

Research Article

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Organic food consumption by athletes in Lithuania

Abstract: Background: With environmental pollution increasing, interest in organic farming and organic foodstuffs has been growing all over the world. Data on organic food consumption by Lithuanian athletes is not yet available. This lack of data determined the aim of this study: to identify the particulars of organic foodstuff consumption among athletes.

Methods: In September–November 2012, we polled 158 of the best-performing athletes of the Olympic sports team through direct interviews. An approved questionnaire was used to identify the specifics of organic foodstuff consumption among athletes.

Results: The survey results showed that 97% of athletes consume organic foodstuffs, and 80% of athletes highlighted the positive impact of organic food on health. Nevertheless, a slim majority of athletes (51.7%) consume organic foodstuffs seldomly, 2–3 times per week. The range of organic foodstuffs consumed depends on the gender of athletes, and the consumption of some products depends on monthly incomes.

Conclusions: Survey results confirm the need for the production and expansion of the variety of organic foodstuffs. In the course of the development of the organic food market, it should be beneficial for manufacturers to target high-performance athletes and physically active people.

Keywords: Organic food, organic farming, athletes, nutrition

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1 Introduction

Worsening environmental pollution is bringing about ever growing global interest in organic farming and organic foodstuffs free of any pesticide residues, heavy metals, hormones, excess nitrates, genetically modified organisms, and synthetic food additives [1, 2]. The growing market for organic products in Lithuania has created favorable conditions for organic production, which has resulted in the introduction of an organic product certification system and the design and patent of a logo for organic products. The growing market may also have influenced the growth in the number of organic farms in Lithuania. According to the data of the International Federation for Organic Agriculture Movements (IFOAM) [3], Estonia and Latvia are among the seven member states of the European Union (EU) boasting the best-developed organic farming. Meanwhile, the number of organic farms in Lithuania has been decreasing for the past 6 years [3], and sales of organic foodstuffs are quite sluggish [2].

The expansion of the organic food market could be increased by reducing the price of organic products, increasing their availability, and educating consumers about organic products [4]. In the course of the development of the organic food market, the age, gender, education, and occupation of consumers should also be considered [5-11], distinguishing the Lithuanian population involved in significant physical activity. The latter group includes high-performance athletes enduring long-term intensive physical loads on a daily basis. Physical loads strongly increase athletes' bodies' needs for nutrients, which results in higher consumption of various foodstuffs. The training process of high-performance athletes

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includes various regimes, with dietary optimization among the important ones. Inclusion of organic foodstuffs into the daily diet of athletes could evidently have a significant impact on the diversity of the food products consumed and encourage formation of healthy eating habits, which is associated with the better performance of athletes. Data on organic food consumption among athletes in Lithuania has not been collected yet. This lack of data determined the aim of our study: to identify the particulars of the consumption of organic foodstuffs among Lithuanian high-performance athletes.

2 Methods

During a direct interview conducted in September to November 2012, the highest-performance athletes ($n=158$) in Lithuania were polled. These athletes were engaged in the following Olympic disciplines: boxing, judo, wrestling, cycling, swimming, cross-country skiing, downhill skiing, figure skating, biathlon, modern pentathlon, basketball, gymnastics, track and field, kayaking, and canoeing, were polled. Only the high-performance athletes of Lithuania who were on lists approved by the director of the Department of Physical Education and Sports were questioned. A total of 65% of all high-performance athletes in Lithuania were polled. The athletes' organic food consumption was studied in a direct interview.

As in previous scientific studies, a validated questionnaire containing 21 questions was used to identify the specifics of the consumption of organic foodstuffs [12]. The questionnaire was used to collect information about the athletes' age, gender, sport, income, frequency of organic food consumption, reasons for organic food consumption, the most frequent places organic food is acquired, the major sources of information encouraging the consumption of organic foodstuffs, etc. Possible response options in the questionnaire were nominal and dichotomous.

All the organizational issues regarding the survey were discussed with the Lithuanian Olympic Sports Center and with the Bioethics Committee prior to the research. The study of the athletes' consumption of organic foodstuffs was conducted in accordance with a permit to carry out biomedical research issued by the Bioethics Committee on 3 November 2009 (No. 158200-11-113-25).

Athletes consented to participate in the study voluntarily. Additionally, the research allowed the opportunity to withdraw from the study at any time. Athletes who agreed to take part in the study were polled at the Lithuanian Olympic Sports Center. The confidentiality of

the data was ensured. The data of individual athletes was not used. The respondents' personal information (given names, surname, residential address, phone number, and email address) was destroyed, and the Lithuanian Olympic Sports Center was informed of the destruction. Respondents' consent to participate in the study, anonymity, and confidentiality guarantees have made it possible to receive answers sufficient to establish a definitive comparative sample and process the data statistically.

2.1 Statistical methods and experimental procedures

The SPSS (Statistical Package for Social Sciences) v. 15.0 was used to conduct statistical data analysis. Categorical data was analyzed with the use of chi square (χ^2) and Fisher's exact tests. To measure the association between categorical variables, Cramer's V and phi (ϕ) coefficients were applied. The relevance level $\alpha=0.05$ was used for hypothesis verification. The difference in the results was considered statistically relevant when $p \leq 0.05$.

3 Results

3.1 Description of the respondents

The characteristics of the respondents are presented in the first table (Table 1). The respondents were divided by sport into athletes focusing on anaerobic capacity, mixed aerobic and anaerobic capacity, and aerobic capacity. Male athletes accounted for 73.4% of those questioned and female athletes made up 26.6%. The average age of the athletes was 19.8 ± 3.2 , and average experience in their sport was 7.6 ± 3.9 years. Athletes 14–18 years old made up 45.6% of the total, and older athletes (19–31 years old) represented 54.5% respondents.

3.2 Frequency of organic food consumption

The survey results showed that of the 158 respondents, 97% ($n=153$) of Lithuanian high-performance athletes (91.4% males and 97.6% females) consume organic food products. In the group of athletes who consume organic food, those who consume it 2–3 times per week account for 51.7%, and those who consume organic food on a daily basis account for only 27.9% of respondents.

Table 1: Respondents' characteristics

Feature	Characteristics of the feature
Sports	
Anaerobic training ¹ (abs. (%))	25 (15.8)
Aerobic and anaerobic training ² (abs. (%))	66 (41.8)
Aerobic training ³ (abs. no. (%))	67 (42.4)
Total	158
Gender	
Males (abs. (%))	116 (73.4)
Females (abs. (%))	42 (26.6)
Total	158
Age (in years)	
Min.	14
Max.	31
Average ± standard deviation (SD)	19.8±3.2
Sporting experience (in years)	
Min.	1
Max.	20
Average ± standard deviation (SD)	7.6±3.9
Monthly incomes	
< LTL 500 (abs. (%))	114 (72.6)
LTL 501–1000 (abs. (%))	27 (17.2)
> LTL 1001 (abs. (%))	16 (10.2)
Total	157

Note: ¹ = basketball, track and field; ² = boxing, judo, wrestling, downhill skiing, figure skating, modern pentathlon, gymnastics, canoeing and kayaking; ³ = cycling, swimming, cross-country skiing, biathlon LTL= Lithuanian Litas

Analysis of the particulars of the consumption of specific organic food products identified different consumption of organic food products in the male and female groups ($p=0.040$). Weak association between the respondents' gender and organic food consumption was established (Cramer's $V=0.164$). Comparing male versus female athletes, male athletes are more frequent consumers of organic meat (55.7% vs 34.1% respectively, $p=0.019$), fish products (40.6% vs 22.0% respectively, $p=0.034$), candies and other sweets (22.6% vs 7.3% respectively, $p=0.031$) (Table 2).

The consumption of some organic food products is determined by the monthly incomes of athletes (Table 3). Comparison of the athletes consuming certain organic food products with the athletes not consuming them in the group of organic food consumers, a medium-strength dependence was established between monthly incomes and the consumption of the food products in question: dairy products (Cramer's $V=0.235$, $p=0.018$), cereal products (Cramer's $V=0.332$, $p<0.0001$), organic bread (Cramer's $V=0.223$, $p=0.027$), pasta (Cramer's $V=0.204$, $p=0.048$), candy and other sweets (Cramer's $V=0.226$, $p=0.034$), fish (Cramer's $V=0.204$, $p=0.048$), and vegetables (Cramer's $V=0.321$, $p=0.011$). Athletes with low incomes (<Lithuanian Litas (LTL) 500 and/or LTL 501–1000 per month) more often choose vegetables, dairy products, fish products, candies and other sweets, pasta, and bread and other baked products than respondents with high incomes (>LTL 1001 per month).

3.3 Reasons for organic food consumption

Analysis of respondents' opinions about organic food products established that the great majority of athletes (81.6% ($n=120$)) believe that organic food products are healthier. This opinion is shared by both male athletes (80.2% ($n=85$)) and female athletes (85.4% ($n=35$)), ($p=0.467$). However, age-dependent differences were identified. The health benefits of organic food products appealed more to athletes aged 19–31 (87.5% ($n=70$)) than 14–18 (74.6% ($n=50$)), ($p=0.045$, $\phi=0.166$). At the same time, features of organic foodstuffs such as safety and flavor are not prioritized by Lithuanian high-performance athletes. Organic foodstuffs are considered tastier than other conventional products by 40.1% ($n=59$) of athletes, and they are considered safer by only 27.2% ($n=40$) of respondents.

3.4 Most popular places for organic food shopping

Athletes hardly buy any organic foodstuffs at trade fairs (those who do account for 2.5% ($n=4$)), while the majority buy organic food in supermarkets (51.3% ($n=81$)) and at markets (50.0% ($n=79$)). More detailed data analysis confirmed that organic food products are purchased in supermarkets by the great majority of males (48.3% ($n=56$)) and females (59.5% ($n=25$)), ($p=0.211$). Buyers of organic food at markets are distributed equally by gender (50.0% ($n=58$) and 50.0% ($n=21$) respectively, $p=0.211$). By the organic food products purchased at supermarkets and

Table 2: Distribution of organic food products by gender

Purchased products	Males n=106		Females n=41		p value
	Abs. No.	%	Abs. No.	%	
Fruit, berries	89	84.0	34	82.9	0.879
Vegetables	95	89.6	11	10.4	0.267
Teas	36	34.0	16	39.0	0.565
Dairy products	73	68.9	22	53.7	0.084
Cooking oil	19	17.9	10	24.4	0.377
Eggs	56	52.8	21	51.2	0.861
Meat products	59	55.7	14	34.1	0.019
Fish products	43	40.6	9	22.0	0.034
Candies and other sweets	24	22.6	3	7.3	0.031
Bread and other baked goods	47	44.3	19	46.3	0.827
Pasta	34	32.1	9	22.0	0.226
Cereal products	34	32.1	11	26.8	0.536
Spices	18	17.0	8	19.5	0.718

Table 3: Distribution of organic food products by income

Purchased products	< LTL 500 n=104		LTL 501–1000 n=26		> LTL 1001 n=16		p value
	Abs. No.	%	Abs. No.	%	Abs. No.	%	
Fruit, berries	88	84.6	20	76.9	14	87.5	0.577
Vegetables	95	91.3	16	73.1	14	87.5	0.011
Teas	35	33.7	11	42.3	5	31.3	0.673
Dairy products	67	64.4	21	80.8	6	37.5	0.018
Cooking oil	16	15.4	9	34.6	4	25.0	0.077
Eggs	49	47.1	17	65.4	10	62.5	0.168
Meat products	47	45.2	17	65.4	8	50.0	0.183
Fish products	37	35.6	13	50.0	2	12.5	0.048
Candies and other sweets	15	14.4	9	34.6	1	12.5	0.034
Bread and other baked goods	44	42.3	17	65.4	4	25.0	0.027
Pasta	24	23.1	12	46.2	6	37.5	0.048
Cereal products	30	28.8	15	57.7	0	0.0	<0.0001
Spices	14	13.5	7	26.7	4	25.0	0.179

markets, the respondents of different ages do not have significant statistical differences. Organic food products are purchased at supermarkets by 50.0% (n=36) of younger and 52.3% (n=45) of older athletes (p=0.771). Athletes buying organic food at markets are distributed by age in a similar manner. Organic food products are purchased at markets by 51.4% (n=37) of athletes aged 14–18 and 48.8% (n=42) of athletes aged 19–31 (p=0.749).

3.5 Information sources promoting organic food consumption

Only 55.7% (n=88) of respondents are satisfied with the information that is available about organic food products. Many male and female athletes think that there is a shortage of information about organic food (42.2% and 50.0%, respectively, p=0.386) (Table 4). Associations between the respondents' age and knowledge about organic food products were determined. A lack of information about organic food products is more often expressed by athletes aged 19–31 (53.5%) than athletes aged 14–18 (33.3%) (p=0.011).

The following main sources of information about organic food products are most frequently named by the athletes: acquaintances, friends, and family members (51.9% (n=82)); television programs (45.6% (n=72)); educational institutions (39.9% (n=63)); and the Internet (39.2% (n=62)). Less frequently named sources of information include supermarkets (27.8% (n=44)) and the mass media (32.9% (n=52)).

Male athletes, when compared with females, tend to receive more information about organic food at supermarkets (p=0.033) and from acquaintances, friends, and family members (p=0.025) (Table 4). If the general

structure of sources of information in the male and female groups is compared, no statistically significant differences are determined (p=0.437). Differences in the structure of information sources were, however, discovered between the 14–18 and 19–31 age groups of the respondents (p=0.018), and medium strength dependence between the sources of information and the age groups was also established (Cramer's V=0.191). Older athletes find more information about organic food online (47.7% (n=41), p=0.018) and in the mass media (43.0% (n=37), p=0.003), while athletes aged 14–18 received information at educational institutions (48.6% (n=35), p=0.040).

According to our survey data, irrespective of gender ($\chi^2=0.314$, p=0.575) and age ($\chi^2=0.049$, p=0.824), 96.2% (n=152), Lithuanian high-performance athletes express the need for the development of purposeful organic farming in Lithuania.

4 Discussion

Organic produce is a very small proportion of the total food market, but the growing demand for organic foods promotes the supply of products, which leads to higher organic food production and ensures wider sales of organic food products. Studies indicated that the demand for organic food has increased, especially in North America and Europe [13, 14]. It was observed that the consumption of organic foods in the EU has been increasing annually 10–15% [15]. Regardless of that overall trend, organic food consumption varies among European countries. Consumers of organic food comprise about 66.7% of the population in Denmark, 47.8% in Sweden, 39.9%

Table 4: Accessibility of information about organic products by gender

Information about organic products	Males n=106		Females n=42		p value
	Abs. No.	%	Abs. No.	%	
Lack of information	49	42.2	21	50.0	0.386
Media	38	32.8	14	33.3	0.946
TV	56	48.3	16	38.1	0.256
Educational institutions	46	39.7	17	40.5	0.926
Supermarkets	27	23.3	17	40.5	0.033
Internet	44	37.9	18	42.9	0.575
Family members, friends	54	46.6	28	66.7	0.025

in Germany, 38.4% in the Netherlands, 30.8% in Great Britain, 27.5% in Italy, 20.9% in Greece, and 13.9% in Spain [16]. A comparison of the number of consumers of organic food in some EU countries and Lithuania, including those individually studied in our high-performance athletes' segment, demonstrates that the proportion of organic food consumers in Lithuania is higher than in other EU countries. Analysis of the particulars of organic food consumption among the Lithuanian population in 2005–2010 revealed that organic food was in demand and bought and consumed by 73–82% of people [2, 12, 17, 18]. Meanwhile, the survey results show that there is an even higher demand for organic foodstuffs among Lithuanian high-performance athletes, and 97% of respondents report consuming them. But only a small number of the athletes surveyed consume organic food products quite often, i.e. daily. Study results published in 2005, 2009 and 2010 [2, 12, 18, 19] allow organic food consumption between the general public and athletes in Lithuania to be compared. The data shows that the share of the Lithuanian population consuming organic food on a daily basis varies from 20 to 32% and basically does not differ from the figure received from the survey of athletes (27.9%).

The most popular organic food products among the Lithuanian population include vegetables, fruits and berries, dairy products, and cereal products. Slightly less popular are fish, poultry, meat products, eggs, teas, cooking oil, spices, and candy and other sweets [1, 12, 18, 19]. The most popular organic foodstuffs for Lithuanian high-performance athletes include vegetables, fruits and berries, dairy products, eggs, meat, and meat products. It should be further noted that if compared with the organic food consumption of the Lithuanian population, a greater majority of the athletes we surveyed consume organic vegetables, berries, fruits, dairy products, eggs, meat products, poultry, and fish. This shows that organic food products have a higher demand and are more marketable among Lithuanian high-performance athletes. The unique qualities of a branch of a sport, the daily endured intense or long-term physical exertion, and the effort and motivation to eat healthier partly explain the bigger demand for organic food products among elite Lithuanian athletes. The 2013 study of the dietary habits of Lithuanian high-performance athletes was conducted to represent the specificity of sport and the promotion of health. This is a priority criterion for the selection of food by athletes [20].

In addition, the formation of the organic food market, the prediction of the growth of organic food consumption, and the focus on the health-improving effects of organic food was reviewed [21, 22]. Because of these characteristics, consumers perceive organic food products as having

some exclusive features: they are healthy, safe, nutritious, rich in vitamins, delicious, as well as being expensive and having limited availability [23, 24]. Not all these properties have been scientifically proven, however. Much research shows that one of the main reasons for choosing organic food products is health concerns [2, 24]. The crucial focus for the Lithuanian population is the health-improving effect of organic food products [12, 17]. The Lithuanian athletes we surveyed are not an exception. A majority highlighted the health benefits of organic food, but at the same time they had reservations about some properties of organic food products such as safety and flavor.

One of the factors limiting the demand for organic food is its relatively high cost [5, 25]. When the interrelation between incomes and organic food consumption was assessed in 2010, it was established that the main reason for the population not buying organic food products was their high price [12]. This conclusion is shared also by other researchers analyzing the particulars of organic food consumption [19, 26]. According to other researchers, as many as 80% of respondents are ready to pay up to 25% more for organic products [18]. The poll results show that athletes with lower incomes more often tend to choose organic food for consumption: vegetables, dairy products, fish, bread and other cereal products, pasta, and candy and other sweets. Higher incomes therefore do not have a decisive impact on athletes' consumption of organic food.

Despite increasing organic food consumption, the number of organic farms in Lithuania has been decreasing for the past 6 years [3]. The largest number of organic farms in Lithuania was recorded in 2007, when there were 2,855 of them. Since then, the number of organic farms has been decreasing: 2,805 certified farms in 2008, 2,679 in 2009, 2,668 in 2010, 2,598 in 2011, and 2,511 in 2012.

Another reason for the low consumption of organic food is the shortage of advertising [18]. Athletes, as consumers, should be attracted by adequate and easily accessible information about organic food products, which is currently insufficient. This is confirmed by the poor awareness of the athletes about organic food, which hardly differs from the Lithuanian population's awareness [2, 12]. Athletes learn about organic foodstuffs mostly from their friends, family members, television programs, and at educational institutions. Meanwhile, over 50% of the Lithuanian population considers the following information sources the most easily accessible and reliable: friends, acquaintances, family members, national and commercial television, and information available at supermarkets and other places of sale [2]. The aforementioned sources of information are crucial for both athletes and the Lithuanian population, but as opposed to from

the general Lithuanian public, the awareness of athletes is determined by age and gender. Male athletes usually learn about organic food from their acquaintances, friends and family members and at supermarkets; older athletes more often find information online and in the mass media, and young athletes receive information at educational institutions.

In conclusion, this study observed high-performance athletes who overcome daily intensive and/or long-term physical loads. For professional athletes, improving health undoubtedly includes a balanced diet and the adequate consumption of nutrients, vitamins and minerals, including increased use of health-friendly organic food. Although the number of athletes consuming organic food is large, the consumption itself is infrequent, including differences in consumption between male and female athletes as well as age groups. A reason for this may be the decreasing number of organic farms in Lithuania, insufficient advertising of organic food products, and poor awareness among athletes. The higher cost is not a factor limiting the consumption of organic food.

This study is the first to have identified and named an additional important variable, high physical activity, that should be taken into account in the prediction of organic food production and the supply and demand for advertising. In addition, this study results are important not only for the optimization of high-performance athletes' nutrition, but also for organic food producers as reasons for organic food production and the development of the organic food market. In the course of the development of the organic food market, it should be expedient for manufacturers to target the segment of high-performance athletes and physically active people.

There were limitations and clinical implications to the research of organic food consumption. The consumption of food as it relates to different branches of sport or seasonality was not evaluated. Therefore, further research is required in order to determine organic food consumption factors for different branches of sports. This research would make it possible to market organic food more efficiently to athletes and physically active people differently at different times of the year.

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