Published by the University "St. Kliment Ohridski" – Bitola

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Original research article
DOI: 10.20544/AISC.1.1.25.P09

#UKLO Annual International Scientific Conference 2024

DIETARY HABITS OF DIFFERENT CONSUMER CATEGORIES REGARDING THE CONSUMPTION OF FUNCTIONAL FOOD

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Abstract

The aim of this paper is to study consumer dietary habits regarding the consumption of functional foods, with a particular focus on functional dairy products as one of the elements of sustainable development. Functional foods, enriched with additional nutritional components (probiotics, antioxidants, vitamins), positively influence human health and well-being, the preservation and stability of biodiversity, climate change, and environmental protection.

The research was conducted on 373 respondents who varied by gender, age, and educational level. They answered an anonymous questionnaire consisting of 48 questions regarding the demographic characteristics of the respondent, the frequency, and habits of consuming functional dairy products. The questionnaire was created using Google Forms and distributed electronically. For statistical processing and analysis of the data, tools from Microsoft Office Excel and SPSS 21 statistical software were used.According to the results, women prefer functional food more frequently than men (4.5 vs. 4.1 points). By age: the category of individuals aged 14-18 years are the most frequent consumers of functional food (4.7 points); those aged 19-34 years consume it the least (4.11 points), while among individuals aged 35-50 years and over 51 years, no significant differences were observed, with an average of 4.2 points (on a scale of 1-6).

Regarding education level, respondents with higher education consume functional food more than those with secondary education (4.36 vs. 4 points).From the results obtained, it can be concluded that dietary habits and the consumption of functional foods differ among various categories of respondents, depending on their demographic characteristics, but an upward trend in the consumption of functional dairy products is expected with the application of ecological and economically sustainable practices.

Keywords: functional food, bioactive components, functional dairy products, nutrition, health.

INTRODUCTION

Human nutrition is a crucial and essential element for survival. Food serves to sustain life, promote growth and development, regenerate body tissues, and perform all bodily activities. The primary nutrients (proteins, carbohydrates, fats, vitamins, minerals, and trace elements) required by humans are obtained from food (Barley, 2015). There is increasing consumer interest in the connection between diet and health, with the ultimate goal of improving overall health and physical condition. The concept of functional food includes food that provides greater health benefits than ordinary food (Domiter, 2019). Functional food can deliver expected effects only if the body properly utilizes the bioactive and nutritional components, which means it should be consumed in amounts consistent with normal dietary intake (Balorda, 2018). Incorporating bioactive components with proven beneficial effects on one or more functions of the body results in the development of new products with specific composition and physiological effects, forming the basis for the production of functional foods (Miletić et al., 2008). Animal-based foods contain functional ingredients such as whey proteins, calcium, bioactive peptides, and conjugated linoleic acid from meat, fatty acids from fish, sphingolipids from eggs, probiotics from dairy products, all of which have beneficial effects on health. Due to their nutritional composition and chemical characteristics, animal-based foods are suitable for incorporating bioactive molecules (Martins et al., 2018). The production of functional food from animal sources has been steadily increasing. Various products are available on the market, such as meat and egg products enriched with omega-3 fatty acids and probiotic fermented dairy products, which are well-received by consumers (Kalevska et al., 2020). The dairy industry faces numerous challenges within the technological process for developing high-quality, efficient, nutritious (healthy), tasty, and new products (Bröring, 2005; Bröring et al., 2006). In the era of industrialization, fermented dairy products have become more diverse, incorporating probiotics, prebiotics, omega-3 fatty acids, phytosterols, bioactive peptides, vitamins, minerals, fruits, extracts, flavoring agents, and others (Ozer & Kirmaci, 2010).

1. FUNCTIONAL DAIRY PRODUCTS

The design of functional fermented dairy products involves enriching or modifying their natural base with probiotic cultures. By incorporating probiotic microorganisms into starter cultures, new types of fermented products are created, which exhibit numerous preventive and/or therapeutic properties (Kalevska et al., 2020). The nutritional value depends on the composition of the raw materials, the microbial culture, and the changes that occur during production, especially during fermentation (Tratnik & Božanić, 2012). The most commonly used probiotic cultures are strains from two main genera: *Lactobacillus spp.* and *Bifidobacterium spp.* Each of these should always be present in balance with other starter cultures to produce various lactic acid dairy products (Foulquié et al., 2006; Parvez et al.,

2006; Granato et al., 2010). When prebiotics are used in combination with probiotics, the term "synbiotics" is used (Amiri et al., 2010), and the number of beneficial bacteria in the digestive system increases severalfold (Lenaerts, 2020). The main reason for using synbiotics is that each probiotic, without its prebiotic, is not capable of surviving in the digestive system. Without the necessary food source, probiotics are more sensitive to acid, low pH values, and temperature (Kalevska et al., 2020).

The most commonly consumed functional dairy products include: yogurt, which, according to Domiter (2019), is traditionally consumed in many countries around the world and is considered a rich nutritional food. By using probiotic cultures, bio-yogurt or probiotic yogurt is produced (Ozden, 2008), which is believed to have numerous positive effects on health through the microbial cultures that directly or indirectly, through their metabolites, act on the gut microbiota (Košičiarová et al., 2017) and also facilitate digestion (Tewari et al., 2019). Kefir is a fermented liquid beverage that resembles yogurt and has a distinct sour taste (Yerlikaya, 2014). Due to its rich nutritional content and probiotics (which balance the gastrointestinal system), kefir has become very popular worldwide and is produced in many countries (Otles & Cagind, 2003). The fermentation is carried out by a special kefir culture, which is a combination of bacteria and yeast (Iličić, 2010). Its health benefits are attributed to the proteins, vitamins, antioxidants, minerals, and certain bioactive compounds present in kefir grains (Hatmal et al., 2018). Cheese is one of the most valued food products, rich in beneficial proteins, minerals, vitamins, and enzymes (Tewari et al., 2019). Its low lactose content and high micronutrient content make cheese an ideal food (Tratnik & Božanić, 2012). Whey is a component of milk formed as a by-product during cheese production in the dairy industry (Solak & Akin, 2012). It is considered a therapeutic beverage because it is rich in high-quality proteins, lactic acid, enzymes, vitamins (B6, B2, B12, K, C), minerals (potassium, calcium, magnesium, phosphorus), amino acids, and it also has a low caloric value (Solak & Akin, 2012).

1.1. Aims of the Research

The aim of this study is to analyze and determine the dietary habits of different categories of respondents regarding the consumption of functional foods, with a particular focus on functional dairy products, as the most common food group that includes bioactive ingredients for functional purposes (Menrad, 2003). The research explores the differences that may arise due to factors such as gender, age, and level of education. Based on the results of the study, appropriate recommendations can be provided for the prevention and improvement of health, which could be used to create a more successful strategy for promoting functional food. This, in turn, would raise consumer awareness of the connection between diet and health, encouraging a greater inclusion of functional dairy products in daily nutrition, potentially leading to a new approach for the development of dairy products with functional characteristics.

1.2. Materials and Methods

To assess the general characteristics of purchasing behavior and consumption habits regarding functional foods, with a particular focus on functional dairy products, as well as the dietary habits of respondents, an anonymous questionnaire consisting of 48 questions was developed. This questionnaire aimed to determine how often respondents consume certain food products, such as fruits and vegetables, milk and dairy products, fish, eggs, cereals, and others. The questionnaire was distributed electronically (via Google Forms) to targeted groups by e-mail. A total of 373 individuals participated in the survey, of which 51% were women and 49% were men, meaning the sample was balanced in terms of gender.

Regarding age, the most represented age group was 35 to 50 years, comprising 49% of the respondents. This was followed by the group aged 14 to 18 years (21%), 51 to 66 years (20%), and finally the 19 to 34 years age group, which accounted for approximately 11% of the total sample.

Approximately 82% of the respondents had completed higher education, while the remaining 18% had completed secondary education.

For the statistical processing and analysis of the data, the tools used included Microsoft Office Excel, SPSS 21 statistical software, and ANOVA tests. The questionnaire was qualitative in nature, and the dietary habits were derived as averages from the responses to the questions about how often respondents consume: milk and dairy products, fish, eggs, fruits, vegetables, cereals, teas, vitamin-fortified juices, olive oil, vitamin/mineral-enriched cookies, omega-3 or vitamin D-enriched margarine, and butter with reduced fat (cholesterol).

In relation to the consumption of functional dairy products, the following questions were asked:How often do you consume milk, fermented dairy products, fermented probiotic dairy drinks with added fruit, cereals, nuts, honey, cocoa, etc,whey, cheese?

1.3.RESULTS AND DISCUSSION

The quality of human health is greatly influenced by dietary habits. In this context, over 80% of the respondents agree with the statement that "*diet greatly affects health."* When asked *whether they eat healthily*, slightly over 23% of the respondents answered positively, while 60% indicated that they somewhat pay attention to their diet. Around 87% reported consuming a varied diet, and about 82% engage in physical activity (walking, brisk walking, running) for 30 to 60 minutes per day. For 53% of the respondents, *the taste of food is the most significant factor* influencing their decision when purchasing food products.

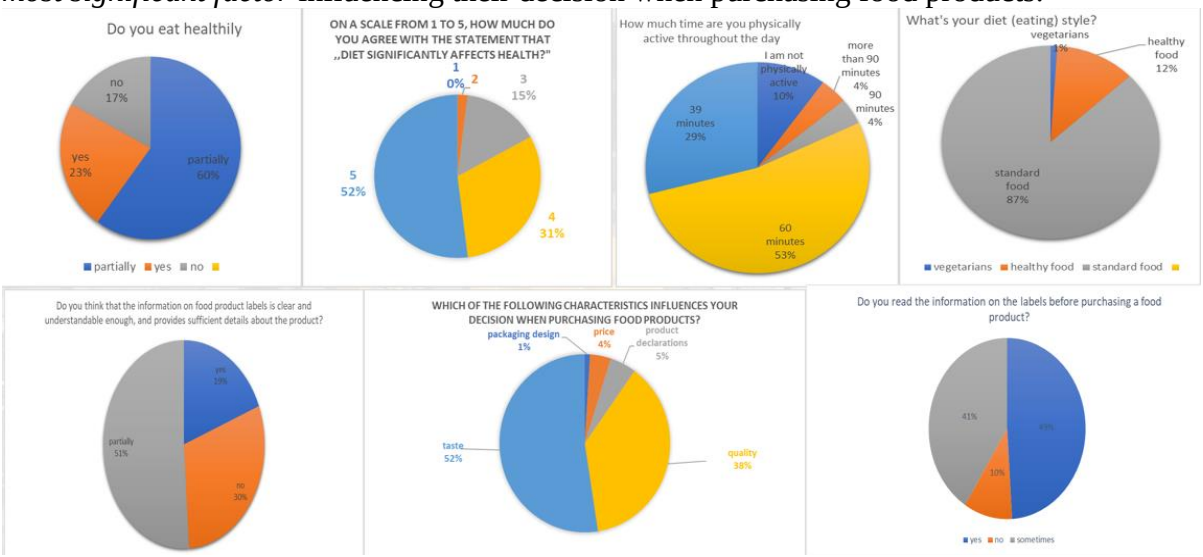

Figure 1. Respondents' habits (Source: author's analysis)

Table 1. Distribution of responses regarding how often respondents consume the listed products (in % of the total number of respondents) (Source: Calculation by the author)

Product	Don't consume	Less than once every 3 months	At least once every 3 months	At least once every 3 days	At least once a week	Every day	Did not answer
Milk and dairy products	5	0	7.3	18.7	12	56.5	0.5
Fish	11.3	0.8	27.7	1	49.7	0.5	9
Eggs	1.3	0	5.6	21.6	24.3	40.2	7

Fruits	0	0	0	19	0	74	7
Vegetables	0	0	0	41	0.7	52.5	5.8
Grains	14.5	0	5.5	16.5	20.7	36.3	6.5
Teas	15.7	0	8.8	21	10.5	36.3	7.7
Juices enriched with vitamins	15.1	0.3	24.3	18.6	3	29.3	9.4
Olive oil	4.8	0	5	15.7	11.6	56.1	6.8
Biscuits enriched with vitamins/minerals	32.5	0.2	19.3	5	15	20.7	7.3
Margarine enriched with omega-3 or vitamin D	38.3	0.3	20.1	8.8	22.4	1.8	8.3
Butter with reduced fats (cholesterol)	40.2	0	8.3	8.8	31.3	1	10.4

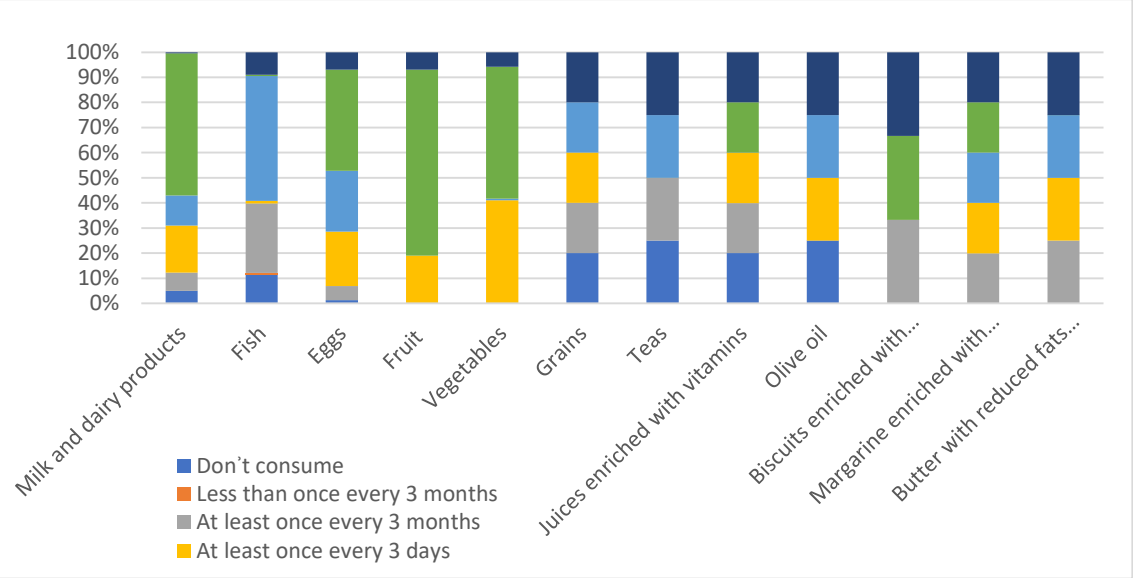

Figure 2. Distribution of responses regarding how often respondents consume the listed products (in % of the total number of respondents)(Source: Calculation by the author)

Gender, as a demographic characteristic, is a natural factor that leads to many differences between men and women in various aspects of daily life, including dietary habits. According to the statistical analysis conducted, women's dietary habits, on a scale of 1 to 6 points, have an average score of approximately 4.5 points, with a standard deviation of nearly 0.44 points. In contrast, men's dietary habits average slightly above 4.1 points, with a standard deviation just above 0.6 points. This indicates that women generally report better dietary habits than men, although there is more variation in the responses from men.

Table 2. Eating habits by gender(Source: Calculation by the author)

Gender	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
Female	190	4.5162	.43710	4.4537	4.5788	3.50	5.42
Male	183	4.0701	.60757	3.9815	4.1587	3.00	5.58
Total	373	4.2974	.57231	4.2391	4.3556	3.00	5.58

To further explore the structure of dietary habits, an ANOVA test was conducted, analyzing each product group individually (Table 3). The results indicate that there are statistically significant differences between men and women in the frequency of consumption of the listed types of food products (the calculated F statistic is high, and the corresponding p-values are below 0.05), with the exception of vegetables, where the average score for both men and women is around 5.5.

In relation to other food products, women, on average, consume milk and dairy products, eggs, fruit, tea, olive oil, vitamin/mineral-enriched cookies, and omega-3 or vitamin D-enriched margarine more frequently. On the other hand, men, on average, consume fish, cereals, vitamin-enriched juices, and butter with reduced fat (cholesterol) more frequently.

Table 3. ANOVA test for eating habits by gender, individually by product group (Source: Calculation by the author)

Product group	Gender	N	Average	Standard Deviation	F	P-value"
Milk and dairy products	F	190	5.57	.79	49.69	.000
	M	183	4.68	1.54		
Fish	F	190	3.18	1.21	9.01	.003
	M	183	3.50	.75		
Eggs	F	190	5.68	.51	234.65	.000
	M	183	4.54	.88		
Fruits	F	190	5.99	.10	119.25	.000
	M	183	5.59	.49		
Vegetables	F	190	5.54	.50	0.24	.622
	M	183	5.56	.52		
Grains	F	190	5.17	1.06	88.46	.000
	M	183	3.67	1.93		
Teas	F	190	4.90	1.12	30.17	.000
	M	183	3.91	2.20		
Juices enriched with vitamins	F	190	3.61	1.72	30.71	.000
	M	183	4.61	1.77		
Olive oil	F	190	5.45	1.03	20.08	.000
	M	183	4.85	1.52		
Biscuits enriched with	F	190	3.62	2.07	16.12	.000

vitamins/minerals	M	183	2.83	1.70		
Margarine enriched with omega-3 or vitamin D	F	190	3.12	1.31	37.52	.000
	M	183	2.18	1.63		
Butter with reduced fats (cholesterol)	F	190	2.37	1.50	11.71	.001
	M	183	2.93	1.63		

Age is another important demographic factor that plays a significant role in the differences observed in people's dietary habits. According to the results of the analysis, young minors (ages 14-18) most frequently consume the listed food products, with an average score of 4.7 points and a standard deviation of 0.33 points.
In contrast, individuals aged 19 to 34 years are the least frequent consumers of the listed food products, with an average score of 4.11 points and a standard deviation of 0.61 points. Those aged 35 to 50 years, as well as individuals over 51 years old, have an average consumption frequency of approximately 4.2 points.

Table 4: Eating habits by age group (Source: Calculation by the author)

Age (years)	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
14-18	79	4.7447	.32967	4.6709	4.8186	3.17	5.17
19-34	40	4.1104	.61074	3.9151	4.3057	3.25	5.17
35-50	181	4.1842	.51565	4.1085	4.2598	3.00	5.42
51-66	73	4.1963	.65283	4.0440	4.3487	3.42	5.58
Total	373	4.2974	.57231	4.2391	4.3556	3.00	5.58

As with gender, an ANOVA test was conducted to determine differences in the frequency of consumption of the listed food products based on the age group of the respondents. The results were analyzed individually for each product group, and the outcomes can be seen in the following table:

Table 5: ANOVA test for eating habits by age, individually by product group (Source: Calculation by the author)

Product group	Age (years)	N	Average	Standard Deviation	F	P-value"
Milk and dairy products	14-18	79	5.90	.469	20.92	.000
	19-34	40	5.33	.997		
	35-50	181	5.07	1.126		
	51-66	73	4.37	1.867		
Fish	14-18	79	3.61	.564	8.19	.000
	19-34	40	3.43	.813		
	35-50	181	3.08	1.201		
	51-66	73	3.63	.842		

Eggs	14-18	79	5.90	.441	45.58	.000
	19-34	40	4.88	.939		
	35-50	181	5.11	.881		
	51-66	73	4.44	.726		
Fruits	14-18	79	5.99	.113	25.73	.000
	19-34	40	5.78	.423		
	35-50	181	5.84	.368		
	51-66	73	5.48	.503		
Vegetables	14-18	79	5.59	.494	2.34	.073
	19-34	40	5.70	.564		
	35-50	181	5.54	.500		
	51-66	73	5.45	.501		
Grains (cereals)	14-18	79	5.57	.710	38.51	.00
	19-34	40	4.50	1.633		
	35-50	181	4.52	1.504		
	51-66	73	2.96	1.996		
Teas	14-18	79	5.42	.914	16.90	.00
	19-34	40	4.58	1.738		
	35-50	181	4.32	1.622		
	51-66	73	3.48	2.375		
Juices enriched with vitamins	14-18	79	4.58	1.524	18.22	.00
	19-34	40	4.18	1.448		
	35-50	181	3.48	1.834		
	51-66	73	5.07	1.653		
Olive oil	14-18	79	5.97	.158	24.93	.00
	19-34	40	4.08	1.900		
	35-50	181	4.95	1.367		
	51-66	73	5.36	.948		
Biscuits enriched with vitamins/minerals	14-18	79	3.80	2.436	5.20	.002
	19-34	40	3.08	2.153		
	35-50	181	2.88	1.753		
	51-66	73	3.56	1.424		
Margarine enriched with omega-3 or vitamin D	14-18	79	2.44	1.318	5.57	.001
	19-34	40	1.88	1.181		
	35-50	181	2.80	1.470		
	51-66	73	2.96	1.940		
Butter with reduced fats (cholesterol)	14-18	79	2.16	1.506	15.41	.000
	19-34	40	1.95	1.431		
	35-50	181	2.62	1.589		
	51-66	73	3.60	1.310		

When discussing dietary habits, another important aspect is the level of education of individuals. According to the results from the statistical analysis, it is confirmed that individuals with a higher level of education, on average, tend to have better dietary habits. The frequency of consumption of the listed food items can be seen in the following table:

Table 6: Eating habits by level of education (Source: Calculation by the author)

Education	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
High school	66	4.0240	.69087	3.8542	4.1938	3.00	5.58
Faculty	307	4.3561	.52651	4.2970	4.4153	3.25	5.58
Total	373	4.2974	.57231	4.2391	4.3556	3.00	5.58

Additionally, when observing the consumption frequency by product group at a significance level of 0.05, it can be concluded that individuals with higher education generally consume more milk and dairy products, eggs, fruit, cereals, and tea. In contrast, individuals with secondary education tend to consume more vitamin-enriched juices and butter with reduced fat (cholesterol).

For products such as fish, vegetables, olive oil, vitamin/mineral-enriched cookies, and omega-3 or vitamin D-enriched margarine, there is no significant difference in the frequency of consumption between individuals with higher education and those with secondary education.

Table 7: ANOVA test for eating habits by level of education, individually by product group (Source: Calculation by the author)

Product group	Education	N	Average	Standard Deviation	F	P-value"
Milk and dairy products	High	66	4.36	1.145	30.76	.000
	Faculty	307	5.30	1.269		
Fish	High	66	3.52	.916	2.44	.119
	Faculty	307	3.30	1.036		
Eggs	High	66	4.29	.696	80.60	.000
	Faculty	307	5.30	.856		
Fruits	High	66	5.47	.503	59.22	.000
	Faculty	307	5.86	.344		
A vegetables	High	66	5.48	.504	1.30	.255
	Faculty	307	5.56	.510		
Grains (cereals)	High	66	3.17	1.768	49.25	.000
	Faculty	307	4.71	1.584		
Teas	High	66	3.35	2.304	30.32	.000
	Faculty	307	4.64	1.589		
Juices enriched with vitamins	High	66	4.83	1.861	13.70	.000
	Faculty	307	3.94	1.766		
Olive oil	High	66	4.97	1.109	1.53	.217
	Faculty	307	5.19	1.367		
Biscuits enriched with vitamins/minerals	High	66	3.05	1.723	0.71	.400
	Faculty	307	3.27	1.984		
Margarine enriched with omega-3 or vitamin D	High	66	2.35	1.835	3.21	.074
	Faculty	307	2.72	1.470		
Butter with reduced fats (cholesterol)	High	66	3.45	1.590	21.92	.000
	Faculty	307	2.47	1.537		

From the perspective of the frequency of consumption of certain functional dairy products, the results indicate that the respondents are not sufficiently informed about the nutritional value and health benefits of consuming them. (Table 8)

Table 8:Distribution of responses regarding how often respondents consume the listed products (in % of the total number of respondents) (Source: Calculation by the author)

Product	Never	Rarely	2-3 times a month	1-2 times a week	Every day
Milk	0.3	33.8	13.1	24.9	27.9
Fermented dairy products	1.3	11	10.2	56.6	20.9
Fermented probiotic dairy beverages with added fruit, grains, nuts, honey, cocoa, etc.	4.6	14.2	10.7	46.4	24.1
Whey	39.4	28.2	16.4	16	0
Cheese	0.8	4.3	5.9	51.7	37.3

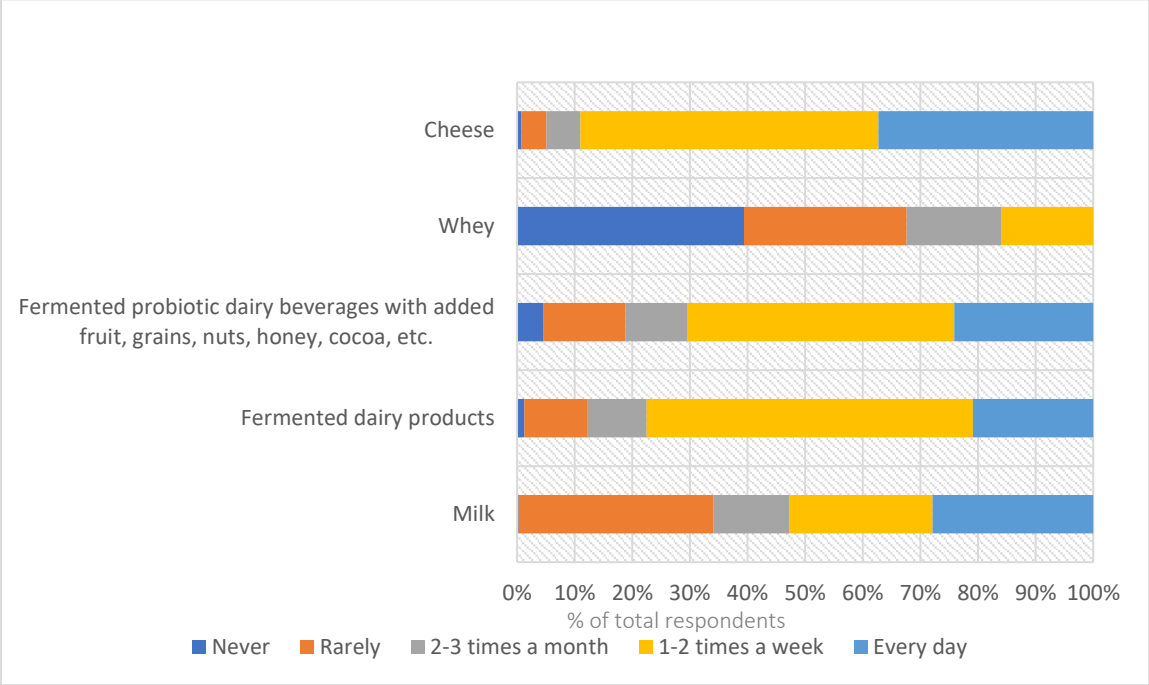

Figure 3. Distribution of responses regarding how often respondents consume the listed products (in % of the total number of respondents) (Source: Calculation by the author)

According to gender as a demographic factor, the results show that women, on average, consume functional dairy products more frequently than men. Specifically, women score an average of 3.53 points for the frequency of consumption, while men score an average of 3.39 points.

Table 9: Consumption of functional dairy products by gender (Source: Calculation by the author)

Gender	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
Female	190	3.5305	.50502	3.4583	3.6028	2.20	4.60
Male	183	3.3945	.45036	3.3288	3.4602	2.00	4.40
Total	373	3.4638	.48316	3.4146	3.5130	2.00	4.60

The consumption of functional dairy products can also be influenced by age as a demographic factor. According to the results obtained, younger respondents under the age of 35 consume functional dairy products less frequently than those over the age of 35.

Table 10: Consumption of functional dairy products by age (Source: Calculation by the author)

Age (years)	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
14-18	79	3.3316	.40495	3.2409	3.4223	2.00	4.20
19-34	40	3.2950	.49611	3.1363	3.4537	2.40	4.20
35-50	181	3.5503	.52107	3.4739	3.6267	2.20	4.60
51-66	73	3.4849	.40265	3.3910	3.5789	2.40	4.40
Total	373	3.4638	.48316	3.4146	3.5130	2.00	4.60

According to the level of education, the conducted analysis shows that the consumption of functional dairy products among individuals with a completed secondary education averages 3.3 points, while among those with a completed higher education, this indicator averages around 3.5 points. The degree of variability is approximately the same for both groups, with a standard deviation just below 0.5 points.

Table 10: Consumption of functional dairy products by level of education (Source: Calculation by the author)

Education	N	Average	Standard Deviation	95% confidence Interval		Minimum	Maximum
				Lower bound	Upper bound		
High	66	3.3091	.49263	3.1880	3.4302	2.00	4.40
Faculty	307	3.4971	.47536	3.4437	3.5505	2.20	4.60
Total	373	3.4638	.48316	3.4146	3.5130	2.00	4.60

Regarding the benefits of consuming functional dairy products, the results show that these benefits are often unknown to the public, which may be a result of limited awareness and the absence of educational campaigns in this regard. Evidence of this is the high percentage of respondents who answered "I don't know" to several questions in the survey, specifically in this context.

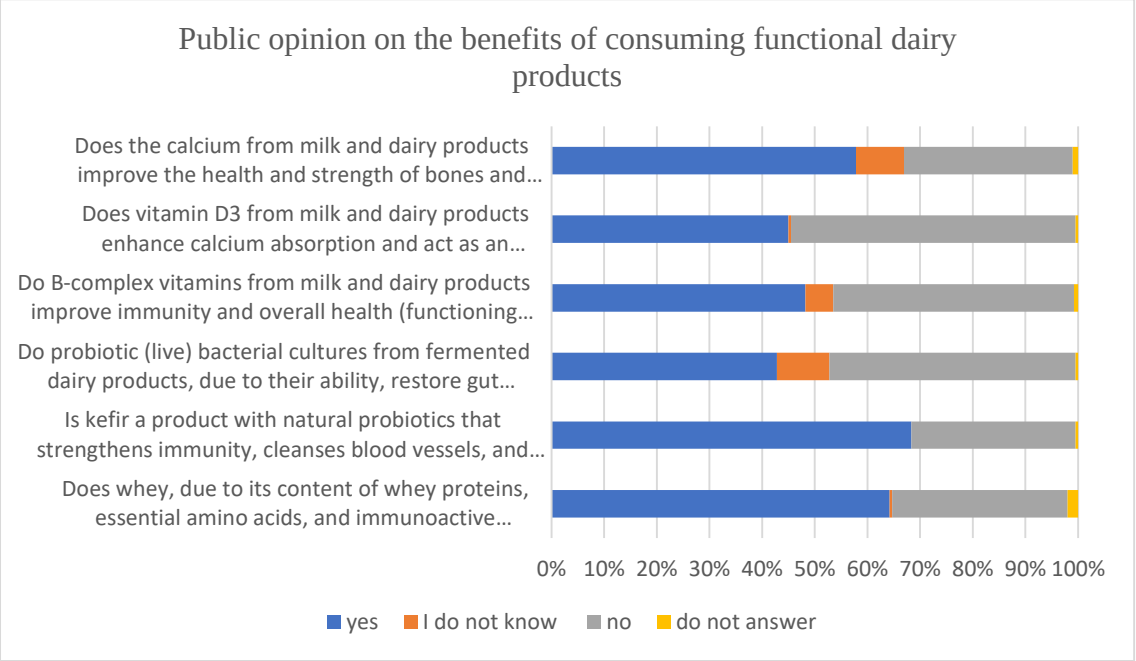

Figure 4: Public opinion on the benefits of consuming functional dairy products (Source: Calculation by the author)

CONCLUSION

Dietary habits, as well as the consumption of functional dairy products, vary among different categories of citizens, depending on their demographic characteristics.

There are statistically significant differences between men and women in dietary habits and the consumption of functional dairy products, and among individuals with different levels of education. The consumption of functional dairy products is, on average, higher among individuals with higher education.

There are statistically significant differences in dietary habits and the consumption of functional dairy products among individuals from different age groups. According to the analysis conducted on four age categories, the dominant group is the 35-50 age group 181 (49%) respondents, followed by the 14-18 age group 79 (21%) respondents, then the 51-66 age group 73 (20%) respondents, and finally the 19-34 age group 40 (11%) respondents).

According to the results obtained, the following recommendations can be made:

-Due to various exogenous and endogenous factors, such as the fast pace of life with much stress, irregular diet, and lack of time for physical activity, the number of digestive disorders is increasing.

-The digestive system is overloaded and often works slowly, accompanied by a strong feeling of bloating, discomfort, heaviness, and pressure in the intestines.

- Functional food, is rich in plant fibers, (vitamins, minerals, and good bacteria), which can influence the intestinal microbiota, thereby affecting the basic functions of the digestive system.

- The modern dairy industry, produces various fermented dairy products, especially beverages, for all categories of people. Daily consumption at an optimal level positively impacts the condition of the entire body.

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