses a challenge for agricultural producers.

Our third hypothesis states that the most frequent buyers of organic fruit are wealthier households with a small number of people and those with a higher number of people under 18 years of age. Our results showed that a higher self-assessment of economic situation and a higher total household income had a significant positive effect on the willingness to purchase organic fruit. A trend towards increased frequency of organic fruit purchases was also observed among households characterised by a higher number of members—both overall and under 18 years of age. Thus, hypothesis three was confirmed.

The total number of people in the household, along with the number of minors alone, were found to be significant factors ($p < 0.05$) in relation to the frequency of buying organic

fruit. The same relationship with respect to organic products in general has been confirmed several times [46,64,65]. This is justified parents' concerns for the health of their children and their desire to install good eating habits in them. As can be seen, this is a strong motivation that partially offsets the importance of the family's weaker financial status.

These results, confirmed to a large extent in other studies [46,66,67], were used to select the forms of organic fruit packaging that are the most desirable among specified groups of different economic statuses. The selected package size containing 1 kg of apples proved to be the most desirable across consumer groups of all economic status categories. Guided also by additional comments included by respondents, organic apple packaging of the previously indicated size, consisting of materials that exclude synthetic materials, would be in the highest possible demand.

In addition to the lowering of the price of organic fruit, an important aspect that could affect their purchase among consumers of non-organic fruit was found to be the better display of these products in stores. The availability and display of organic products in stores is a commonly examined issue in studies devoted to this topic and was also indicated by consumers as a frequent reason that constitutes a barrier to their purchase of organic products [29]. Consumers of non-organic fruit, as a potential group that could constitute new consumers in this case, are the main group on which activities that could expand the market for organic fruit should be focused. Thus, given the increasing appearance of clearly demarcated sections of organic products in stores, it would be reasonable to try to display organic unprocessed products, such as raw fruits together with conventional products, with clearly visible information about the difference in the origin of these products. Such a move could increase the chances of buying organic fruit by people who do not visit sections devoted to these products. In particular, given the demonstrated highest frequency of fruit purchases in supermarkets, which is also confirmed by other works examining the most frequent places to buy organic food [68–70], the implementation of this concept in these stores could help increase the development of this particular branch of organic production.

It should be emphasized that awakening the interest of this group of consumers who do not buy organic food is both very necessary and very difficult. Consumer awareness is growing slowly not only in Poland. A study by Espinosa-Brisset et al. [71] shows that even in France, where consumers show relatively high interest in organic food, locally produced and minimally processed products are preferred over organic products. Similarly, Hempel and Hamm [72] showed in Germany that consumers were more willing to pay higher prices for local food than for organic food. Also, in a survey of the Danish population, Denver and Jensen (2014) found that respondents who perceive the benefits of organic products have relatively high preferences for both organic and locally produced apples. In contrast, respondents who perceive benefits from locally produced products have high preferences for Danish and locally produced apples but not for organic apples [73]. This is probably due to the fact that consumers have very little knowledge of the composition of organic food and the dangers of consuming pesticide residues and other chemicals.

The contribution of a wide range of demographic and economic factors in determining the purchase behaviour and preferences for organic products sometimes yields controversial results based on the literature. The sometimes indicated increased preference of women to buy organic products [61,74] is not reflected in some studies [75] that analyse gender as a factor shaping the buying behaviour and preferences for organic products. This was also the case in this study. However, despite the lack of significant results, there was an apparent greater preference among women for all proposed forms of organic fruit consumption. In this case, it is likely that an existing but small effect may explain the inconclusive results. Nevertheless, it is worth taking into account when adapting innovative changes to the needs of specific consumer groups.

5. Conclusions, Limitations and Recommendations

It is important to note the limitations of our survey. It was conducted on a population of about 500 people in Poland, selected in a representative manner. However, it would be worth repeating the survey on a larger population in the future to confirm or deny the first results.

The presented research fills a gap in the analysis of Polish consumers' opinions on the organic fruit with a particular focus on apples. The analysis of the available literature presented both in the Introduction and in the Discussion indicates that there has been no such research in Poland to date. The research to date has generally focused on consumer preferences toward organic food without taking into account the different types of organic food.

Surely, therefore, future lines of research should firstly address consumer preferences in relation to different product groups, above all fruit and vegetables as very important products for health. Secondly, quantitative research should cover a larger group of producers than has been the case so far, i.e., at least 1000 people, who constitute a representative group for the Polish population. Thirdly, it is additionally worth deepening the research with a qualitative aspect, by conducting in-depth individual interviews in person or by telephone. Such research should include experts from the organic food industry, distributors and consumers of organic food, as well as decision makers responsible for promoting organic food.

In this way, it will be possible to get an answer to the question of what factors may lead to the more frequent purchase and consumption of particular product groups of organic food. It will also be possible to better understand consumers' motivations in deciding to buy these and not other product groups. All this will allow for better marketing strategies and more effective management of the organic market in Poland.

It is important to meet consumer expectations. In the case of apples—because they were analysed in the survey—the most preferred assortment should be offered, i.e., juices, smoothies and apple chips, as well as 1 kg packages in the case of fresh apples. For organic fruit, it is worth targeting the retail outlets where customers are most likely to buy it, namely physical supermarkets, local grocery stores and discount stores.

Finally, it is worth paying attention to the expectations of younger, more affluent customers and those interested in organic food. The findings described lead to specific recommendations for managers and staff of retail outlets offering organic apples. Shops should widely introduce the range of organic apples—currently they are hardly available on the market and only in selected retail outlets. Organic apples should be displayed on shop shelves with labels that are clear from a distance, preferably in colour, with the word ORG and bearing the European organic production logo. Near the location of these apples, there should be a plate with information on the organic production method, variety and nutritional value of the fruit. Apples should be packaged in 1 kg cardboard boxes, as this is the packaging preferred by consumers. The described changes would meet the expectations of consumers especially interested in organic fruit, i.e., younger, wealthier and better educated. On the other hand, it should be recommended that retail outlets sign contracts with Polish organic apple producers, which would reduce the price of this product in the store. In doing so, it is important that these are local producers. The conclusions described above are a solid recommendation for producers, distributors and traders. The authors will forward these recommendations to, among others, the Polish Chamber of Organic Food and the EKOOWOC association, which brings together 20 organic fruit growers located about 70 km from Warsaw.

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