

Dietary patterns and their association with sociodemographic factors in Lithuanian adult population

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Key words: dietary patterns; sociodemographic factors; health behavior monitoring.

Summary. The aim of the study was to determine the association between dietary patterns and sociodemographic factors using the data of Lithuanian health behavior monitoring.

Material and methods. In 1998–2004, four cross-sectional surveys were carried out within the FINBALT HEALTH MONITOR project. For every survey, a random sample of 3000 Lithuanians aged 20–64 years was taken from the National Population Register by mailed questionnaires. The response rates varied from 61.7% to 74.4%. Factor analysis was employed in order to reduce the number of food items. Four main factors were defined: “light food,” “sweets,” “heavy food,” and “cereals” factors. The associations between dietary patterns and sociodemographic factors were examined by applying a logistic regression analysis.

Results. Four major factors accounted for 45.9% of the total variance in food intake in men and 46.5% in women. The “sweets” factor was inversely associated with age both in men and women. A strong positive association was found between age and the “cereals” factor. Men and women with a higher level of education were more likely to follow “light food” and “sweets” pattern and less likely “heavy food” if compared with people with a lower level of education. The odds of consuming “light food” were higher in cities than in rural areas. Married men and women were more likely to follow “heavy food” pattern compared to unmarried.

Conclusion. This study identified four main dietary patterns in Lithuanian population. Dietary patterns of people with a higher level of education and inhabitants of cities are closer to the recommendations on healthy nutrition.

Introduction

Nutrition plays an important role in the development of chronic noncommunicable diseases (NCD): cardiovascular diseases, hypertension and stroke, obesity, type II diabetes mellitus, various forms of cancers (1). Studies have shown higher mortality and morbidity from NCD in lower socioeconomic groups (2, 3). Unhealthy diet might explain some of these socioeconomic disparities (4). People with a higher socioeconomic status choose a healthier diet as compared to those with a lower socioeconomic status (5, 6). Higher socioeconomic status is associated with higher consumption of both fruits and vegetables and lower consumption of animal fat. People from higher social classes are more likely to choose modern and healthy foods, while people with lower socioeconomic status tend to follow a traditional diet (7–9).

NCD present the major health problem in Lithuania. Mortality from NCD in the country is considerably higher if compared to Western Europe. Several studies have revealed social inequalities in mortality

and life expectancy in Lithuania (3). During the transition period in the 1990s, rapid political and economic changes have greatly influenced the health situation. People in low socioeconomic groups were mostly affected by economic instability. Substantial changes in nutritional habits of adult population have been observed in 1994–2004 in Lithuania (10). People started to consume more vegetable oil, margarine and less animal fat (lard, butter, and high-fat milk). The consumption of fresh vegetables, fruits, and dark bread has increased. Although all social groups of Lithuanian population have changed their diet, the social differences in nutrition habits still remained significant.

Dietary patterns might have a greater effect on health than any single food item (11). Identification of dietary patterns is very important for interventions aimed at promoting healthy nutrition. These interventions should focus on overall eating patterns rather than only on specific foods. The investigation of dietary patterns and their relations to social factors is

needed in order to plan preventive programs targeted to specific groups of population.

The aim of the current study was to determine the dietary patterns and their association with sociodemographic factors using the data of Lithuanian health behavior monitoring within the framework of the international FINBALT HEALTH MONITOR project.

Material and methods

The data from the cross-sectional postal surveys of 1998, 2000, 2002, and 2004 were used. For every survey, a national random sample of 3000 inhabitants aged 20–64 years was drawn from the National Population Register. The sampling unit was individual in all the surveys, and no measures to substitute for non-respondents were taken. The study material was collected through a postal survey. The response rates were 63.8%, 74.4%, 63.6%, and 61.7%, respectively. The study population comprised 3439 men and 4335 women.

Education was measured by five educational levels (primary, incomplete secondary, secondary, vocational, and university). The respondents with primary and incomplete secondary education were considered as having low education, those with secondary and vocational – intermediate, and those with university – high education. The degree of urbanization was based on an administrative classification of the places of residence. The respondents were grouped according to their place of residence as living in cities, towns, or villages. Marital status was dichotomized as married and others (single, divorced, widowed) (Table 1).

Self-administered food frequency questionnaire included questions about consumption of 26 commonly eaten foods. The alternatives used in the frequency scale were as follows: never, 1–2 days a week, 3–5

days a week, or 6–7 days a week.

Statistical analyses were performed using the statistical software SPSS 12.0 for Windows. Dietary patterns in men and women were assessed by a factor analysis. The main factors were identified using principal component analysis and orthogonal transformation (Varimax rotation) to make the interpretability easier. Food items with absolute factor loading >0.5 were considered as significantly contributing to the main factor. Categories that cross-loaded on several factors or had correlation of less than 0.5 with all of the factors were subsequently eliminated. The factor analysis extracted four main factors: “light food,” “sweets,” “heavy food,” and “cereals.” Factor scores for each main factor were calculated summing up the observed frequencies of the component food items weighted by factor loading. These scores were used in multivariate logistic regression analysis. Dichotomous variables were developed from each factor score based on median split. The odds of having positive factor’s value were calculated according to a range of sociodemographic variables. When the 95% confidence interval does not include 1, the OR was judged as statistically significant.

Results

The factor-loading matrix is shown in the Table 2. “Light food” factor was positively associated with the consumption of fresh fruit, vegetables, chicken, and fish. Sweet pastries (cookies, cakes) and sweets (candies, chocolate) were ascribed to the second factor named “sweets.” “Heavy food” factor included meat, meat products, eggs, and boiled or fried potatoes. “Cereals” factor was associated with the consumption of porridges, cereals, rice, pasta, and curd cheese.

Four major factors accounted for 45.9% of total

Table 1. Characteristics of the study population

Characteristic		Men N=3439 %	Women N=4335 %
Age groups, years	20–34	33.9	33.2
	35–49	38.4	39.0
	50–64	27.7	27.8
Level of education	Low	17.4	12.0
	Intermediate	64.0	63.7
	High	18.6	24.3
Place of residence	Cities	42.8	47.2
	Towns	28.3	30.6
	Villages	28.9	22.2
Marital status	Married	72.8	66.0
	Others	27.2	34.0

Table 2. The main factors and factor loadings for the dietary variables

Type of food	Main factors for men				Main factors for women			
	Light food	Sweets	Heavy food	Cereals	Light food	Sweets	Heavy food	Cereals
Fresh vegetables	0.68	—	—	—	0.77	—	—	—
Fresh fruit	0.66	—	—	—	0.71	—	—	—
Chicken	0.61	—	—	—	0.55	—	—	—
Fish	0.59	—	—	—	0.54	—	—	—
Sweet pastries	—	0.81	—	—	—	0.83	—	—
Sweets	—	0.78	—	—	—	0.83	—	—
Boiled potatoes	—	—	0.68	—	—	—	0.68	—
Eggs	—	—	0.59	—	—	—	0.60	—
Meat, meat products	—	—	0.51	—	—	—	0.55	—
Fried potatoes	—	—	0.50	—	—	—	0.52	—
Cereals, porridge	—	—	—	0.75	—	—	—	0.73
Rise, pasta	—	—	—	0.63	—	—	—	0.64
Curd cheese	—	—	—	0.53	—	—	—	0.50

Values of <0.5 were excluded from the table for simplicity.

variance in food intake in men and 46.5% in women (Table 3). “Light food” factor explained nearly 20% of total variance.

Logistic regression analysis revealed that dietary patterns were differently associated with age, level of education, place of residence, and marital status. The “sweets” factor was inversely associated with age both in men and in women (Table 4 and 5). A strong positive association was found between age and the “cereals” factor: older people favored the “cereals” diet. Men and women with a higher level of education were more likely to follow the “light food” and “sweets” pattern and less likely “heavy food” than people with low education. The place of residence had a significant effect on dietary patterns. The odds of consuming “heavy food” in towns and villages were higher than in cities. Conversely, people living in cities were more likely to consume “light food” than those living in rural areas. Men in towns and villages favored “cereals” diet more often than the inhabitants of cities did. Married men and women

were more likely to follow “heavy food” pattern compared to the unmarried. “Sweets” factor was more common for married men than for the other. The odds of having “light food” among married women were higher than among the unmarried.

Discussion

Factor analysis was employed in the present study in order to identify dietary patterns of the Lithuanian adults. Factor analysis defined four major factors. Two factors (“light food” and “cereals”) might be assigned to healthy patterns, while the other two (“sweets” and “heavy food”) might increase a risk of chronic diseases (12). The identified patterns are to some extent similar to those found in previous studies where a “prudent diet” was characterized by a high intake of fruit and vegetables and a Western dietary pattern proved a high intake of meat were derived from factor analysis (11, 13). On the other hand, some differences between the studies are evident. The dietary patterns defined in the present study represent

Table 3. Description of the main factors

Factor	Description	Percentage of variance explained	
		Men	Women
Light food	Fresh vegetables, fruit, berries, poultry, fish	18.3	17.2
Sweets	Sweet pastries (cookies, cakes), sweets (candies, chocolates)	10.6	11.4
Heavy food	Meat and meat products, eggs, boiled potatoes, fried potatoes	9.3	10.4
Cereals	Porridges, cereals, rise, pasta, curd cheese	7.7	7.5
All factors		45.9	46.5

Table 4. Adjusted odds ratios for the likelihood of having positive values of main factors in relation to socioeconomic characteristic in men**

Variable		“Light food” factor		“Sweets” factor		“Heavy food” factor“		Cereals” factor	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age groups, years	20–34	1.00		1.00		1.00		1.00	
	35–49	0.98	0.83–1.16	0.50	0.42–0.59*	1.12	0.94–1.33	1.4	1.19–1.66*
	50–64	0.91	0.75–1.09	0.26	0.21–0.32*	0.94	0.78–1.13	1.66	1.38–2.0*
Level of education	Low	1.00		1.00		1.00		1.00	
	Intermediate	1.28	1.05–1.57*	1.53	1.24–1.88*	0.78	0.64–0.95*	0.88	0.72–1.07
	High	2.31	1.81–2.95*	2.61	2.03–3.36*	0.43	0.34–0.55*	1.12	0.88–1.42
Place of residence	Cities	1.00		1.00		1.00		1.00	
	Towns	0.73	0.61–0.86*	1.02	0.86–1.21	1.69	1.43–2.0*	1.18	1.01–1.39*
	Villages	0.53	0.45–0.63*	0.90	0.76–1.07	2.05	1.73–2.43*	1.2	1.03–1.44*
Marital status	Married	1.00		1.00		1.00		1.00	
	Others	0.99	0.84–1.16	0.66	0.56–0.78*	0.79	0.67–0.93*	1.1	0.94–1.30

OR – odds ratio; CI – confidence interval.

* $P < 0.05$. **Odds ratios are adjusted for all variables in the logistic regression analysis.

Table 5. Adjusted odds ratios for the likelihood of having positive values of main factors in relation to socioeconomic characteristic in women**

Variable		“Light food” factor		“Sweets” factor		“Heavy food” factor“		Cereals” factor	
		OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age groups, years	20–34	1.00		1.00		1.00		1.00	
	35–49	1.22	1.06–1.41*	0.57	0.49–0.66*	1.19	1.03–1.38*	1.45	1.25–1.67*
	50–64	1.13	0.96–1.33	0.32	0.27–0.38*	1.01	0.86–1.18	2.04	1.74–2.40*
Level of education	Low	1.00		1.00		1.00		1.00	
	Intermediate	1.66	1.34–2.05*	1.07	0.87–1.31	0.75	0.61–0.92*	0.93	0.76–1.13
	High	2.85	2.25–3.62*	1.33	1.05–1.68*	0.44	0.35–0.61*	1.20	0.96–1.51
Place of residence	Cities	1.00		1.00		1.00		1.00	
	Towns	0.69	0.60–0.80*	1.03	0.89–1.19	1.36	1.18–1.56*	1.03	0.98–1.18
	Villages	0.52	0.44–0.62*	0.94	0.80–1.11	2.25	1.91–2.65*	1.06	0.90–1.24
Marital status	Married	1.00		1.00		1.00		1.00	
	Others	0.80	0.70–0.92*	0.94	0.81–1.11	0.72	0.64–0.83*	1.03	0.91–1.17

OR – odds ratio; CI – confidence interval.

* $P < 0.05$. **Odds ratios are adjusted for all variables in the logistic regression analysis.

Lithuanian nutrition habits. Other researchers conclude that results from the factor analysis are limited to the studied population (12, 13).

The method of the factor analysis for the identification of the dietary patterns presents some limitations because it is affected by subjective decisions. The results depend on the food items included (some of food items can be omitted due to low loadings or cross-loading on several factors), the number of the factors extracted, and the method of rotation used (13, 14). In our study, the extracted factors accounted for almost 50% of the total variance. However, this find-

ing should be interpreted cautiously as the factor structure depended on the food items initially assessed.

All identified patterns were similar for Lithuanian men and women. Earlier studies reported healthier dietary patterns of women than men (15). The Baltic Nutrition Survey, conducted in Estonia, Latvia, and Lithuania, also found out that diet of women was healthier if compared to that of men (16).

Our study shows that dietary patterns were differently related to sociodemographic factors. Older people consumed foods ascribed to “cereals” factor more often and “sweets” less often if compared to

younger respondents. As documented in several other studies, middle-aged people prefer high-fiber diet, while young people consume more sweets, soft drinks, snacks, ready-made food (17, 18).

The current study suggests that in general, people with a higher level of education followed healthier dietary patterns if compared to people with a low education. Many studies have reported educational differences in food consumption (9, 19–21). Highly educated tend to be closer to the national and international recommendations of dietary guidelines (9, 22). They consume more fruit and vegetables and have a lower intake of fat and meat (23, 24).

Dietary patterns of Lithuanian population were associated with place of residence. Both men and women living in the rural areas favored “heavy food” pattern and were more likely to follow “light food” pattern. A less healthy diet of people living in rural areas has been also reported by other investigators (9, 19). It should be noted that Lithuanian men in villages and towns consumed more food ascribed to “cereals” factor (porridges, cereals, rice, pasta, curd cheese). This may have some protective effect on health through the increase of dietary fiber intake.

Dietary patterns were associated with marital status in men and women differently. Married women were more likely to consume fresh vegetables, fruits, poultry, and fish, while married men were more likely to consume sweets. Married people, both men and women, were more likely to follow “heavy food” pat-

tern. The findings of other surveys on the association between marital status and dietary patterns are inconsistent (25, 26). Some investigators have shown that dietary patterns of married people are healthier, while the conclusion about the others is contrary.

Sociodemographic differences in dietary patterns might suggest several explanations. Price is an important factor influencing food choice. Lack of money, which is more common among older people, people with a low education, and those living in rural areas, can restrict consumption of healthy food (27). When buying food, people from a higher social class choose health over food price more frequently than those from a lower social class (5, 28). People with a higher level of education are more concerned about their health; they are more knowledgeable about healthy nutrition and choose healthier foods more easily if compared to people with a lower level of education (5, 28, 29).

Conclusion

The present study identified four main dietary Lithuanian population patterns and indicated the sociodemographic differences in these patterns. Dietary patterns of people with a higher level of education and inhabitants of cities are closer to the recommendations on healthy nutrition. It is very important to reinforce the promotion of healthy nutrition, particularly among the low social status groups, in order to achieve the major target of Lithuanian health program to decrease socioeconomic inequalities in health.

Lietuvos gyventojų mitybos įpročių, socialinių ir demografinių veiksnių sąsajos Mitybos įpročiai, socialiniai ir demografiniai veiksniai

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Raktažodžiai: mitybos modeliai, socialiniai ir demografiniai veiksniai.

Santrauka. *Darbo tikslas.* Įvertinti Lietuvos gyventojų mitybos įpročių, socialinių ir demografinių veiksnių sąsają.

Tyrimo medžiaga ir metodai. Dalyvaujant tarptautiniame FINBALT HEALTH MONITOR projekte 1998–2004 m., Lietuvoje atliktos keturios apklausos paštu. Kiekvienai jų iš Lietuvos gyventojų registro sąrašų atsitiktinai buvo atrinkta po 3 tūkst. 20–64 metų žmonių. Atsako dažnis – nuo 61,7 iki 74,4 proc. Siekiant sumažinti mitybos įpročius charakterizuojančių kintamųjų skaičių, taikyta faktorinė analizė. Logistinė regresinė analizė taikyta siekiant įvertinti gyventojų mitybos įpročių sąsają su socialiniais ir demografiniais veiksniais.

Rezultatai. Išskirti keturi veiksniai: „lengvo maisto“, „saldumynų“, „sunkaus maisto“ ir „košių“, kurie paaiškino 45,9 proc. teikiamos informacijos apie vyrų mitybą, ir 46,5 proc. informacijos apie moterų mitybą. Didesnės „saldumynų“ veiksnio reikšmės nustatytos jaunesnio amžiaus vyrams ir moterims. Stiprus teigiamas ryšys nustatytas tarp gyventojų amžiaus ir „košių“ veiksnio. Aukštojo išsilavinimo vyrai ir moterys dažniau nei žemesnio išsilavinimo gyventojai rinkosi produktus, priskirtus „lengvo maisto“ ir „saldumynų“ veiksniams, rečiau – „sunkaus maisto“ veiksniai. Galimybė, kad miesto gyventojai dažniau rinktų „lengvą maistą“, buvo didesnė palyginus su kaimo gyventojais. Šeimoje gyvenantys vyrai ir moterys dažniau nei vieniši rinkosi

„sunkaus maisto“ veiksmui priskirtus maisto produktus.

Išvados. Lietuvos gyventojų mitybą galima charakterizuoti keturiais mitybos veiksniais. Gyventojų, turinčių aukštesnį išsilavinimą bei gyvenančių mieste, mitybos įpročiai labiau atitiko sveikos mitybos rekomendacijas nei žemesnio išsilavinimo ir gyvenančių kaime žmonių.

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