

THE NEED FOR INFORMATION ON NUTRITION AMONG ADOLESCENTS AND ADULT KNOWLEDGE REGARDING FOOD CONSUMPTION RECOMMENDATIONS

Rūta Maceinaitė¹, Žymantas Žandaras¹, Genė Šurkienė¹, Birutė Strukčinskienė², Rimantas Stukas¹, Valerij Dobrovolskij¹, Rokas Arlauskas¹

¹Department of Public Health, Institute of Health Sciences, Faculty of Medicine, Vilnius University, Vilnius, Lithuania

²Department of Public, Health Faculty of Health Sciences, Klaipėda University, Klaipėda, Lithuania

SUMMARY

Objectives: The eating habits of most Lithuanian people do not adhere to the recommendations for a healthy diet. If children and adolescents were provided with the relevant information, it would not only improve their nutritional knowledge, but also their eating habits in adulthood and the subsequent health of their children. The objective of this study was to determine the need for information on nutrition among Lithuanian adolescents, the current knowledge of adults regarding recommendations for the consumption of various food groups, and the factors that influence both the need for information and the current knowledge.

Methods: Two cross-sectional studies were conducted, consisting of 3,574 adolescents aged 14–18 years and 1,007 adults aged 18–75 years. Logistic regression models with confidence intervals of 95% were used to determine the influence of various socio-demographic factors on the adolescent need for information on nutrition and the adult knowledge of nutrition.

Results: A total of 66.7% of adolescents stated that they need information regarding nutrition, whereas 29.8% indicated that they lack such information. Significantly more girls than boys, and more students from schools in urban areas than students from schools in rural areas, expressed their need for information on nutrition. Lithuanian adults lacked knowledge of recommendations for the consumption of various food groups. Women and respondents with higher education degrees were found to have more knowledge on recommendations of the consumption of various food groups compared to men and respondents of other levels of education respectively.

Conclusions: The results of this study demonstrate that the required information on nutrition must be continuously provided via various channels to both adolescents and adults, and socio-demographic factors must be taken into account when planning public health intervention measures.

Key words: information on nutrition, nutritional knowledge, need for information on nutrition

Address for correspondence: Ž. Žandaras, Department of Public Health, Institute of Health Sciences, Faculty of Medicine, Vilnius University, M. K. Čiurlionio g. 21/27, LT-03101, Vilnius, Lithuania. E-mail: zymantas.zandaras@gmail.com

<https://doi.org/10.21101/cejph.a6635>

INTRODUCTION

According to the World Health Organization (WHO), an unhealthy diet is one of the major risk factors precipitating the development of noncommunicable diseases, such as diabetes, cardiovascular diseases, and cancer (1). Studies have shown that the majority of people do not consume enough fruit, vegetables, or dietary fibre, while consuming more high-calorie foods, fats, free sugars, and salt. Such unhealthy eating habits may be partially linked to the increased production of processed foods and changes in lifestyle (2). On the other hand, the eating habits of both adults and adolescents can be influenced by their knowledge of the benefits of healthy eating.

Healthy eating habits depend on a person's individual characteristics (such as age, sex, lifestyle, and degree of physical activity), but the basic recommendations of a healthy diet apply equally to everyone. The daily consumption of at least 400 grams

of fruit and vegetables (except potatoes and other starchy root vegetables) is recommended, as such an amount reduces the risk of noncommunicable diseases and provides sufficient amount of dietary fibre (2). The consumption of recommended quantity of protein affects child's growth, maturation, and health in adulthood (3). Dietary fibre can potentially reduce the risk of noncommunicable diseases (4), whilst saturated fat leads to an increased risk of coronary heart disease (5). To maintain normal health, the total amount of fat consumed should not exceed 30% of total daily energy intake (6). Consumption of free sugars increases the risk of tooth decay, weight gain and obesity, and heart and circulatory diseases, therefore, the intake of free sugars should be reduced to less than 10% of total daily energy intake (7). It has been found that a high sodium intake causes 4.1 million deaths worldwide every year (8). It is recommended that daily sodium intake should not exceed 5 grams, as such an amount helps to prevent hypertension and reduces the risk of cardiovascular diseases (2).

A person's eating habits form during childhood and adolescence, and it is challenging to make changes later in life. Therefore, most eating habits remain unchanged in adulthood (9). Even though a child's eating habits are determined by a range of socioeconomic factors that include the media, friends, peers, and neighbours, the influence exerted by their family and their surrounding environment is exceptional (10). The knowledge and attitude of parents towards healthy eating plays a key role in the development of a child's eating habits (11). Parents form their child's dietary environment and set an example through their own choices and behaviour (11). Eating habits are associated with a person's current knowledge, and so the healthy eating habits of a child can only be formed by parents who possess sufficient knowledge (12). Unfortunately, not all parents possess this knowledge, and so the school also plays an important part in providing children with the information on nutrition that they need (13). However, the health-promoting information relating to diet that schools provide is not always sufficient for children.

The diet of Lithuanian children and adolescents is not healthy, and children do not consume enough vegetables, fish, or fish products. Instead, many children consume unhealthy foods such as foods that have been deep fried, pan fried, or otherwise cooked in oil; sweets; and carbonated and/or sweetened beverages (14). The results of the most recent Health Behaviour in School-aged Children (HBSC) study confirmed that Lithuanian children consumed too few fruit and vegetables and too much sugar. Only one in three 15-year-old girls and one in four 15-year-old boys consumed fruit and vegetables daily, and of the 13-year-olds surveyed, 21% of girls and 17% of boys consumed sweets daily (15).

Although one survey of the lifestyles of Lithuanian adults showed that the majority (72.1% of women and 52.8% of men) considered a healthy diet to be important (16), another survey of the actual eating habits of Lithuanian adults and seniors showed that only 40.2% of the respondents would describe their diet as 'good' (17). The eating habits of most Lithuanians did not adhere to the recommendations of a healthy diet – the consumption of fruit and vegetables was too low (17, 18); only every other adult consumed grains daily (17); fish was consumed rarely or not at all (18); fat and sugar accounted for too high proportion of daily energy intake (17); and the majority of the population admitted to adding salt to premade food (16, 18).

Thus, a great deal of research has been conducted to assess the eating habits of the population in the light of dietary recommendations, but there is a lack of representative research on knowledge of healthy eating in both adolescents and adults. One can presume that providing children and adolescents with the relevant information would not only improve their knowledge of healthy eating, but would also improve their eating habits as adults, and thus would subsequently improve the health of their children. The objective of this study was to determine the need for information on nutrition among Lithuanian adolescents, adult knowledge of recommendations for the consumption of various food groups, and the factors that influence both current knowledge and the need for information. The only way to properly target any public health intervention measure is to first determine which socio-demographic groups are most lacking in nutritional knowledge.

MATERIALS AND METHODS

Study Design and Sample Size

Two cross-sectional studies were conducted: the first was aimed at determining the need for information on nutrition among Lithuanian adolescents; and the second was aimed at assessing adult knowledge of healthy eating. Both studies form part of an ongoing piece of representative research focusing on adult and adolescent health in Lithuania.

The target population of the first study was Lithuanian adolescents in school years 9 and 10. Most adolescents in these school years in Lithuania were aged between 14 and 17 years – a period known as the middle stage of adolescence, within which lifestyle habits tend to form. Whilst being aware of the exact size of this target population, the OpenEpi program was used to calculate the sample size of the study. Based on the response rate of a similar study conducted in 2016, the required sample size was calculated to be 30% larger – 3,832 adolescents. The Vilnius Regional Bioethics Committee approved this study in 2017 (No. 158200-17-953-458).

The target population of the second study was Lithuanians between 18 and 75 years of age. A multi-stage stratified probabilistic sampling method was used in this study to ensure the representativeness of the data: each Lithuanian had an equal opportunity to be included in the study. The sample size was calculated at 1,007 respondents.

Instrument

An original, self-administered, and structured questionnaire was prepared for the survey of the adolescents. The questionnaire consisted of 46 questions, some of which were aimed at assessing the need for information on nutrition among adolescents and determining the factors that influenced that need. The reliability of the questionnaire was tested by providing 25 adolescents with the same questionnaire twice, 15–20 days apart. The questionnaires that had been filled out by the same students were paired, and a Kappa coefficient (for categorical variables) or a weighted Kappa coefficient (for ordinal variables) was calculated for each question. Questions with a coefficient value of less than 0.40 were amended by altering their phrasing.

The instrument of the second study was an original structured questionnaire. A portion of the questionnaire was dedicated to assessing the knowledge of Lithuanian adults on recommendations for the consumption of certain food groups.

Data Collection

The survey of Lithuanian adolescents took place from May 2018 to April 2019, and each participating school was provided with questionnaires for one class in year 9 and one class in year 10. Coordinators that had been appointed by the heads of the schools were provided with detailed instructions for the survey process. The survey coordinators distributed the questionnaires to the students that were present on the day of the survey of the selected classes, and students could either choose to fill out the form at school or to take it home. A total of 110 classes from various schools in Lithuania participated in the survey. Of the

4,495 distributed questionnaires, 3,360 were returned (a response rate of 74.7%). Of the returned questionnaires, 86 were invalid (where more than one answer was marked in response to a single-choice question, or in the case of partially completed questionnaires), and thus 3,574 valid questionnaires were used in the analysis.

The survey of Lithuanian adults was conducted in March 2019. A combined survey method was used: 60% CAPI (computer assisted personal interview) and 40% CAWI (computer assisted web interview). The CAPI survey was conducted by a professional interviewer, who led the conversation with a respondent according to the questions provided and then marked their answers on the questionnaire. The CAWI survey was conducted by sending a link to the respondent, who could then answer the questions at their own convenience. Each link to the questionnaire was unique to ensure that it could only be filled out once. A total of 1,007 Lithuanians aged 18–75 participated in the survey.

Data Analysis

The data was analysed using the Stata and WinPepi statistical software. Any potential mistakes in data entry were highlighted using variable frequency tables and via the analysis of tables that could reveal discrepancies.

Prevalence estimates were calculated at 95% CI. Logistic regression models were developed to determine the influence of various socio-demographic factors on the need for information on nutrition among Lithuanian adolescents and adult knowledge of nutrition. The final models included both the variables with a significance level of 0.2 or less after bivariate analysis and the variables that did not have multicollinearity (variables with a correlation coefficient of 0.5 or greater were considered collinear and were therefore not included in the models). The models were evaluated using regression diagnostics: ORa were obtained from the models and their 95% CIs were calculated. The significant level was considered at $p < 0.05$.

RESULTS

Characteristics of Respondents

The 3,574 adolescents included in the study were equally distributed according to school years, and 53.1% of them were females. Over half of the adolescent respondents were 16 years old and resided in urban areas. The highest proportion of the parents of adolescents had attained special secondary, post-secondary, or vocational education (36.8% of mothers and 48.4% of fathers). Over half of the adolescent respondents attended non-HPS-network (Health Promoting School) schools, gymnasiums and schools or educational institutions in urban areas. The adult respondents from the second study were distributed equally in terms of age and sex. In terms of their geographical distribution, 43.1% lived in urban areas and the remainder listed their residence as being in towns or rural areas. The majority of the respondents were married or living in partnership, 37.5% had attained higher education, and over half of the respondents listed their monthly income as €700 or less (Table 1).

Table 1. Characteristics of respondents

Adolescents (N=3,574)		
	n	%
Gender		
Male	1,676	46.9
Female	1,898	53.1
School year		
Year 9	1,798	50.3
Year 10	1,776	49.7
Age		
14 or 15 years	1,256	35.1
16 years	1,712	47.9
17 or 18 years	606	17.0
Place of residence		
Village	1,239	34.7
Town	745	20.8
City	1,590	44.5
Mother's education ^a		
Lower-secondary, secondary	842	28.9
Special secondary, post-secondary, vocational	1,073	36.8
Higher	999	34.3
Father's education ^a		
Lower-secondary, secondary	759	28.8
Special secondary, post-secondary, vocational	1,275	48.4
Higher	601	22.8
Type of school		
Secondary	1,035	29.0
Gymnasium	2,539	71.0
Location of school		
Village, town	1,645	46.1
City, major city	1,928	53.9
School is a member of HPS network		
HPS	1,327	37.1
Non-HPS	2,247	62.9
Adults (N=1,007)		
Gender		
Male	476	47.3
Female	531	52.7
Age		
45 years old and younger	517	51.3
Older than 45 years	490	48.7
Place of residence		
Village	297	29.5
Town	276	27.4
City	434	43.1

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Table 1. Characteristics of respondents

Education		
Non-higher (lower-secondary, secondary, vocational, and other)	629	62.5
Higher	378	37.5
Marital status		
Single, divorced	363	36.0
Married, living in partnership	644	64.0
Income (netto) per month		
700€ and less	574	57.0
More than 700€	433	43.0

*660 (18.5%) students did not know their mother's education level; 939 (26.3%) students did not know their father's education level; HPS – health promoting school

Adolescents' Need for Information on Nutrition

According to the study, 66.7% (95% CI: 65.2–68.3) of adolescents indicated that of all the topics discussed during lessons at school intended to promote health, education on the topic of a healthy diet was most required. This statement was supported by 72.6% (95% CI: 70.5–74.5) of girls and 60.1% (95% CI: 57.8–62.5) of boys. Moreover, this statement was made more frequently by adolescents from schools in urban areas – 69.9% (95% CI: 67.8–71.9) and 63.0% (95% CI: 60.6–65.3) of girls and boys, respectively, and gymnasiums – 68.2% (95% CI: 66.3–70.0) and 63.2% (95% CI: 60.2–66.1) of girls and boys, respectively.

According to the study data, significantly more girls than boys stated that nutrition was the most important topic of health promotion. Students from schools in urban areas were 1.24 times more likely to indicate that education on nutrition was most required, compared to students from small towns and rural areas. In addition, this statement was made more frequently by respondents

in year 10, respondents whose mothers had achieved higher education, and respondents who were students in a gymnasium, but these differences were not statistically significant (Table 2).

Although a large portion of adolescents stated that education on nutrition was the most necessary topic of health promotion at school, the results of the study showed that nearly a third of adolescents (29.8%, 95% CI: 28.4–31.4) thought that, of all the topics of health promotion, they lacked information on this the most. This statement was supported by 31.3% (95% CI: 29.3–33.5) of girls and 28.1% (95% CI: 26.0–30.3) of boys. In addition, the majority of adolescents who made this statement were those whose mothers (32.0%, 95% CI: 29.2–35.0) and fathers (31.1%, 95% CI: 27.5–34.9) had attained higher education, compared to those adolescents whose parents had other levels of education.

Using logistic regression, the factors influencing the above-mentioned opinion of the adolescents were analysed. The factor of sex exerted a significant influence: girls were 16% more likely to state that adolescents lacked information on nutrition. It should be noted that adolescents who studied in schools outside of the Lithuanian HPS network were more likely to say that they lacked information on nutrition than adolescents who studied in schools from the HPS network, but this difference was not statistically significant. Other factors had no significant influence on the opinions of the respondents regarding the lack of information on nutrition (Table 3).

Current Nutritional Knowledge among Adults

The results of the study showed that nearly half of all adult respondents knew that it is recommended to consume fruit and vegetables (with exception of potatoes) multiple times a day, but only 22.1% of respondents knew that the recommended daily intake of fruit and vegetables was at least 400 grams. A similar number of respondents were certain that bread and grains should

Table 2. Factors that influenced the statement of adolescents that education on nutrition was most required

	ORc	ORa	95% CI	p-value
Gender				
Male	1.00			<0.001
Female	1.75	1.56	1.34–1.83	
School year				
Year 9	1.00			0.269
Year 10	1.12	1.09	0.93–1.28	
Mother's education				
Lower-secondary, secondary	1.00			0.708
Special secondary, post-secondary, vocational	1.09	1.04	0.86–1.26	
Higher	1.23	1.11	0.90–1.37	
Type of school				
Secondary	1.00			0.244
Gymnasium	1.24	1.11	0.93–1.33	
Location of school				
Village, town	1.00			0.010
City, major city	1.36	1.24	1.05; 1.56	

N=2,914; likelihood-ratio $\chi^2 = 47.31$; df. 6; $p < 0.001$; Hosmer-Lemeshow test $\chi^2 = 3.52$; df. 8; $p = 0.898$; R-square 0.013

Table 3. Factors influencing opinions of adolescents regarding the lack of information on nutrition

	ORc	ORa	95% CI	p-value
Gender				
Male	1.00			0.040
Female	1.75	1.16	1.01–1.34	
School year				
Year 9	1.00			0.113
Year 10	1.12	1.23	0.97–1.30	
School is a member of HPS network				
HPS	1.00			0.073
Non-HPS	1.15	1.15	0.99–1.33	

N = 2,914; likelihood ratio $\chi^2 = 10.06$; df. 3; $p = 0.018$; Hosmer-Lemeshow test $\chi^2 = 4.31$; df. 5; $p = 0.506$; R-square 0.002

be consumed multiple times a day, and over half of the adults knew that meat, fish, milk, and dairy products should be consumed daily (or less frequently), but in moderation. The results of the study also revealed that nearly 40% of the respondents were aware that butter, salt, and sweets should be consumed rarely and in small amounts. Only 43.3% of the adult respondents stated that they knew that the recommended daily sodium intake was no more than 5 grams (Table 4).

When examining the factors that influence the Lithuanian population's knowledge of recommendations for the consumption of various food groups, it was discovered that women had a significantly higher likelihood of knowing the recommendations for the consumption of fruit and vegetables, butter, salt, and sweets than men. Such knowledge was also more likely to be found among the respondents with a background in higher education, as opposed to respondents with other levels of education. It should be noted that respondents who had attained higher education were 83% more likely to know the recommended frequency of fruit and vegetable (with exception of potatoes) intake, and more than twice as likely to know the recommendations for meat, fish, milk, and dairy product consumption. When assessing the factors that influenced knowledge of dietary recommendations, it was found that place of residence was also relevant. Residents of rural areas had a 64% higher chance of knowing the recommendations for consuming bread and grains compared to residents of urban areas, while residents of urban areas had a 67% higher chance of knowing the intake recommendations for butter, sweets, and sodium compared to rural residents (Table 5). The age, marital status, and monthly income of respondents had no significant influence on their nutritional knowledge (Table 5).

DISCUSSION

This was the first study in Lithuania that aimed to determine the need for information on nutrition among Lithuanian adolescents, adult knowledge of recommendations for the consumption of various food groups, and the factors that influence both current knowledge and the need for information. The results of this study showed that it is necessary to provide adolescents and adults with more information about healthy eating.

A study conducted in Lithuania in 2011 demonstrated that only 12.8% of students received the required information on healthy eating at school (19). The results of our study established that one in three adolescents lacked such knowledge, and it is clear that this situation is improving at an extremely slow rate. Other researchers have confirmed the need for information on nutrition among adolescents (20).

Gaps in adolescent knowledge of nutrition should be filled by parents as well as schools, but our study has shown that the knowledge of adults on this subject is not sufficient. This conclusion can be made by assessing the knowledge of adults regarding recommendations for the consumption of various food groups: only one in five respondents was familiar with the recommendations for bread and grain consumption, and only around 40% of adults knew the recommendations for the consumption of butter, sweets, and salt. Lithuanians are not exceptional in this regard: according to other researchers, the populations of various countries had either average or poor nutritional knowledge (21). According to various studies, Lithuanians do not consume enough fruit and vegetables in their diet (17, 18). Such a situation may exist due to a lack of knowledge: only 22% of respondents were aware of

Table 4. Distribution of adults who had knew the recommendations for the consumption of various food groups (N = 1,007)

Dietary recommendations	n	%	95% CI
Fruit and vegetables (except potatoes) should be consumed multiple times a day	489	48.6	45.5–51.7
Daily intake of fruit and vegetables (except potatoes) should be at least 400 grams	223	22.1	19.7–24.8
Bread and grains should be consumed multiple times a day	212	21.1	18.7–23.7
Meat, fish, milk, and dairy products should be consumed daily (or less frequently) but in moderation	571	56.7	53.6–59.7
Butter, salt, and sweets should be consumed rarely and in small amounts	400	39.7	36.7–42.8
Daily sodium intake should not exceed 5 grams	436	43.3	40.3–46.4

Table 5. Factors that influence adults' correct knowledge of recommendations for consumption of various food groups (N = 1,007)

	ORc	ORa	95% CI	p-value
Recommended frequency of fruit and vegetable (except potatoes) consumption^a				
Gender				
Male	1.00			
Female	1.70	1.67	1.29–2.14	<0.001
Education				
Non-higher (lower-secondary, secondary, vocational, and other)	1.00			
Higher	1.92	1.83	1.41–2.39	<0.001
Daily recommended intake of fruit and vegetables (except potatoes)^b				
Gender				
Male	1.00			
Female	1.73	1.71	1.26–2.33	0.001
Recommendations for consumption of bread and grains^c				
Place of residence				
City	1.00			
Town	1.55	1.52	1.04–2.23	0.03
Village	1.70	1.64	1.13–2.40	0.009
Recommendations for consumption of meat, fish, milk, and dairy products^d				
Education				
Non-higher (lower-secondary, secondary, vocational, and other)	1.00			
Higher	2.17	2.05	1.55–2.72	<0.001
Recommendations for consumption of butter, sweets, and salt^e				
Gender				
Male	1.00			
Female	1.77	1.80	1.37–2.34	<0.001
Education				
Non-higher (lower-secondary, secondary, vocational, and other)	1.00			
Higher	2.13	1.75	1.32–2.32	<0.001
Place of residence				
Village	1.00			
Town	1.60	1.45	1.02–2.06	0.030
City	1.98	1.67	1.19–2.35	0.003
Recommendations for sodium intake^f				
Gender				
Male	1.00			
Female	1.67	1.65	1.28–2.13	<0.001
Education				
Non-higher (lower-secondary, secondary, vocational, and other)	1.00			
Higher	1.84	1.64	1.24–2.16	<0.001

^alikelihood ratio $\chi^2=43.96$; df. 4; $p<0.001$; Hosmer-Lemeshow test $\chi^2=8.37$; df. 8; $p=0.399$; R-square 0.032. Adjusted for age and marital status.

^blikelihood ratio $\chi^2=19.76$; df. 4; $p=0.006$; Hosmer-Lemeshow test $\chi^2=7.40$; df. 8; $p=0.494$; R-square 0.0186. Adjusted for age, marital status and monthly income.

^clikelihood ratio $\chi^2=9.90$; df. 4; $p=0.019$; Hosmer-Lemeshow test $\chi^2=7.87$; df. 3; $p=0.050$; R-square 0.010. Adjusted for education.

^dlikelihood-ratio $\chi^2=38.14$; df. 4; $p<0.001$; Hosmer-Lemeshow test $\chi^2=6.43$; df. 7; $p=0.491$; R-square 0.028. Adjusted for gender, marital status and monthly income.

^elikelihood ratio $\chi^2=64.57$; df. 6; $p<0.001$; Hosmer-Lemeshow test $\chi^2=15.47$; df. 8; $p=0.06$; R-square 0.048. Adjusted for place of residence and marital status.

^flikelihood ratio $\chi^2=39.78$; df. 5; $p<0.001$; Hosmer-Lemeshow test $\chi^2=12.36$; df. 8; $p=0.136$; R-square 0.029. Adjusted for place of residence and monthly income.

the need to consume at least 400 grams of fruit and vegetables daily, and less than half of those surveyed were familiar with the recommendations for the frequency of consumption of fruit and vegetables. A similar lack of knowledge has been observed by

other researchers (21, 22). Therefore, the results of both of our studies indicate that children's needs for information on nutrition are not being met, which leads to a lack of knowledge that they carry into adulthood and, in turn, pass on to their own children.

These results prove that adults need to be educated on the topic of nutrition just as children do, because they can then pass such knowledge on to their own children. The importance of parental education in shaping the eating habits of future generations and the links between parental knowledge and the eating habits of children have been confirmed by other researchers (23).

In assessing the impact of socio-demographic factors on adolescent need for information and adult knowledge, the factor of sex was conspicuous: girls had a greater need for information on nutrition than boys; girls felt that they lacked information on nutrition more than boys; and women had better knowledge of recommendations for the consumption of fruit, vegetables, butter, sweets, and salt than men. These results suggest that the girls surveyed were more interested in nutrition than boys and, as a result, that women had more knowledge on nutrition as adults compared to men. The role of sex as a significantly influential factor has also been confirmed by other researchers, whose studies have shown that the eating habits of girls and women are healthier than those of men (24, 25).

Education also had a significant effect on the knowledge of adults: respondents who had attained a higher level of education were significantly more likely to know the recommendations for consuming vegetables, fruit, meat, fish, milk, butter, sweets, and salt compared to respondents who had not. The notion that knowledge of nutrition had clear links to level of education was also noted by the authors of a systematic review of the scientific literature surrounding general knowledge of nutrition (26). Other studies also corroborate the idea that education, as well as sex, has a significant influence on people's eating habits and their knowledge of nutrition (25, 27). Although the respondents with higher levels of education had better knowledge of nutrition than those with other levels of education, our studies have shown that the educational background of neither parent has any significant impact on the child's need for information on nutrition. These results differ from the findings of other researchers, who have found a significant association between the education level of parents and the eating habits of children (23). In our opinion, the reason for such a discrepancy could be the lack of knowledge of the adolescents surveyed regarding the education level of their parents (a large portion of students failed to indicate the level of their mother's or father's education, so it is possible that the results of the study could have been distorted by these erroneous entries).

Adolescents' need for information on nutrition was also significantly influenced by the location of their school (information on nutrition was most required by students from schools in urban areas), while the knowledge of adults was influenced by their place of residence (rural residents had more knowledge of bread and grain consumption recommendations; urban residents were more knowledgeable about the recommendations for the consumption of butter, sweets, and salt). The significant influence that place of residence had on nutritional knowledge was also confirmed by other researchers (28). It should be noted that no significant differences were found between knowledge of nutrition among respondents of different ages or different marital statuses, but the findings of other researchers on this issue are contradictory (29, 30). For example, a study conducted in China determined that there was a significant difference between rural and urban kindergarten teachers in their knowledge of various nutritional topics, as urban residents had a better knowledge of vitamins and

child nutrition, while rural residents had a better knowledge of calcium and dietary fibre intake (29).

Limitations

It was determined that adolescents lacked information on nutrition and that adults had poor knowledge of the recommendations for the consumption of various food groups. A wide age range of adults (aged 18–75 years) participated in this study, but no adolescents outside the age range of 14–18 years were included. The WHO defines adolescents as 'individuals between 10 and 19 years of age', and therefore a study that includes this entire age group is necessary in order to provide a clearer conclusion regarding the need of Lithuanian adolescents for information on nutrition.

The adolescents and adults who participated in the survey were not related, however, a very small possibility remains that some adolescents and their parents were both interviewed separately. Therefore, in order to ascertain the association between the needs of adolescents for information on nutrition and the knowledge of their parents on nutrition, a separate study of adolescents and adults from the same families should be conducted.

Although the logistic regression models that were created to determine the influence of socio-demographic factors on the need of adolescents for information on nutrition and the knowledge of adults on nutrition included a series of factors, the possibility remains that some significant factors that may have influenced the outcome of the study have been omitted.

One intention of this study was to ensure that all students filled out the questionnaires under the same conditions. The majority of students completed their questionnaire in their classroom, while some chose to do it at home. It is likely that both teachers at school and parents at home were interested in obtaining 'better' results from the students' responses and may therefore have had an influence on them. The adult survey was also conducted under varying conditions: some respondents were surveyed by a professional interviewer, while the rest filled out the questionnaires independently. These factors could have had a slight influence on the results of the study.

CONCLUSIONS

The results of this study are an important source of information that reveals an acute issue in Lithuanian public health: adolescents lack information on nutrition, and adult knowledge of the recommendations for the consumption of various food groups is poor. These results indicate that when adolescents fail to receive the required information on nutrition from their family or school they remain poorly informed as adults and, consequently, this process negatively impacts the eating habits of their own children. The results obtained also revealed that some socio-demographic factors exert a significant influence on both the adolescent need for information and the adult knowledge of nutrition. We believe that the results of this study send a clear message to the policy makers and heads of schools: that information on nutrition must be continuously provided via various channels to both adolescents and adults, and that socio-demographic factors must be taken into account when planning public health intervention measures.

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Received November 9, 2020

Accepted in revised form September 24, 2021