

# Social variations in nutritional habits and their trends in Lithuanian adult population

Vilma Kriaucioniene

Master of Public Health

MPH 2006:24



Nordic School of Public Health





## Master of Public Health

– Essay –

Title and subtitle of the essay Social variations in nutritional habits and their trends in Lithuanian adult population				
Author Vilma Kriaucioniene				
Author's position and address Junior Researcher, Department of Preventive Medicine, Institute for Biomedical Research, Kaunas University of Medicine, Eiveniu 4, LT-50009, Kaunas, LITHUANIA				
Date of approval 2006-08-29			Supervisor NHV/External Janina Petkeviciene	
No of pages 41	Language – essay English	Language – abstract English	ISSN-no 1104-5701	ISBN-no 91-7997-157-1

The aim of this study was to assess the socio-demographic variations in nutritional habits and their trends over the last decade in Lithuanian adult population.

Methods: Six health behaviour surveys were carried out within the international FINBALT HEALTH MONITOR project between 1994-2004. For every survey the national random sample of 3000 inhabitants aged 20-64 was taken from the National Population Register. The study material was collected through mailed questionnaires covering sociodemographic characteristics and some nutrition habits. Response rates ranged from 61.7% to 74.4%. Education was measured using five educational levels. The respondents were categorized into three groups: persons with incomplete secondary education (primary or incomplete secondary), secondary (secondary or vocational), and university education. The degree of urbanization was based on the administrative classification of the places of residence. The respondents were grouped as living in cities, towns, or villages. The effect of age, level of education, place of residence, and marital status upon nutritional habits was evaluated using multifactor logistic regression analysis that was carried out separately for men and women.

Results: Positive trends in nutritional habits were observed between 1994-2004 in Lithuania. The diet of the Lithuanian population tended to become closer to the WHO recommendations for healthy nutrition. The intake of animal fat decreased. Almost a half of population replaced butter on bread by low fat margarine. The proportion of men using vegetable oil for cooking increased from 31.1% in 1994 to 82.6% in 2004, and the proportion of women – from 47.7% to 89.4, respectively. The consumption of fresh vegetables, fruit, and dark bread has increased. Although all social groups of the Lithuanian population have changed their diet, social differences in nutrition habits still remained significant. Women, highly educated persons and urban population have healthier diet than men, people with lower education and rural population. The odds ratio of using vegetable oil among men with university education was higher by 98% and among women – by 67% than that among persons with incomplete secondary education. The respondent with university education were more than twice as likely as low educated people to consume fresh fruits daily. The proportion of persons drinking whole milk was much higher in villages (OR 4.80 (CI 4.0-5.8) for men and 7.33 (CI 6.1-8.8) for women) compared to cities.

Conclusions: Existing social differences in nutritional habits should be considered in the programs for the promotion of healthy nutrition and implementation of Lithuanian Food and Nutrition Action Plan development.

Key words

nutritional habits, socioeconomic status, food frequency questionnaire, trends.

## TABLE OF CONTENTS

<b>Introduction and background</b> .....	3
<b>Aim</b> .....	7
<b>Specific objectives</b> .....	7
<b>Materials and methods</b> .....	8
<b>Results</b> .....	10
The trends in the nutritional habits of the Lithuanian population in 1994-2004.....	10
Social differences in nutritional habits of Lithuanian population .....	14
<b>Discussion</b> .....	21
<b>Acknowledgment</b> .....	31
<b>References</b> .....	32
<b>List of abbreviation</b> .....	42

## INTRODUCTION

Food and health are highly associated. Food can offer health and life but it can also bring illness and death. Diet plays an important role in most of the chronic noncommunicable diseases (NCD): cardiovascular diseases, hypertension and stroke, obesity, type II diabetes mellitus, various forms of cancers (1). As a result of industrialization, urbanization, economic development, and market globalization rapid changes in diets and lifestyles have taken place over the last decades; these changes are making a significant impact upon the health and nutritional status of populations. The transition in nutrition is marked by a transformation from diets based on staple foods, such as grains, potatoes, locally grown vegetables, towards more varied diets that include more processed food, more foods of animal origin, and more added sugar, salt and fat (2, 3). Dietary changes together with reduced physical activity have been leading to a rapid increase in NCD. In 2001, chronic diseases contributed approximately 60% of the total reported deaths in the world and approximately 46% of the global burden of disease (4).

During the last decade dramatic changes occurred in the political, social and economic situation of Lithuania. These changes have affected health and diet habits of the population: during the transition towards the market economy, the availability of certain foods have been reduced for some population subgroups, the reductions in subsidies have increased the prices of food products, and market globalization as well as insistent advertisement has decreased the demand for local traditional foods. On the other hand, the availability of healthy foods such as vegetable oil, margarine, or skimmed milk increased.

During the transition period in the 1990's, people from low socioeconomic groups appeared to be the most affected by the economical instability. Studies that were carried out in Lithuania have shown higher mortality in lower socioeconomic groups (5). Trends in mortality were not steady throughout the period of 1991-2000. An average increase in mortality within Lithuanian population during the period of 1991-1994 had reached 4.1% per year. In 1995-2000, a decreasing tendency was observed. Positive changes were determined by mortality from cardiovascular disease (about 50%) (6). Increasing inequalities in mortality by education, occupation, place of residence were documented (7-12). The risk of death from cardiovascular disease was 1.5 times higher among manual workers than among non-manual workers (13). Usually non-manual workers have a higher level of education. Studies that have been carried out in Lithuania on the inequalities in health present a significantly lower mortality of people with higher education compared to those with no higher education (14, 15). Life expectancy in men with incomplete secondary education was 11.7 years shorter, and the life expectancy in women with incomplete secondary education was 4.3 years shorter, as compared to better-educated men and women (16).

During the periods of political and economical transition, less educated people tend to be at the worse situation when competing for a better-paid job, pursued occupation, favourable working conditions. On the other hand, the mortality of the rural population is significantly higher than the mortality of people living in the urban areas, and these

inequalities are increasing (7). Trends in life expectancy differ markedly among the urban and rural population.

It is well documented that health inequalities depend on economic, cultural, psychosocial, environmental and lifestyle factors, where nutrition also plays a significant role (17, 18). Dietary survey data indicate that unfavourable dietary habits might explain part of the socioeconomic disparities in health (18). People with a higher socioeconomic status have a healthier diet compared to those with lower socioeconomic status (19-23). Higher socioeconomic status is associated with higher consumption of both fruit and vegetable 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 (2, 24-26). Those belonging to a lower social class are exposed to an unhealthier environment; they have a lower income, and may not be able to afford to buy the more expensive, healthy food (19, 27, 28). People with lower socioeconomic status usually have less money to spend on food. Probably they have a lower income as they are more likely to be unemployed, receiving benefits and less qualified.

The most common socioeconomic status indicators employed in the studies are education, occupation and income (29).

Education has some advantages compared to occupation and income, because it is easy to measure and it sustains minor changes over adult life. Therefore, education is frequently taken to be the main measure of the socioeconomic status. The data of the surveys performed in 15 European countries have shown a relationship between the education and the consumption of vegetables and fruits: in many countries a higher education level was associated with a greater consumption of fruits and vegetables (18, 30). A positive correlation between education level and consumption of fruits and vegetables was stronger in the Nordic countries as compared with the South European countries (31). However, the results of a recent study have indicated that Spanish people with university education consumed fruit and vegetables more frequently than those with low education did (32). Other investigators have confirmed that low and high-educated people had different sources of fats. For example, high-educated Finns consumed less whole milk and butter on bread but they eat more cheese than the low educated people did (3). As a result, the proportion of fat in food was similar among all educational groups.

Well-educated people may more easily understand the advantages of a healthy diet (3, 16, 33). 85% of highly educated Norwegian women and 61% of men preferred food they considered to be healthy (31). The survey that had been carried out in England suggested that social class and education were making impact upon the ways people learned how to cook. Cookery books were more important for higher social classes, whilst cookery classes at school were more important for lower social classes.

Socioeconomic status is a very important social determinant in public health nutrition studies. However, the use of other social determinants such as gender, place of residence, and family status is none the less significant, too. Gender is related to certain

roles and statuses in the society and family (27). Men and women have different perspectives and priorities in relation to such issues as diet and health, and even the ethical dimension of food choice (34, 35). A food choice is a way to express social position as well as masculinity or femininity. Men have traditionally valued heavy, powerful, and strong things, while women put the emphasis on lightness (27). By choosing red meat, men show their virility and power. A significant greater proportion of the energy consumed by men in a range of Europe societies is obtained from meat, animal products and alcohol, while that of women is obtained from vegetable, fruits and berries (36-38). It is more uncertain however, which status is ascribed to fish. Bourdieu finds that especially in the working classes of France, fish seems to be regarded as an unsuitable food for men (39). Nevertheless, it has been found in other studies that fish goes well with male identity, especially in fishing communities (40).

Men and women tend to hold rather different views on what is the ideal body shape for each sex. Men and women tend to display similar rates of obesity. However, women seem to be more inclined to lose weight through food intake restriction as well as to be more dissatisfied with their body shape if compared to men (41). In the UK study 40,8% of women and only 23,9% of men pointed out that they were dissatisfied with their body shape (34). Guilt in relation to eating also seemed to be frequently prevalent in females than in males. Lean constitution is a desirable body shape for women, while well-toned, muscular body is a typical value for men. These stereotypes may vary according to different countries and cultures. But it may be that the western cultural force to keep the thin female body more compulsory as compared with 'good' male body images (42).

According to many international studies, women have healthier food behavior and diets more consistent with current nutrient recommendations if compared to men (43-45). Population dietary changes among women are observed earlier and more pronounced if compared to the behaviour of men. This includes an increase in vegetable consumption, a decrease in meat consumption, and a switch from fat to leaner milk types (31, 46). In most Western countries men drink more alcohol and eat more meat and potatoes (and less fish, chicken, vegetables, fruits and cheese) than women (44, 45). Dietary surveys in Denmark have documented that meat, potatoes, and alcohol make up a relatively greater proportion of men's diets if compared to the proportion of these consumed by women, while vegetables, fruits, fish, cottage cheese, yoghurt compose a greater proportion of women's diet (47). Similar data were reported in a number of dietary surveys undertaken in Finland, Sweden, Great Britain, Norway (48-51). Women seem to be more knowledgeable about food and nutrition and indicate higher levels of care in selecting foods to achieve a healthy diet (52-54). Women more often than men chose the foods they considered to be healthy. Men frequently prefer food they like (55-57). There was a huge gender difference in the frequency of meal cooking. A total of 68% of women indicated that they cooked every day, compared to only 18% of men (58). Food purchasing and preparation is most often a women responsibility; women might be influencing the amount eaten at each meal, as well as the frequency of such meal, or food products eaten.

Dietary habits vary with age. Some of the previous studies have demonstrated that diet of older people is healthier if compared to the diet of the young (59, 60). A cross-

sectional study that was carried out in England showed that 16-24 year old people were classified as low consumers, compared with only 36% of 45-74 year olds (50). A higher consumption of fruit and vegetables was also reported by the older respondents (49, 59, 61). In addition, the Malmo Diet and Cancer Study has revealed that the proportion of people reporting low consumption of vegetables and no consumption of fruit juices increased with age, while the proportion with a low consumption of fruits decreased with increasing age (51). However, the results of the France survey stated that the lower intake of fruit and vegetables for young people is a generation effect and not an age effect (62). The finding being explained by the fact that the younger generation is not interested in preparing fresh vegetables and fruit. The fruit and vegetables that are eaten more frequently by the young are the ones that are convenient to eat (tomatoes, mandarins, bananas), while those that are eaten less frequently are less convenient and require some preparation (cauliflowers, leeks, lettuces) (62). Full fat milk was often used as drinking milk, however, significantly frequently in the oldest age group (59). In the Baltic countries, the corresponding data were revealed (52). According Australian studies, reduced fat milk consumption was more frequent among the elderly people and women (63). Most aged men and women more often preferred butter to margarine as a spread on bread if compared to the youngest people (52, 53, 59, 64). Danish studies have indicated, that older man and women consumed animal fats, low-fat margarine, light rye bread, white bread, potatoes, fruit, fish and jam more frequently, and vegetable margarine, milk, coarse rye bread, coarse white bread, rice, pasta, meat for sandwiches, ice cream and candies less frequently if compared to the younger age groups (46). The data from the English Cohort-EPIC study have demonstrated that the age trends represent the differences of at least 20% between the youngest and the oldest population for white fish, soup, and tea (that were consumed more by older respondents. At the same time alcohol, other drinks, legumes, nuts, other cereal products, fish products, coffee, vegetarian foods, poultry, and shellfish were all consumed more frequently by the younger subjects (65). Generally, fruit, vegetables, and other high-fibre foods were more popular among the middle-aged, whereas soft drinks, salty snacks, high-fat foods were more popular among the younger persons (48, 59).

Urban Norwegian men, as well as women reported a higher consumption of fruit and vegetables in comparison to those living in rural areas. Diet of men living in cities had lower proportion of energy from fat than men living in rural areas (26). The relationship between the place of residence and the usage of fats and fruit were revealed in a Chinese study. The Chinese people that lived in cities consumed fat, animal products and fruit more frequently (66). The analogous situation is observed with different developing countries, reflecting the rate of economic development as well as demonstrating that higher socioeconomic groups can afford more luxurious food products (66).

Many studies have investigated the differences in nutritional habits according to the family status (3, 67-71). Marital status and health behaviour have significantly been related in most cases. The married ones had better diet if compared to the unmarried ones (43, 72). Finish men in favour of healthy diets were most often married. They reported a low consumption of meat and white bread, a high consumption of fish and whole meal bread, a low consumption of full cream milk, cream, butter, sugar, biscuits and pies, a moderate consumption of wine and low consumption of beer, a high

consumption of fruit and vegetables (73). Nevertheless, the data from the East Anglia presented contrary results. In health and nutrition studies, the strength of the association between health, nutrition and marital status has been found to be different for men and women. Women were more likely to control the health of the rest of the family members through the food served in the family (27, 69). Women were usually responsible for the food preparation, even if they worked longer hours than husbands did (69, 74). Less than 40% of men with wives employed full-time and less than 30% of husbands with wives employed part-time or not employed at all shared in meal preparation (75). Several more studies have demonstrated that marriage often has a positive impact on nutritional behavior, particularly for men and suggest that women appear to make a positive impact upon the quality of their husbands' diets, while men have little or no impact on the quality of their wives' diets (67).

Since eating behaviour is for the most part a learned behaviour, parents, and especially mothers, play an important role in children nutrition (19, 43). Scientific literature presents that mothers from a higher social class more frequently assume that children's taste could be developed, whereas working class mothers more frequently consider that children might eat snacks as long as they are provided with three main meals per day, as well as that tasty food is important to please children and family (43). Despite a tighter budget, lower social class mothers bought foodstuffs, which their family preferred, more frequently if compared to higher or middle class mothers (19).

## **AIM**

The aim of the study is to assess the socio-demographic variations in nutritional habits and their trends over the last decade in Lithuanian adult population.

## **SPECIFIC OBJECTIVES**

To evaluate the trends in food habits of Lithuanian adult population between 1994 and 2004.

To determine gender and age differences in nutritional habits in Lithuanian adult population;

To examine the associations between nutritional habits and the level of education;

To evaluate the differences in nutritional habits in relation to the place of residence and marital status.

## MATERIAL AND METHODS

Lithuania joined the international project of health behaviour monitoring (FINBALT HEALTH MONITOR) in 1994. Finland, Estonia, Latvia, and Lithuania are the countries participating in this project.

In Lithuania, six health behaviour surveys on national samples of the adult population were being carried out every two years. For every survey, a national random sample of 3000 inhabitants (aged 20-64) was taken 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 questionnaires were mailed in March and those who did not respond within a month received another copy of the questionnaire in May. The self-administrated questionnaire was filled-in by 11659 respondents (5146 men and 6513 women) altogether. Table 1 presents the number of the respondents of each survey. Response rates ranged from 61.7% to 74.4% (Table 1).

Table 1. Number of respondents and response rate

Year	Number of respondents						Response rate
	Men		Women		Total		
	N	%	N	%	N	%	%
1994	787	42.2	1077	57.8	1864	100	64.3
1996	920	45.5	1101	54.5	2021	100	68.9
1998	823	43.9	1051	56.1	1874	100	63.8
2000	996	45.4	1199	54.6	2195	100	74.4
2002	836	44.4	1047	55.6	1883	100	63.6
2004	784	43.0	1037	57.0	1822	100	61.7
Total	5146	44.1	6513	55.9	11659	100	

The standardized questionnaire contained questions on the socio-demographic characteristics, subjective health, smoking, nutrition habits, alcohol consumption, physical activity, and advice to change health behaviour. The main questions of interest have been kept unchanged to ensure the comparability between the years studied.

The respondents were differentiated into three age groups: 20-34, 35-49, and 50-64 year-old. Education was measured using five educational levels (primary, incomplete secondary, secondary, vocational, and university). The respondents were categorized into three main groups: persons with incomplete secondary education (primary or incomplete secondary), secondary (secondary or vocational), and university education. The degree of urbanization was based on the administrative classification of the places of residence. The respondents were grouped as living in cities, towns, or villages according to their place of residence. They were categorized as married and unmarried according to their marital status.

In 1994, the questionnaire included 13 separate food-related questions dealing with cooking fats, bread spreads, vegetables, milk, bread, eggs, sugar, coffee and tea consumption. Since 1996 the question on the frequency of the consumption of fresh vegetables has been included and since 1998, the food frequency questionnaire (FFQ) has been included. The respondent was asked to mark the frequency of the consumption of the 20 common food items: 'How often during the last week have you consumed the following foods and drinks?' The respondent could choose one of the following answers: never, 1-2 days a week, 3-5 days a week, or 6-7 days a week. What concerns the food items, the former questions on cooking fats, bread spreads, milk, bread, eggs, sugar, and coffee and tea consumption were kept unchanged.

## **Statistical analysis**

Statistical analyses were performed using the statistical software package SPSS 11.0 for Windows. In order to assess the trends in nutrition habits between 1994 and 2004, age-adjusted prevalence rates were calculated using the distribution of Lithuanian population by age in 2001 (census data) as a standard. P for the trends was estimated.

Data from 1998, 2000, 2002, and 2004 were used for the analysis of the associations between the social factors and nutrition habits. The differences in the distribution of the respondents were assessed using analyses of the chi-squared tests. The difference was considered to be significant when  $p < 0.05$ . The effect of age, level of education, place of residence, and marital status upon nutritional habits was evaluated using multifactor logistic regression analysis that was carried out separately for men and women. The reference groups were as follows: the age group of 20-34 year-olds, the respondents with an incomplete secondary education, the residents of the urban areas, and the married subjects. The results are presented as odds ratios and 95% confidence intervals. When the 95% confidence interval did not include 1, the odds ratio was considered to be statistically significant.

The scientific literature survey on the investigated subject was done using the Pub Med database. References were listed according to the Vancouver citation system.

## RESULTS

### The trends in the nutritional habits of the Lithuanian population in 1994-2004

Substantial changes in nutritional habits of the Lithuanian population over the last ten years have been observed (Fig.1). Since 1994, the proportion of persons using mostly vegetable oil for cooking has doubled (among men from 31.1% in 1994 to 82.6% in 2004, and among women - from 47.7% to 89.4%, respectively). The data of the last survey showed that only 8.5% of men and 5.6% of women used lard for cooking.

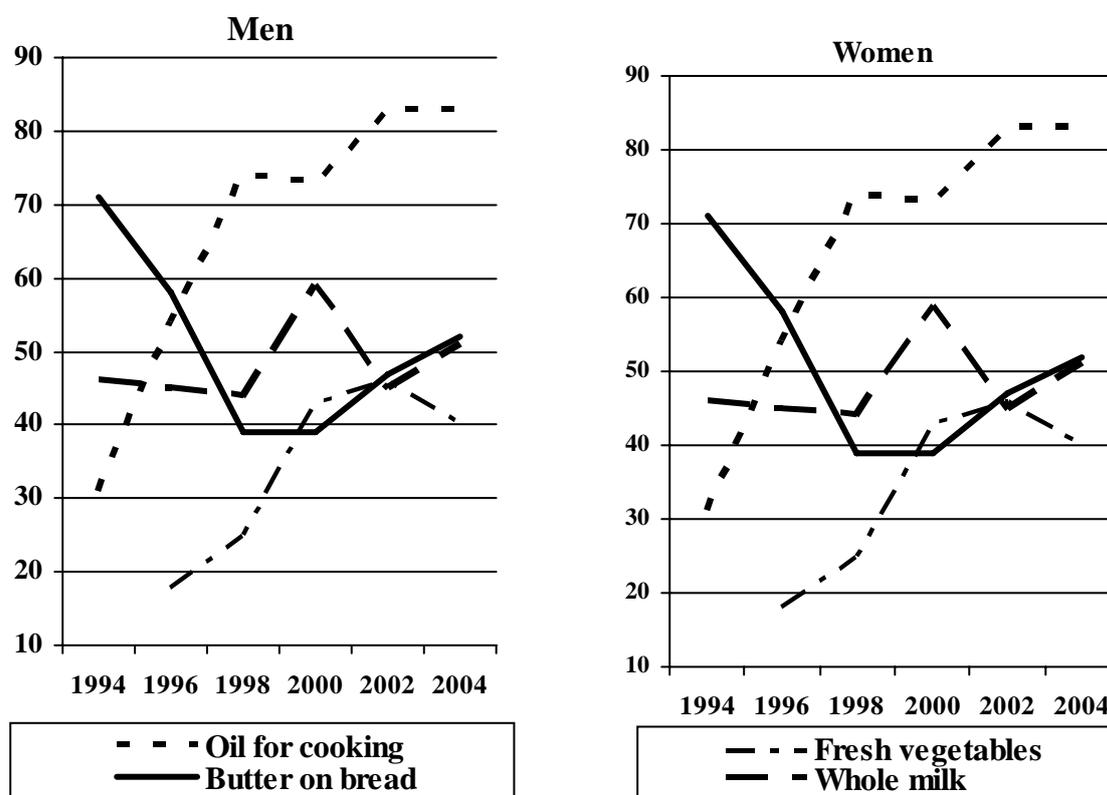
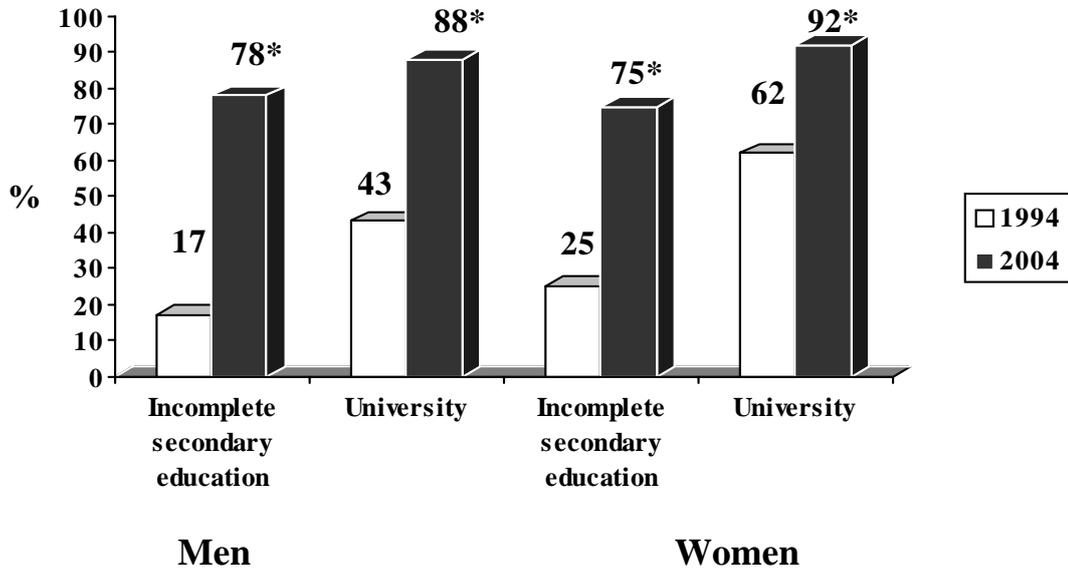


Fig.1. Trends in the nutritional habits of the Lithuanian adult population in 1994-2004 (the proportion of persons using vegetable oil for cooking, spreading butter on bread, drinking high-fat milk and eating fresh vegetables at least 3 days a week; p for trends < 0.05 for all nutritional habits in men and women)

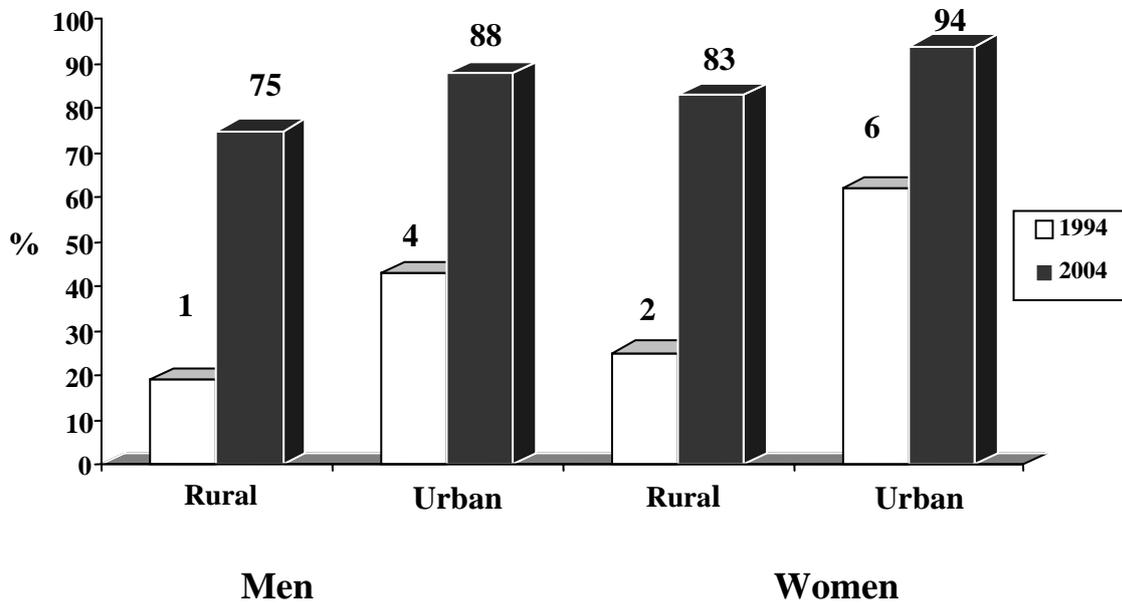
The usage of vegetable oil has increased in all educational groups of population, and that increase was most substantial among people with lower education. Although the educational differences in the usage of vegetable oil were diminishing over ten years, in 2004 people with university education continued to use vegetable oil more often compared to those with incomplete secondary education (Fig.2). The data of the last

survey showed that the use of vegetable oil was more common in urban than in rural areas. However, the increase was more evident in rural areas (Fig.3).



\*p<0.05 compared to 1994

Fig.2. Proportion of persons using vegetable oil for cooking in 1994 and 2004 by level of education

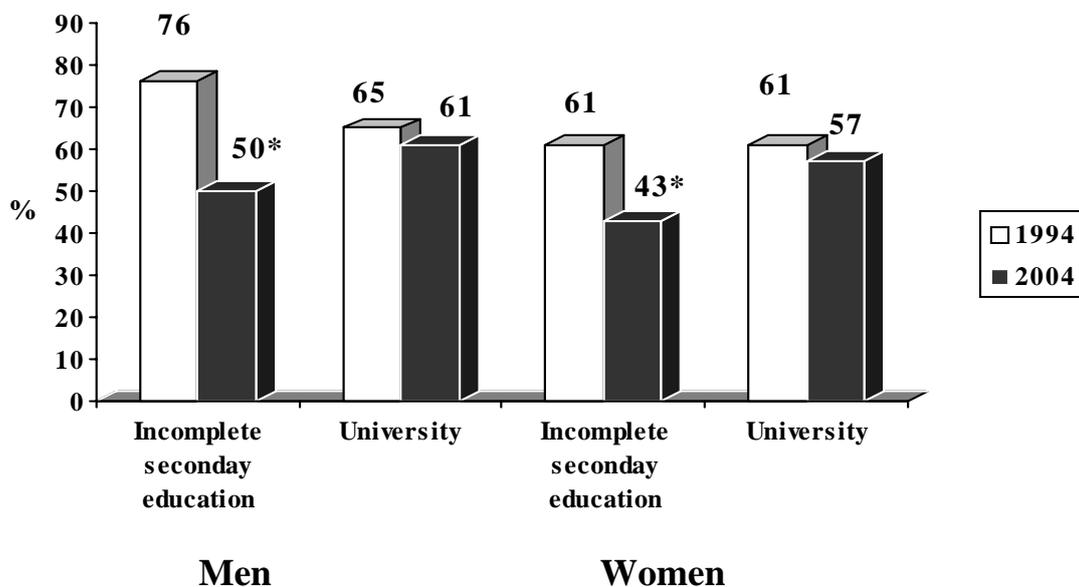


\*p<0.05 compared to 1994

Fig.3. Proportion of persons using vegetable oil for cooking in 1994 and 2004 by place of residence

In 1994, 74.2% of men and 66.3% of women indicated that they had used butter on bread (Fig.1). In the year 2000, the proportion of persons who spread butter on bread halved (in men - from 71.2% in 1994 to 37.6% in 2000, and in women - from 66.3% to 38.2%, respectively) because people started to use margarine. However, data of 2002 and 2004 showed that the use of butter increased again. Over the last five years, the availability of spreads based on milk fats (mixture of butter and vegetable oil) has increased in the Lithuanian market significantly, and people started to consume them, which resulted in the increase in the use of animal fat on bread. In 2004, 52% of men and 53.8% of women reported that they used butter or mixture of butter on bread.

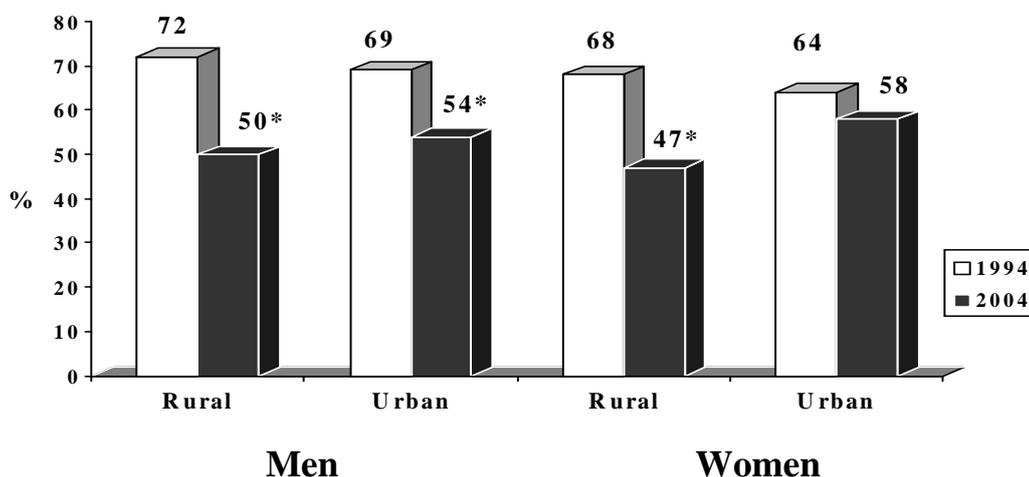
People with incomplete secondary education have decreased the usage of butter on bread, while frequency of this habit has not changed among better educated people (Fig.4). The proportion of persons that started to spread margarine instead of butter on bread was larger in rural than in urban areas. In 2004, spreading of butter on bread was less common among women living in rural areas than among women in cities (Fig.5).



\*p<0.05 compared to 1994

Fig.4. Proportion of persons spreading butter on bread in 1994 and 2004 by level of education

Over the ten-year period, almost no changes have been found in the consumption of high-fat milk (Fig.1). In 2004, 37.8% of the respondents reported drinking this kind of milk, while in 1994 this habit was indicated by 46.8% of the subjects.



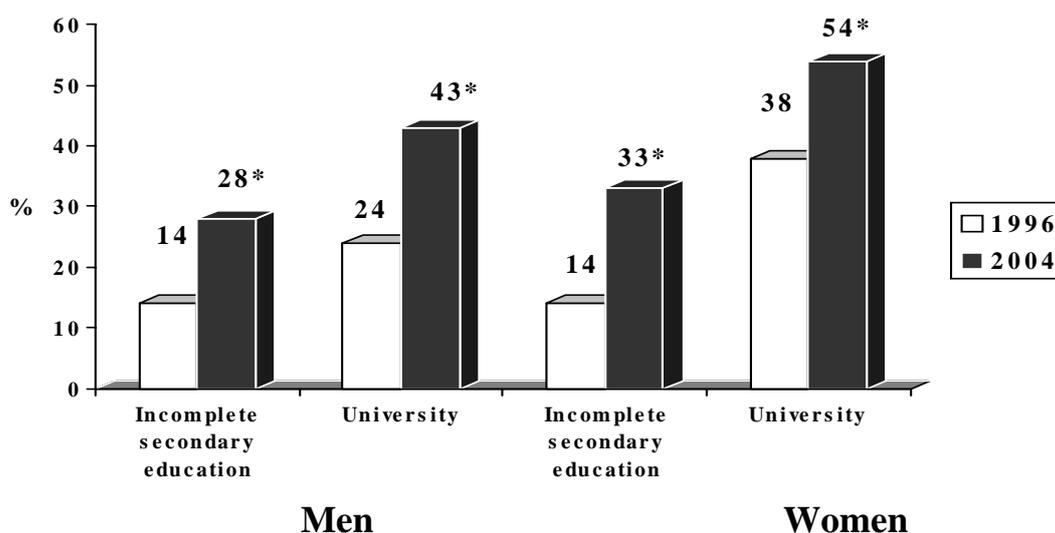
\*p<0.05 compared to 1994

Fig.5. Proportion of persons spreading butter on bread in 1994 and 2004 by place of residence

Lithuanians started to eat fresh vegetables more frequently. In 1996, 18.1% of men and 24.8% of women consumed fresh vegetables at least three days during the last week, while in the year 2004 this proportion was 39.9% in men and 49.9% in women (Fig.1). In the last survey, daily consumption of fresh vegetables was reported by 14.9% of men and by 18.7% of women (in 1996 – by 3.5% and 5.4%, respectively).

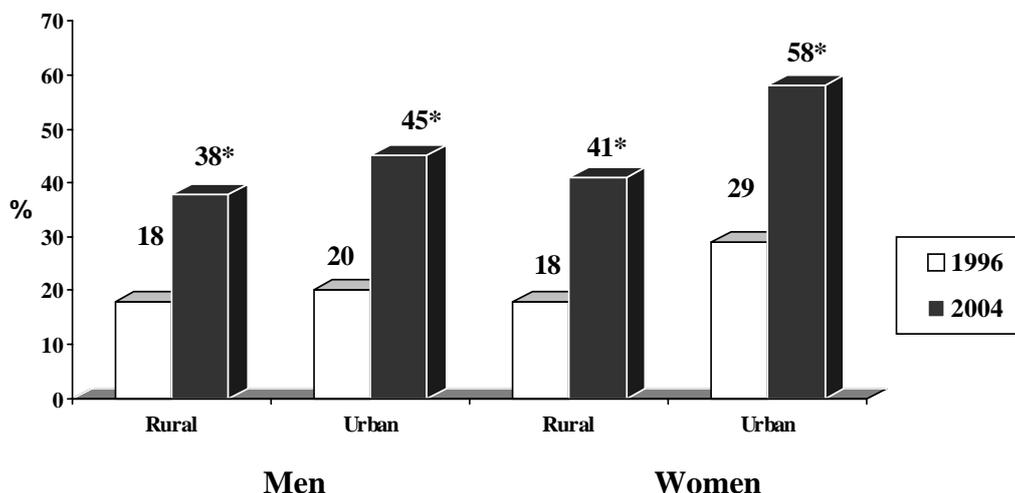
The frequency of the consumption of fresh vegetables has increased in all educational groups. However, the differences between the groups remained (Fig.6). The respondents with university education more frequently ate fresh vegetables than those with incomplete secondary education. The increase in the consumption of fresh vegetables was more evident in urban than in rural population (Fig.7)

Over the period of ten years, the consumption of fresh fruit and berries has almost not changed. In 2004, 25.8% of men and 40.2% of women at least three days a week ate fresh fruit and berries.



\*p<0.05 compared to 1996

Fig.6. Proportion of persons who have eaten fresh vegetables at least 3 days during the last week in 1996 and 2004 by level of education



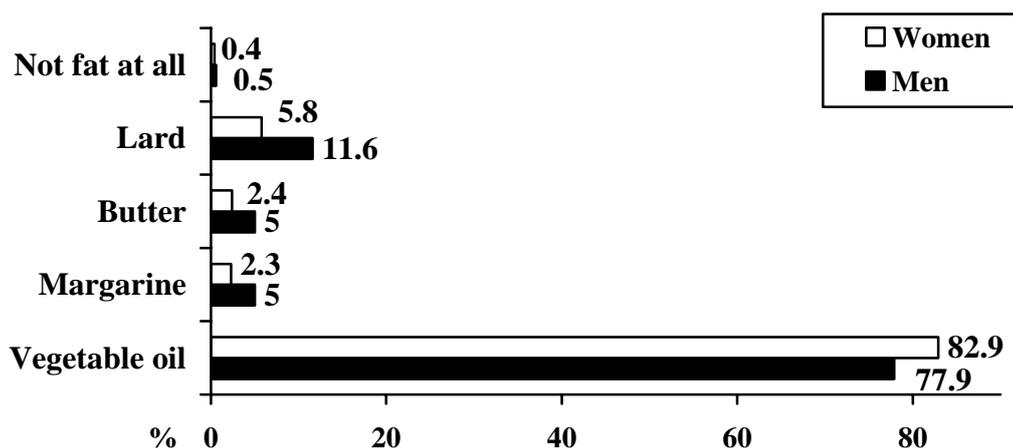
\*p<0.05 compared to 1996

Fig.7. Proportion of persons who have eaten fresh vegetables at least 3 days during the last week in 1996 and 2004 by place of residence

Positive trends in the nutritional habits have been observed in Lithuanian adult population over the last decade. The diet of Lithuanian population became more in line with the WHO nutrition recommendations. People started to eat less animal fats (lard, butter, or whole milk), to use more vegetable oil and margarine, and to consume more fresh vegetables. The changes in dietary habits were observed in all social groups.

### Social differences in nutritional habits of Lithuanian population

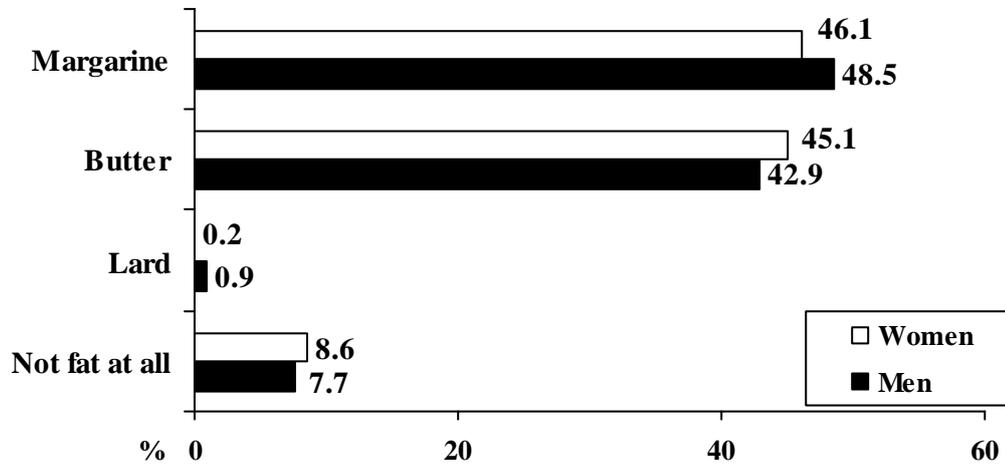
Our study showed gender differences in nutritional habits. Women used oil for cooking more often than men - 82.9% and 77.9%, respectively (Fig. 8). The consumption of animal fat (lard or butter) was more common among men than among women: 16.6% and 8.2%, respectively.



$\chi^2 = 183.2$ ;  $p < 0.001$  between men and women

Fig.8. Distribution of men and women by kind of fat used for cooking

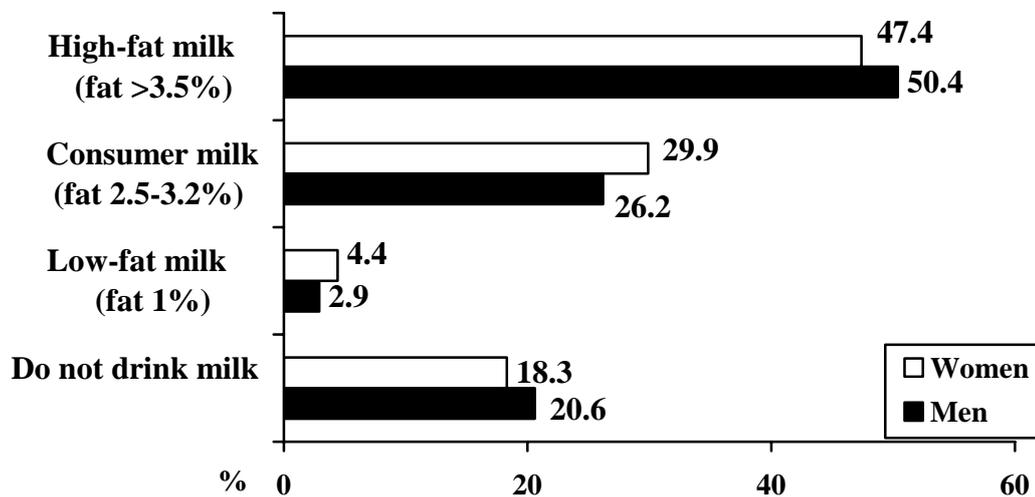
Butter and margarine were the most popular bread spreads. Women used butter on bread slightly more often than men: 45.1% and 42.9%, respectively (Fig. 9). Only 8.2% of the respondents did not use any fat on bread.



$\chi^2 = 25.2$ ;  $p < 0.05$  between men and women

Fig.9. Distribution of men and women by kind of bread spreads

Milk is one of the main sources of fat in the Lithuanian population. Every second man and 47.4% of women reported that they consumed high-fat milk (Fig. 10). Very small proportion of respondents (4.4% of women and 2.9% of men) drank low-fat milk. Approximately every fifth respondent did not consume milk (Fig. 10).

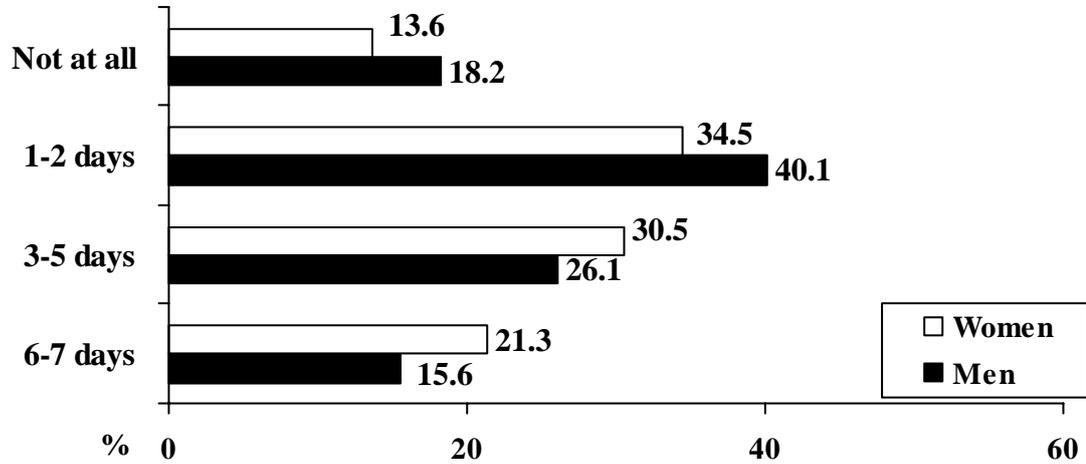


$\chi^2 = 29.8$ ;  $p < 0.001$  between men and women

Fig.10. Distribution of men and women by kind of milk usually consumed

Gender had an effect on the use of vegetables and fruits. Fresh vegetables were more popular among women than among men. The proportion of the respondents consuming fresh vegetables daily was 20.3% in women, and 15.6% in men (Fig. 11). Fruits were

consumed less frequently than vegetables. Only 16.7% of women and 9.7% of men reported daily use of fruits ( $p < 0.001$ ). A substantial part of the respondents (38.2% of men and 26.6 % of women) did not consume any fruit during last week ( $p < 0.001$ ).



$\chi^2 = 81.4$ ;  $p < 0.001$  between men and women

Fig.11. Distribution of men and women by frequency of consumption of fresh vegetables during the last week

Dark bread was consumed more often by men than by women: 31.8% of men and 14.9% of women consumed at least 4 slices of dark bread daily (Table 2). Every third respondent stated that they did not consume dark bread. Porridges and cereals were more popular among women. Men more frequently were daily users of meat and meat products, compared to women: 27% and 15.8%, respectively. Women drank more coffee and used less sugar for tea and coffee than men.

Table 3. Prevalence (%) of some nutrition habits by sex

Nutrition habits	Men	Women	p
Eating no porridges and cereals last week	52.6	40.5	<0.001
Eating meat or meat products at least 6 days a week	27.0	15.8	<0.001
Eating no fish last week	21.8	23.2	>0.05
Eating cheese at least 3 days a week	21.4	22.3	>0.05
Drinking coffee at least 3 cups a day	22.2	27.3	<0.001
Using no sugar for tea	6.4	16.0	<0.001
Using no sugar for coffee	5.0	11.7	<0.001
Having no breakfast	16.7	21.2	<0.001
Eating dark bread at least 4 slices a day	31.8	14.9	<0.001

Nutritional habits of the Lithuanian population differed by age. The adjusted odds ratios (OR) for the likelihood of having certain nutritional habits depending on age are presented in Table 4. The youngest respondents used vegetable oil for cooking more often than eldest people. The use of butter on bread, and the consumption of high-fat milk were more prevalent among elderly respondents. Young people consumed meat and meat products more often than the eldest did. The proportion of persons consuming dark bread, porridges, and fish was lower among young respondents compared to the eldest people (Table 4).

The nutrition habits were related to the educational level of the respondents. The diet of better-educated people was closer to the recommendations for healthy nutrition. A positive association was found between the level of education and consumption of vegetable oil used in food preparation (Table 5). The odds ratio of using vegetable oil among men with university education was higher by 98% and among women – by 67% than that among persons with incomplete secondary education. The consumption of fresh vegetables and fruit as well as fish was more common among better-educated respondents, compared to low educated people. The respondents with university education were more than twice as likely as low educated people to consume fresh fruits daily. The educational level was inversely associated with the consumption of high-fat milk. The odds of drinking high-fat milk among men with university education were lower by 55% and among women – by 51%, compared to those among persons with incomplete secondary education. Persons with university education preferred butter for spreading on bread, and hard cheese. The likelihood of spreading butter on bread was twofold higher among better-educated respondents, compared to those with lower levels of education. A positive association was found between daily consumption of meat and educational level in women.

The nutrition habits depended on the place of residence. The consumption of high-fat milk was most prevalent among respondents living in rural areas (Table 6). The odds of the consumption of high-fat milk were considerably higher among the respondents living in rural areas, compared to those living in cities. Cheese was more popular in cities. The usage of vegetable oil for cooking and butter on bread was more prevalent among urban population, compared to the inhabitants of rural areas. Women living in rural areas consumed fresh vegetables less frequently than those living in cities. The respondents in rural areas were less likely to consume fruits, compared to the urban population. People living in rural areas more often used dark bread, compared to those living in cities.

Table 4. Odds ratios for the likelihood of having certain nutrition habit by sex and age

Nutritional habits	Men				Women			
	Age groups				Age groups			
	35-49		50-64		35-49		50-64	
	OR	95% CI						
Having no breakfast	0.93	0.75-1.15	<b>0.64</b>	<b>0.49-0.83</b>	1.00	0.84-1.18	<b>0.44</b>	<b>0.36-0.55</b>
Using vegetable oil for cooking	<b>0.61</b>	<b>0.53-0.83</b>	<b>0.35</b>	<b>0.28-0.45</b>	1.01	0.79-1.30	<b>0.72</b>	<b>0.56-0.92</b>
Eating fresh vegetables at least 6 days a week	0.96	0.76-1.21	0.85	0.65-1.12	<b>1.23</b>	<b>1.03-1.47</b>	0.88	0.71-1.09
Eating fresh fruits at least 6 days a week	0.98	0.72-1.32	1.05	0.75-1.47	1.14	0.93-1.39	1.20	0.95-1.50
Eating rye bread at least 4 slices a day	<b>1.04</b>	<b>1.04-1.53</b>	<b>1.31</b>	<b>1.06-1.61</b>	<b>2.01</b>	<b>1.59-2.54</b>	<b>2.27</b>	<b>1.77-2.89</b>
Eating porridges or cereals less than once a week	<b>0.74</b>	<b>0.62-0.88</b>	<b>0.48</b>	<b>0.39-0.59</b>	<b>0.75</b>	<b>0.64-0.87</b>	<b>0.42</b>	<b>0.35-0.51</b>
Eating meet or meat products at least 6 days a week	0.84	0.70-1.01	<b>0.61</b>	<b>0.49-0.75</b>	1.00	0.83-1.21	<b>0.67</b>	<b>0.4-0.4</b>
Eating fish less than once a week	<b>0.58</b>	<b>0.47-0.71</b>	<b>0.52</b>	<b>0.41-0.66</b>	<b>0.70</b>	<b>0.59-0.83</b>	<b>0.51</b>	<b>0.41-0.62</b>
Using butter on bread	1.13	0.95-1.34	<b>1.49</b>	<b>1.23-1.79</b>	1.05	0.91-1.22	<b>1.62</b>	<b>1.38-1.90</b>
Drinking whole milk	<b>1.19</b>	<b>1.01-1.42</b>	<b>1.23</b>	<b>1.06-1.57</b>	<b>1.31</b>	<b>1.12-1.53</b>	<b>1.59</b>	<b>1.33-1.89</b>
Eating cheese at least 3 days a week	0.99	0.79-1.23	1.15	0.68-1.12	<b>1.41</b>	<b>1.18-1.70</b>	<b>1.41</b>	<b>1.14-1.74</b>
Drinking coffee at least 3 cups a day	1.05	0.86-1.28	<b>0.58</b>	<b>0.45-0.74</b>	1.07	0.91-1.24	<b>0.42</b>	<b>0.34-0.52</b>
Using no sugar for tea	<b>2.13</b>	<b>1.41-3.22</b>	<b>2.53</b>	<b>1.64-3.89</b>	<b>0.74</b>	<b>0.60-0.91</b>	0.86	0.68-1.08
Using no sugar for coffee	1.25	0.76-2.05	<b>1.90</b>	<b>1.14-3.19</b>	<b>0.79</b>	<b>0.62-0.99</b>	<b>0.63</b>	<b>0.47-0.84</b>

OR – odds ratio, CI – confidence interval; Reference group - age group of 20-34 years; Odds ratios adjusted for the level of education, the place of residence, and marital status

Table 5. Odds ratios for the likelihood of having certain nutrition habit by sex and level of education

Nutritional habits	Men				Women			
	Level of education				Level of education			
	Secondary school		University		Secondary school		University	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Having no breakfast	1.12	0.85-1.48	0.84	0.60-1.18	1.21	0.91-1.60	1.14	0.83-1.54
Using vegetable oil for cooking	<b>1.30</b>	<b>1.04-1.62</b>	<b>1.67</b>	<b>1.25-2.24</b>	1.62	<b>1.23-2.12</b>	<b>1.98</b>	<b>1.40-2.80</b>
Eating fresh vegetables at least 6 days a week	<b>1.47</b>	<b>1.06-2.03</b>	<b>2.01</b>	<b>1.40-2.88</b>	1.17	0.88-1.56	<b>1.50</b>	<b>1.10-2.04</b>
Eating fresh fruits at least 6 days a week	1.29	0.85-1.96	<b>2.79</b>	<b>1.79-4.45</b>	<b>1.48</b>	<b>1.04-2.12</b>	<b>2.84</b>	<b>1.95-4.12</b>
Eating rye bread at least 4 slices a day	0.89	0.72-1.11	<b>0.75</b>	<b>0.57-0.98</b>	<b>0.66</b>	<b>0.51-0.85</b>	<b>0.51</b>	<b>0.37-0.69</b>
Eating porridges or cereals less than once a week	1.04	0.84-1.30	0.92	0.71-1.20	0.95	0.76-1.20	0.87	0.68-1.13
Eating meet or meat products at least 6 days a week	<b>1.41</b>	<b>1.12-1.78</b>	1.18	0.98-1.57	0.79	0.60-1.03	<b>0.66</b>	<b>0.48-0.90</b>
Eating fish less than once a week	0.90	0.71-1.15	<b>0.63</b>	<b>0.46-0.86</b>	0.84	0.66-1.07	<b>0.59</b>	<b>0.45-0.79</b>
Using butter on bread	<b>1.32</b>	<b>1.07-1.61</b>	<b>1.95</b>	<b>1.53-2.49</b>	<b>1.24</b>	<b>1.01-1.53</b>	<b>1.98</b>	<b>1.57-2.50</b>
Drinking whole milk	<b>0.74</b>	<b>0.60-0.92</b>	<b>0.45</b>	<b>0.35-0.58</b>	<b>0.78</b>	<b>0.63-0.98</b>	<b>0.49</b>	<b>0.38-0.63</b>
Eating cheese at least 3 days a week	<b>1.92</b>	<b>1.39-2.65</b>	<b>2.96</b>	<b>2.09-4.21</b>	<b>1.36</b>	<b>1.01-1.85</b>	<b>2.04</b>	<b>1.47-2.84</b>
Drinking coffee at least 3 cups a day	1.08	0.83-1.40	1.32	0.98-1.79	<b>1.48</b>	<b>1.13-1.93</b>	1.32	0.93-1.77
Using no sugar for tea	1.66	0.97-2.84	<b>3.01</b>	<b>1.74-5.39</b>	<b>2.2</b>	<b>1.47-3.30</b>	<b>3.59</b>	<b>2.35-5.46</b>
Using no sugar for coffee	1.11	0.61-2.02	1.53	0.80-2.95	<b>1.77</b>	<b>1.10-2.86</b>	<b>2.25</b>	<b>1.37-3.70</b>

OR – odds ratio, CI – confidence interval; Reference group – group of respondents with incomplete secondary education; Odds ratio adjusted for age, place of residence and marital status

Table 6. Odds ratios for the likelihood of having certain nutrition habit by sex and place of residence

Nutritional habits	Man				Women			
	Place of residence				Place of residence			
	Towns		Villages		Towns		Villages	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Having no breakfast	0.88	0.71-1.09	<b>0.66</b>	<b>0.52-0.83</b>	1.01	0.85-1.20	<b>0.71</b>	<b>0.57-0.87</b>
Using vegetable oil for cooking	0.97	0.78-1.20	<b>0.49</b>	<b>0.40-0.60</b>	<b>0.68</b>	<b>0.53-0.88</b>	<b>0.31</b>	<b>0.25-0.40</b>
Eating fresh vegetables at least 6 days a week	0.96	0.76-1.21	0.82	0.64-1.05	<b>0.76</b>	<b>0.64-0.91</b>	<b>0.76</b>	<b>0.62-0.93</b>
Eating fresh fruits at least 6 days a week	0.90	0.67-1.20	<b>0.65</b>	<b>0.47-0.90</b>	<b>0.78</b>	<b>0.64-0.95</b>	<b>0.67</b>	<b>0.53-0.86</b>
Eating rye bread at least 4 slices a day	1.14	0.95-1.38	<b>1.45</b>	<b>1.20-1.75</b>	1.20	0.97-1.48	<b>1.68</b>	<b>1.34-2.10</b>
Eating porridges or cereals less than once a week	0.92	0.76-1.10	0.86	0.72-1.04	1.12	0.96-1.31	<b>1.22</b>	<b>1.02-1.46</b>
Eating meet or meat products at least 6 days a week	1.04	0.87-1.25	1.10	0.91-1.32	0.86	0.71-1.05	1.16	0.94-1.43
Eating fish less than once a week	1.05	0.85-1.30	<b>1.26</b>	<b>1.03-1.56</b>	0.95	0.79-1.13	1.18	0.97-1.44
Using butter on bread	<b>0.72</b>	<b>0.61-0.85</b>	<b>0.81</b>	<b>0.68-0.96</b>	<b>0.76</b>	<b>0.66-0.87</b>	<b>0.61</b>	<b>0.52-0.72</b>
Drinking whole milk	<b>2.48</b>	<b>2.09-2.95</b>	<b>4.80</b>	<b>4.00-5.76</b>	<b>2.55</b>	<b>2.20-2.96</b>	<b>7.33</b>	<b>6.09-8.83</b>
Eating cheese at least 3 days a week	<b>0.67</b>	<b>0.54-0.83</b>	<b>0.40</b>	<b>0.31-0.51</b>	<b>0.8</b>	<b>0.67-0.96</b>	<b>0.42</b>	<b>0.33-0.53</b>
Drinking coffee at least 3 cups a day	1.00	0.82-1.23	0.90	0.72-1.10	1.17	0.99-1.37	0.99	0.82-1.19
Using no sugar for tea	0.7	0.49-1.01	<b>0.58</b>	<b>0.39-0.87</b>	<b>0.61</b>	<b>0.50-0.76</b>	<b>0.43</b>	<b>0.33-0.57</b>
Using no sugar for coffee	0.83	0.53-1.29	<b>0.59</b>	<b>0.35-0.99</b>	<b>0.73</b>	<b>0.57-0.93</b>	<b>0.56</b>	<b>0.41-0.77</b>

OR – odds ratio, CI – confidence interval; Reference group – respondents living in cities; Odds ratio adjusted for age, level of education and marital status

The associations between marital status and nutritional habits were estimated. Unmarried men more often used fruits and dark bread, compared to the married ones (Table 7). The daily consumption of meat and cheese were more prevalent among married men. The proportion of the respondents drinking high-fat milk and eating cheese was higher among unmarried men, compared to the married ones. The usage of vegetable oil was less common among unmarried men. Unmarried women were less likely to consume meat and high-fat milk, to use butter on bread, and sugar for tea or coffee, compared to married women.

Table 7. Odds ratios for the likelihood of having certain nutrition habit by sex and marital status\*

Nutrition habits	Men		Women	
	OR	95% CI	OR	95% CI
Having no breakfast	1.04	0.84-1.29	<b>1.33</b>	<b>1.14-1.56</b>
Using vegetable oil for cooking	<b>0.62</b>	<b>0.50-0.75</b>	1.03	0.83-1.27
Eating fresh vegetables at least 6 days a week	1.24	0.99-1.55	0.89	0.76-1.05
Eating fresh fruits at least 6 days a week	<b>1.46</b>	<b>1.10-1.93</b>	0.95	0.79-1.14
Eating dark bread at least 4 slices a day	<b>1.23</b>	<b>1.03-1.47</b>	1.13	0.94-1.36
Eating no porridges and cereals last week	0.85	0.71-1.01	0.99	0.86-1.14
Eating meat or meat products at least 6 days a week	<b>0.23</b>	<b>0.69-0.99</b>	<b>0.68</b>	<b>0.56-0.82</b>
Eating no fish last week	1.12	0.92-1.37	<b>1.38</b>	<b>1.18-1.61</b>
Using butter on bread	0.91	0.77-1.07	<b>0.82</b>	<b>0.72-0.93</b>
Drinking high-fat milk	<b>1.29</b>	<b>1.08-1.53</b>	<b>0.84</b>	<b>0.73-0.97</b>
Eating cheese at least 3 days a week	<b>0.78</b>	<b>0.64-0.98</b>	0.86	0.73-1.02
Drinking coffee at least 3 cups a day	<b>0.78</b>	<b>0.64-0.96</b>	0.94	0.81-1.09
Using no sugar for tea	<b>1.46</b>	<b>1.02-2.07</b>	<b>1.30</b>	<b>1.08-1.57</b>
Using no sugar for coffee	1.02	0.63-1.65	<b>1.26</b>	<b>1.02-1.57</b>

OR – odds ratio; CI – confidence interval; Odds ratio adjusted for age, education and place of residence; \*reference group – married respondents

## DISCUSSION

The present study was done as a part of international FINBALT study. Nutrition habit trends were assessed over a period of ten years with the help of a standardized health behaviour monitoring system for the first time in Lithuania. During the period of 1994-2004, positive Lithuanian nutrition habit trends were revealed in our study. The diet tended to become closer to the WHO recommendations for healthy nutrition. People started to consume more vegetable oil and margarine, and less animal fat (lard, butter, and high-fat milk). The consumption of fresh vegetables, fruit, and dark bread increased. Although all social groups of the Lithuanian population have changed their diet, social differences in nutrition habits still remained significant. Women, young people, people with higher education, and the inhabitants of cities followed a healthier

diet compared to men, elderly people, people with low education, and those living in rural areas.

The methodology of the study has several strengths. The study included a large number of subjects selected from the general population as well as several indicators of the socioeconomic status. The general sample of study was fully representing the general Lithuanian population in terms of age, sex, place of residence and education. The measures were performed in a standardized way and contained many categories. Multivariate regression analysis was applied to control possible associations between the determinants. The response rate remained high enough throughout the monitoring period; therefore the results can be taken as fairly representative of the diet among the 20-64 year old population. The FINBALT Health Monitor project provided a unique opportunity to compare the nutrition habits between Finland and the Baltic countries, using data collected according to a commonly agreed protocol and a standardized questionnaire.

The study has several limitations, too. The study population might have presumably generally practiced healthier dietary habits than the non-respondents did. According to the study in Denmark, the non-respondents were the elderly and frequently unskilled workers with a lower education if compared to the respondents (76). It has been documented that population surveys based on methods requiring high skill from the participants (e.g. self-administered questionnaires) may result in the underestimation of real differences among social groups (77). We used self-reported information only. Due to a limited number of simple food frequency questions in our study it was impossible to investigate the diet more thoroughly, e.g. on energy and nutritional levels. Despite this general level of monitoring nutrition habits among Lithuanian adult population, we were able to reveal new and relevant information about the nutritional habit changes at the national level. Along with the general level of nutritional habit monitoring among Lithuanian adult population we were able to reveal new and relevant information about the nutritional habit changes at a national level. In accordance with scientific reference simple food questions included in a survey can present rough estimates of consumption frequencies in various population groups and identify extreme groups, such as 'high' and 'low' users of certain foods (78). In future studies, these limitations should be taken into account. As well, the qualitative methods should be included in the study.

The results of the decade proved of clear positive changes in Lithuanian population food habits, especially the ones concerned with dietary fats. People started to consume more vegetable oil and margarine, less animal fat such as butter, lard, high-fat milk. Since 1994 the proportion of people using mostly vegetable oil for cooking has doubled in Lithuania. In 1994 more than 70% of men and more than 69% of women indicated having used butter on bread. In the year 2000, the proportion of those spreading butter on bread halved as people started to use margarine. Over the last five years, the availability of spreads based on milk fats (mixture of butter and vegetable oil) has significantly increased in the Lithuanian market, encouraging people to consume these products, and resulting in the increase in the use of the animal fat on bread. According to the study that was carried out by us in Lithuania the frequency of eating fresh

vegetables has increased, while consumption of fresh fruit and berries has hardly changed.

Nutrition guidance around the world is consistent in recommending the consumption of more fruit and vegetables. Many of these guidelines also recommend choosing a variety of fruits and vegetables (79-81). The Lithuanian dietary guideline recommends eating bread and grains several times per day, recommends eating a variety of vegetables and fruits (at least 400 g per day) and replacing fatty meat with fish. The Lithuanian Food pyramid includes from three to five portions of vegetables and from two to four portions of fruit (82). According to our data, the recommendations to eat fresh vegetables (6-7 days/week) were followed by 15.6% of men and 20.3% of women. 18.3% of men and 13.6% of women reported they had not consumed fresh vegetables during the last week at all; respectively, 38.3% of men and 26.5% of women reported on fresh fruit. According to the Health Behaviour Surveys, the differences between Estonia, Latvia, and Lithuania in the frequency of vegetable consumption were small (52, 64, 83). However, the proportion of men and women eating fresh vegetables at least six days per week was the lowest in Estonia, while the consumption of fresh fruit was lower in Lithuania if compared to Latvia and Estonia. Women consumed vegetables and fruit more frequently than men did in all Baltic countries (52, 64, 83). The most commonly consumed vegetables in Latvia, Lithuania, and Estonia were the locally grown ones (e.g., onions, leeks, garlic, carrots, cucumbers, tomatoes, and cabbages) (84). The study that was carried out in eight northern European countries, that is in the Nordic countries (Finland, Sweden, Norway, Denmark, and Iceland) and the Baltic countries (Estonia, Latvia, and Lithuania) illustrated that the mean frequency of the consumption of vegetables was highest in Sweden, Finland, Latvia, and Lithuania. What concerns the potatoes, the consumption of it was highest in the Baltic countries, Iceland and Finland, including Åland. Fruit consumption was slightly higher in the Nordic countries compared to the Baltic countries. Within the fruit group, apples, citrus fruits, and bananas were the three most popular choices in both the Nordic and the Baltic countries (84). The proportion of the daily high-fibre bread consumers did not differ between sexes in both Nordic and Baltic countries. Neither did the consumption of fish differ by sex (84).

Similar changes had occurred in other Europe countries in the seventies of the previous century. The consumption of vegetables, fruit, low fat milk, low fat spreads and cheese had increased, whereas the consumption of butter, whole milk and potatoes had decreased in Finland, Norway and Sweden between 1970 and 1995 (85). At the above-mentioned period, the usage of vegetables among Finish people had increased from 20 to 52 kilos per year per capita (45). The fact that Scottish people were slowly moving from a diet rich in fat and cholesterol to a more healthy diet containing more white meat, fruit, and vegetables was revealed from the analysis performed in Scotland (86). The nutritional habit survey in Italy in 1994-1996 vs. 1980-1984 showed the increase of the skimmed milk usage, and the decrease of the full-fat milk usage. Oil and fats showed lower intakes, fish and seafood showed the increased intakes, while meat either remained stable or decreased (87). In the Central and Eastern Europe, substantial changes have also occurred during the last decade. The consumption of vegetable fats, fruit, vegetables, and poultry was increased in Poland, while the consumption of milk

and milk products was decreased, at the same time influencing the changes in energy and nutrient intakes (88). During the period of 1994-1998, the use of the vegetable oil had increased in Latvia and Estonia (89). According to the ten-year trends of the dietary intake in a middle-aged French population, there was a decrease of a monthly consumption of meat, sausages and ham, eggs and beer, and a slight increase in the consumption of poultry and fish, as well as fruit and vegetables (90). According to the German nutritional habit ten-year study, meat, meat products, and eggs had declined markedly in importance, whereas fish and fish products, milk and milk products (including cheese), and various food groups of plant origin had become more popular (91). On the other hand, British diet is still based on bread, milk, meat and potatoes to a considerable extent, and is relatively low in fruit and vegetables (92). In general, the consumption of fruit and vegetables has increased over the last 20 years; however, the consumption of potatoes and fresh green vegetables has declined. Green vegetables have been replaced by other vegetables such as mushrooms, celery, corn, pumpkin (92). The results of the National Health Interview Survey conducted between 1987 and 1992 in the US population showed that a proportion of Americans consuming high-fat foods (including fried fish, fried chicken, bacon, eggs, whole milk, butter) had decreased, suggesting favourable changes in the dietary fat intake. The percentage of fat from fast foods and ethnic foods over time has increased from 1 to 11% of total fat (93). There are many findings in literature that food habits have become healthier, that the consumption of vegetable oil and fresh vegetables has increased, and that the usage of animal fat has decreased (46, 87, 90, 93). The development involved all socioeconomic groups, though disparities between these groups still exist. The WHO recommends consuming less fat milk and meat products, as they are rich in saturated fatty acids that increase the level of serum cholesterol and the risk of coronary heart disease. The usage of vegetable oil is recommended instead of animal fats (1). Higher consumption of vegetables and fruit (at least 400 g/day) rich in antioxidants, vitamins, and minerals as well as whole grain products is emphasized for prevention of non-communicable diseases.

The strongest and most consistent relationships between socio-economic status and risk factors have been found for education. It is evident that education might be the most important social predictor for a healthy diet. Our findings correspond to the findings of other studies, showing that a healthier diet associates with a higher socioeconomic status in Lithuania. The usage of vegetable oil has increased in all educational groups of Lithuanian population, and that increase was most substantial among people with lower education. Although the educational differences in the usage of vegetable oil were diminishing over ten years the persons with university education continued to use oil more often compared to those with incomplete secondary education in the year 2004. Better-educated people more frequently consumed fresh fruit, vegetables and fish, less frequently consumed high-fat milk, in comparison with the respondents with low level of education.

Studies conducted in several countries have found dietary habits such as frequent consumption of vegetables and fruit, as well as avoidance of fatty ingredients, to be more common among people with a higher socio-economic status (30). Norwegians whose education had lasted for 13 years (and more) consumed less fat in their food compared to those with shorter education (26). Dutch people with higher socioeconomic

status consumed less meat, milk products, and fats than the ones with a lower socio-economic status. However, they consumed more cheese than people with a lower socio-economic status did (94). Similar results were discovered when the consumption of butter and cheese was compared in 10 European countries (78). In most countries, the usage of cheese was higher for high-educated people than for the ones with low education. In Nordic countries, the consumption of butter was lower among those with university education; however, opposite data were found in Great Britain, Belgium and Poland (78). In most countries, people with lower education tended to use animal fats more frequently nevertheless, data from nine European countries did not prove any correlation between fats, fatty acids, and the level of education (33). High-educated French people ate less sausages, ham and sauce; they ate more low-fat dairy products and fish. They also consumed more high-fat dairy products as well as cheese, as compared to the ones with low education, which may have partly compensated for the saturated fat intake (90). The comparison of different educational groups has revealed the diet of university-educated people to be closer to the national and international recommendations contained in many dietary guidelines (26, 27, 94). There is a general assumption that people with a higher socioeconomic status tend to consume foods that are modern, conventionally more nutritious, or more luxurious than foods consumed by people with a lower socio-economic status (56). People with low income consume foods less regularly and have less varied diets. It is quite possible that a less regular meal among low-income families could be compensated by larger food sizes (95). Nutritional habit differences between different socioeconomic groups might occur due to reporting bias, different exposure to healthy food, variable impact of healthy eating promotion campaigns across demographic groups, as well as economic barriers in the purchase of healthy food (96). The facts would also suggest income to be the key factor in food consumption. Nevertheless, the results of a pan-EU consumer attitudinal survey have revealed that only 15% of people in the EU considered price as an important barrier to healthy eating. In contrast, price was mentioned by almost 1 in 4 subjects in the UK and Luxembourg and over 1 in 5 subjects in Sweden and Portugal (97). Cost was the most commonly reported reason for choosing food, particularly in Lithuania (67%), Latvia (60%), and Estonia (41%), especially among people with lower income (74, 98). In Lithuania, it was reported that recent increases in food prices have caused poorer people to consume cheaper, less nutrient dense foods, which are more likely to be less healthy and safe diet (98). Access to healthy and assorted food products could be restricted to areas where poor people live, as well as the shops in the countryside might not be able to provide the consumers with fresh and high quality food (50, 99). Though price is an important factor, it still might be an oversimplification to assume this to be a universal case (50).

Several studies suggest that nutritional knowledge and health-related attitudes to be associated closer with dietary intake than with traditional socio-economic characteristics (100). It has been shown that adults (and particularly people with a high level of education) believe healthy eating to be an important good and long-term health promotion factor (101). A study carried out in 15 EU member states demonstrated that 71% of people thought (either agreeing or agreeing strongly) they did not need to change their diet, as it was healthy enough (97). Such attitude suggests that people

evaluate their own diets very subjectively, and more energy is required to help people to assess their nutrition correctly.

Nutritional habits between sexes have been analyzed in many studies (26, 36, 65, 102). According to our study findings, Lithuanian women diet was healthier if compared with the diet of men. Women used vegetable oil for cooking, consumed fresh vegetables, fruit, and porridges, and had sugar-free tea and coffee more frequently if compared to men. Men more often than women consumed meat and meat products as well as high-fat milk. The findings of our study are consistent with the findings given in the scientific literature (19; 65, 102-104). Many studies that had been carried out in Europe demonstrated the absolute daily intakes of energy to be higher among men than among women. Men reported a higher intake of meat and potatoes, while women reported a higher intake of fruits and vegetable, fish, poultry and cheese (19, 26, 27, 102). Women ate more cereals, cereal products, milk, dairy products and whole grain products, whereas the consumption of red meat, particularly pork, sausages, eggs, alcohol, high sucrose foods, as well as various high starch foods such as potatoes and bread was higher in the diet of men (65). Women often preferred vegetarian diet or a meal without red meat, whereas men tend to prefer a diet with high amounts of red meat and animal fat (105). According to the Australian National Nutrition Survey, approximately 44% of men and 34% of women did not consume any fruit in the 24 hours, and 20% of males and 17% of females did not consume vegetables (20).

Women's greater nutritional knowledge and sex-specific taste preferences also account for the differences in eating behaviour (56). Men usually acquire less knowledge in any nutritional recommendations as well as in the relationship between nutrition, health and the development of related diseases if compared to women (56, 59). Men's food choice is frequently pleasure orientated and carries an enjoyable attitude, while women's attitude towards food is often controversial between health and taste. Sports and exercise are prioritized over nutrition in men's attitude towards their health, while nutrition usually plays a central role for women. It is documented that women control their eating habits in accordance with healthy diet recommendations more frequently than men (31).

Dietary choice differences according to age may have a socio-cultural background or appear to be a physiologic response to aging. Women in their fifties were significantly more likely to report having a poor or fair health as well as to report health motives to have been the important determinants of food choice if compared to younger women (36). Young people more frequently used to changing their nutritional habits, to adopting modern nutritional traditions from other countries. These changes can influence health in both positive as well as negative way. According to our results, people in a young age group used vegetable oil for cooking more frequently and consumed high-fat milk and butter for spread on their bread less frequently if compared to aged respondents. At the same time, aged people consumed dark bread, porridges, and fish more frequently, and ate meat and meat products less frequently. Findings from other studies indicated that energy intakes decreased with age for both men and women from Estonia and Latvia but for men in Lithuania only. Energy intakes did not tend to vary according to age for Lithuanian women (44). Studies describing the intake of fruit

and vegetables generally suggest that increasing age is associated with an increased intake of fruit and vegetables (26, 50). Results obtained from Denmark proved the increasing age to have a positive association with an intake of cooked vegetables, fish with sandwiches and of fish as main meal (24). Similar picture also seems to appear in Norway. The oldest Norwegian women reported a higher consumption of potatoes and fish, whereas the youngest women reported a higher consumption of coffee, meat, and alcohol (59). According to the EPIC study that was carried out in East England, the age trends represent differences of at least 20% between youngest and oldest for white fish, soup and tea that were consumed more by older individuals, whereas alcohol, legumes, nuts, other cereal products, fish products, coffee, vegetarian food, fish, poultry, and shellfish were all consumed more frequently by younger subjects. Elderly subjects were substantially more likely to cook on saturated fats, to use saturated fat spreads on bread, and to drink full-cream milk (62, 106, 107). The Ukrainian people aged 36-55 were much more concerned about the price, and much less concerned about the quality or freshness of the food than the younger-aged groups (57). Such facts might suggest that family-supporting middle-aged people are more concerned about the safety of food than younger people are. The above-mentioned young people are more likely to appear to be single and receive support from their parents (57). Such findings were consistent with the results from the Finish study, where the elderly respondents were generally more interested in healthy nutritional habits as well as in using natural products than the younger respondents were (108).

It is well known that dietary habits tend to be relatively stable over time, suggesting that elderly subjects might have more difficulty when making the recommended changes towards less fat and more vegetables in diet (109, 110). The diet of the elderly subjects may partially reflect their habits of the earlier decades. The consumption of butter and whole milk was substantially higher in the past, and the consumption of margarine, poultry, and vegetables was less frequent as today. Elderly people still consume a diet more appropriate for their earlier years, which, in many cases, would have been characterized by harder manual toil. Consequently, such diet is now considered inappropriate (86). There are many new products (healthy and unhealthy) in the market today and they are most often used by the younger generation. People aged 35-54 and those from a higher socioeconomic rank as well as university-educated individuals were the ones who often reported 'irregular working hours' and 'busy lifestyle' as main barriers to trying to follow a healthier diet. The youngest age group consisted of the ones who frequently considered healthy eating as less pleasant to look at and to eat (111).

It is well documented that eating habits that are developed during childhood would later influence the eating habits in adulthood (43). Mothers generally act as gatekeepers within their families, as they are the ones that frequently buy and prepare food. A study carried out in the Netherlands revealed a clear resemblance in a habitual fat and food intake between parents and their adolescent children as well as between spouses. Significant analogies were found for almost all food items in the food frequency questionnaire between husbands and wives (94% of the items), between mothers and children (87%), and between fathers and children (76%) (112). Foods eaten at home were analogous between the family members in the Dutch National Food Consumption

Survey, whereas foods eaten elsewhere were not analogous (113). Women also attempt to control the health of the rest of the family members through food served in the family. Consequently, a divorce or becoming a widow influences the food habits of men rather than of women (27). The ones living in multi-person households were more likely to follow the dietary habits that would be considered relatively healthy if compared to the individuals living in single-person households (24, 72). Such association was most pronounced among men. It suggests that when healthy eating is concerned, living with someone is of greater importance to men than to women (24). One may have expected single subjects to consume more 'convenience' foods. When meals are served for a family, quality, taste, and presentation may be more important. Perhaps it is not surprising that a study carried out in East England found red meat, poultry, cakes and condiments eaten more frequently by married subject (65). This is in some contrast to the UK Women's Cohort Study. According to the mentioned study, married women or the ones living as married consumed fruit and vegetables more often if compared with women who categorized themselves as divorced, widowed or single (114). Similar tendencies were observed in many other studies. In line with the US findings, married subjects generally eat more fruit and vegetables, less fatty foods (72). Our data demonstrated unmarried women consumed meat and meat products and high-fat milk more frequently, and they spread butter on bread more frequently. Married men ate fresh fruit and dark bread less frequently, and consumed meat and cheese more frequently if compared to the unmarried ones. However, they used vegetable oil more frequently, and consumed high-fat milk and fermented cheese less frequently if compared to single men. Single people had sugar-free tea and coffee more frequently if compared to the married ones. In our questionnaire we did not ask for the information about the fast food products or eating out, and the answers to such questions might not have been in favour of the singles. The other possible explanation is that single women tend to have a stronger motivation to keep control of their weight.

The place of residence was also a significant factor influencing nutritional habits. Our data revealed that rural population nutritional habits were less healthy if compared to those of the urban population. Both rural men and women consumed vegetable oil and fresh fruit less frequently (rural women also consumed fresh vegetables); at the same time, they consumed high-fat milk more frequently if compared to the urban population. The study in the Baltic countries demonstrated that a large proportion of respondents in each country consumed home-grown or raised foods (Latvia 47%, Lithuania 42%, Estonia 32%) or ate home-grown vegetables quite frequently (Lithuania 66%, Latvia 53%, Estonia 29%); this was particularly the case in the rural areas (115). The International Health Behaviour Monitoring study that was carried out in Finland, Estonia, Latvia and Lithuania revealed that urban population used vegetable oil for cooking more frequently, ate fresh vegetables more frequently, and consumed high-fat milk, coffee, meat and meat products less frequently (15, 53, 64, 83, 89). Urban Finish people spread butter on bread less frequently, while urban Lithuanian and Latvian inhabitants spread butter more frequently if compared with rural population (52, 53; 64). Men, as well as women living in the cities of Norway reported a higher intake of fruit and vegetables if compared to those living in rural areas (26). Respondents in rural areas were generally more likely to report using lard or butter for cooking than those in the urban areas (115). A greater proportion of the adults living in the US cities were

following the fruit pattern, whereas suburbanites were more likely to be following the coffee, soft drink, high-fat dessert and cereal patterns. In contrast, rural area residents were less likely to follow bread or cooked cereal pattern at breakfast; however, they were more likely to be breakfast skippers (116). Residence in cities was generally associated with healthier dietary habits, and the fact that people living in rural areas were elderly, had lower level of education and possessed less income might serve as a possible explanation for that. Due to the lack of a background knowledge as well as inability to deal with new information flows, specific sources of information on nutrition might become completely inaccessible for such contingent, creating a particular problem (109, 117). Conversely, better-educated people can better understand the complex information about the diet-disease relationship (109).

Over the past ten years, the diet of Lithuanians has approximated WHO recommendations. However, the intake of animal food and sugar is still too high. Consumption of fruit, vegetables, and cereal products with high fibre content is insufficient. The prevalence of NCD risk factors related to nutrition is very high. Chronic diseases are largely preventable. Between the early 1970s and 1995, the coronary heart disease mortality rates had dropped dramatically in North Karelia (Finland) (118). The larger portion of this substantial decline in the prevalence of the cardiovascular diseases finds its explanation in dietary changes. The decline was achieved through community action and the pressure of consumer demand on food market (119). In September 2000, the WHO Regional Committee for Europe, representing 51 Member States in the European Region, endorsed a resolution to implement the First Action Plan for Food and Nutrition Policy (120). The Action Plan emphasized the need to develop national food and nutrition policies that reduce the burden of food-related diseases were national policies on food and nutrition should address these areas: nutrition, food safety and a sustainable food supply.

In 2004 WHO Assembly approved Global strategy of diet, physical activity, and health. In October 2003, the Lithuanian Food and Nutrition Strategy and Action Plan for 2003–2010 were approved by the Government of the Republic of Lithuania (121). The aim of the Strategy is to protect as well as promote health of the Lithuanian population, and to reduce the prevalence of diseases related to unhealthy nutrition, including NCD. Such focus on population raises a question of whether groups of individuals whose consumption of certain nutrients is systematically too high or too low can be identified. If these groups can be identified, the efforts to improve the dietary behaviour of the population may be undertaken in a more focused and efficient manner. The assessment of social differences in food habits and their trends is important for the planning, implementation and evaluation of NCD prevention programs.

## CONCLUSIONS

1. Positive trends in nutrition habits were observed between 1994-2004 in Lithuania. The diet of the Lithuanian population tended to become closer to the WHO recommendations for healthy nutrition. People started to consume more vegetable oil and margarine, and less animal fat (lard, butter, and high-fat milk). The consumption of fresh vegetables, fruit, and dark bread has increased. Although all social groups of the Lithuanian population have changed their diet, social differences in nutrition habits still remained significant.
2. Lithuanian women had healthier diet than men did. Women more often than men used vegetable oil for cooking, consumed fresh vegetables, fruit, and porridges, and drank sugar-free tea and coffee. The consumption of meat and meat products as well as high-fat milk was less common among women than among men.
3. Men and women in the youngest age group more frequently used vegetable oil for cooking, and less frequently consumed high-fat milk and spread butter on their bread, compared to the eldest respondents. However, compared to older people, they less frequently consumed dark bread, porridges, and fish, and more frequently – meat and meat products.
4. Diet of people with higher education was healthier, compared to that of incomplete secondary education. Better-educated people more frequently consumed fresh fruit and vegetables, used vegetable oil for cooking, more frequently ate fish, and less frequently consumed high-fat milk, in comparison with the respondents with low level of education. However, people with higher education levels, compared to those with incomplete secondary education, more frequently consumed butter, fermented cheese, and less frequently – dark bread. Highly educated men consumed meat more frequently compared to low educated men.
5. Nutrition habits of the rural population were less healthy, compared to those of the urban population. Both man and woman living in the rural areas less frequently had breakfast and used vegetable oil, and more frequently consumed high-fat milk, compared to the urban population. In addition to that, rural population of both sexes less frequently consumed fresh fruit, and woman – fresh vegetables, compared to the inhabitants of the urban areas.
6. Unmarried women less frequently consumed meat and meat products and high-fat milk, less frequently used butter on their bread, and more frequently drank sugar-free tea and coffee, compared to the married ones. Unmarried men more frequently drank sugar-free tea and coffee ate fresh fruit and dark bread, and less frequently – meat and cheese compared to the married ones. However, they less frequently used vegetable oil, and more frequently consumed high-fat milk and fermented cheese, compared to those with married men.

7. The strategy, which aims to reduce the burden of noncommunicable diseases and reduction of the prevalence of chronic diseases and the improvement of the Lithuanian population's health necessitate the promotion of positive changes in nutrition as well as timely prevention of the negative ones. Social differences in nutrition habits should be taken into consideration when preparing programs for the promotion of healthy nutrition.

## **ACKNOWLEDGEMENT**

I would like to thank all NHV leaders, lectures, and entire staff for acquired knowledge, experience and warm atmosphere during the courses. Thank you that staying and learning at the school was such a pleasant experience.

I would like to express my gratitude to my principal supervisor Associate Professor Dr. Janina Petkeviciene for her great comments, suggestions, patient and support during the period of writing this essay.

I also want to thank each of the participants and colleagues I fortunately met during courses in the Nordic School of Public Health. Thank you for the wonderful time spent with you, long discussions and smiles.

I deeply thank to all my family members for their understanding, patient and love.

## REFERENCES

1. Diet, nutrition and the prevention of chronic diseases. Report of a WHO/FAO expert consultation. Technical Report Series 916. Geneva: WHO, 2003.
2. Grignon C. Long-term trends in food consumption: a French portrait. *Food and Food ways* 1999;8:151-74.
3. Ross E, Pratala R, Lahelma E, et al. Modern and healthy? Socioeconomic differences in the quality of diet. *EJCN* 1996;50:753-760.
4. The World Health Report 2002: reducing risks, promoting healthy life. Geneva: WHO, 2002.
5. Kalediene R, Petrauskiene J. Socio-economic transition, inequality, and mortality in Lithuania. *Economics & Human Biology* 2004;2(1):87-95.
6. Petrauskiene J, Kalediene R. Lietuvos gyventojų mirtingumo pokyčiai per pirmąjį Nepriklausomybės laikotarpį (Trends in mortality of Lithuanian population throughout the first decade of independence). *Medicina* 2003;39(8):788-796.
7. Kalediene R, Petrauskiene J. Inequalities in mortality by education and socio-economic transition in Lithuania: equal opportunities? *Public health* 2005;119(9):808-815.
8. Valkonen T, Martikainen P, Jalovaara M, Koskinen S, Martelin T, Makela P. Changes in socioeconomic inequalities in mortality during an economic boom and recession among middle- aged men and women in Finland. *Eur J Public Health* 2000;10:274-280.
9. Manor O, Eisenbach Z, Friedlander Y, Jeremy A. Educational differentials in mortality from cardiovascular disease among men and women: the Israel Longitudinal mortality study. *AEP* 2004;14(7):453-460.
10. Huisman M, Kunst AE, Andersen O, Bopp M, Borgan JK et al. Socioeconomic inequalities in mortality among elderly people in 11 European populations. *J Epidemiol* 2004;58:468-475.
11. Mackenbach JP, Bos V, Andersen O, Cardano M, Costa G et al. Widening socioeconomic inequalities in mortality in six Western European countries. *Int J Epidemiol* 2003;32:830-837.
12. Michels K, Wolk A. A prospective study of variety of healthy foods and mortality in women. *Int J Epidemiol* 2002;31:847-854.

13. Tamosiunas A, Reklaitiene R, Domarkiene S, Baceviciene M, Virviciute D. Prevalence of risk factors and risk of mortality in relation to occupational group. *Medicina* 2005;41(8):705-712.
14. Kalėdienė R. Lietuvos gyventojų bendras mirtingumas ir išsimokslinimo lygis (Association between overall mortality and level of education of Lithuanian population). *Socialiniai mokslai. Sociologija* 1996;3(7):85-87.
15. Grabauskas V, Kalediene R. Tackling social inequality through the development of health policy in Lithuania. *Scand J Public Health* 2002;30(59):12-19.
16. Kalediene R, Petrauskiene J. Inequalities in life expectancy in Lithuania by level of education. *Scand J Public Health* 2000;28:4-9.
17. Davey Smith G, Brunner E. Socio-economic differentials in health: the role of nutrition. *Proc Nutr Soc* 1997;56:75-90.
18. James WPT, Nelson M, Ralph A, Leather S. Socio-economic determinants of health. The contribution of nutrition to inequalities in health. *BMJ* 1997;314:1545-1549.
19. Hupkens CH, Knible RA, Drop MJ. Social class differences in food consumption. *Eur J Public Health* 2000;10:108-113.
20. Giskes K, Turrell G, Patterson C, Newman B. Socio-economic differences in fruit and vegetable consumption among Australian adolescents and adults. *Public Health Nutr* 2002;5(5):663-669.
21. Robinson SM, Crozier SR, Borland SE, et al. Impact of educational attainment on the quality of young women's diets. *EJCN* 2004;58(8):1174-1180.
22. Hulshof KFAM, Lowik MRH, Kok FJ, et al. Diet and life style factors in high and low socio-economic groups (Dutch Nutrition Surveillance System). *EJCN* 1991;45:441-450.
23. Leino M. Risk factors of coronary heart disease in relation to socioeconomic status. Doctoral thesis. Turku University. Finland, 1999.
24. Dynesen AW, Haraldsdottir J, Holm L, et al. Sociodemographic differences in dietary habits described by food frequency questions, results from Denmark. *EJCN* 2003;57:1586-1597.
25. Shahar D, Shai I, Vardi H, et al. Diet and eating habits in high and low socioeconomic groups. *Nutrition* 2005;21:559-566.

26. Johansson L, Thelle DS, Solvoll K, et al. Healthy dietary habits in relation to social determinants and lifestyle factors. *BJN* 1999;81:211-220.
27. Roos E, Lahelma E, Virtanen M, et al. Gender, socioeconomic status and family status as determinants of food behaviour. *Soc Sci Med* 1998;46:1519-1529.
28. Bazzano LA, He J, Ogden LG. Fruit and vegetable intake and risk of cardiovascular disease in US adults: the first National Health and Nutrition Examination. Survey Epidemiologic Follow-up Study. *Am J Clin Nutr* 2002;76:93-99.
29. Kunst AE, Mackenbach JP. Measuring socio-economic inequalities in health. Copenhagen: WHO, 1993.
30. Irala-Estevez JD, Groth M, Johansson L, et al. A systematic review of socio-economic differences in food habits in Europe: consumption of fruit and vegetables. *EJCN* 2000;54:706 -714.
31. Fagerly RA. Gender Differences in Opinions and Practices with Regard to a 'Healthy Diet'. *Appetite* 1999;32:171-190.
32. Agudo A, Pera G. Vegetable and fruit consumption associated with anthropometric, dietary and lifestyle factors in Spain. EPIC Group of Spain. European Prospective Investigation into Cancer. *Public Health Nutr* 1999;2:263-271.
33. Lopez-Azpiazu I, Sanchez-Villegas A, Johansson L, Petkeviciene J, Prattala R, Martinez-Gonzalez MA. Disparities in food habits in Europe: Systematic review of educational and occupational differences in the intake of fat. *J Hum Nutr Dietet* 2003;16:1-16.
34. Beardsworth A, Bryman A, Keil T, et al. Women, men and food: the significance of gender for nutritional attitudes and choices. *British Food J* 2002;104(7):470-491.
35. Abel T, McQueen DV. Determinants of selected unhealthy eating behaviours among male and female adults. *Eur J Public Health* 1994;4:27-32.
36. Jensen KO, Holm L. Preferences, quantities and concerns: socio-cultural perspectives on the gendered consumption of foods. *EJCN* 1999;53:351-359.
37. Baker AH, Wardle J. Sex differences in fruit and vegetable intake in older adults. *Appetite* 2003;40:269-275.

38. Billson H, Pryer JA, Nichols R. Variation in fruit and vegetable consumption among adults in Britain. An analysis from the dietary and nutritional survey of British adults. *EJCN* 1999;53:946-952.
39. Bourdieu P. *Distinction. A Social Critique of the Judgement of Taste*. London: Routledge & Kegan Paul, 1989. (Originally published in French).
40. Doving R. It is called fish? A study of mechanism behind the fish consumption pattern. SIFO report nr.12. The National Institute for Consumer Research, Norway, 1997.
41. Pingitore R, Spring B, Garfield D. Gender differences in body satisfaction. *Obesity Research*, 1997;5(5):402-409.
42. Malson H. Anorexia nervosa, in Ussher JM (Ed.) *Women's Health*, BPS Books: Leicester, 2000.
43. Hupkens CLH, Knibbe RA, Van Otterloo AH, Drop MJ. Social class differences in the food rules mothers impose on their children: a cross-national study. *Soc Sci Med* 1998;47(9):1331-1339.
44. Pomerleau J, McKee M, Robertson A, et al. Macronutrient and food intake in the Baltic republics. *EJCN* 2001;55:200-207.
45. Roos G, Johansson L, Kasmel A, et al. Disparities in vegetable and fruit consumption: European cases from the north to the south. *Public Health Nutr* 2001;4(1):35-43.
46. Osler M. Ten-year trends in the dietary habits of Danish men and women. Cohort and cross-sectional data. *EJCN* 1997;51(8):535-541.
47. Haraldsdottir J. Dietary guidelines and patterns of intake in Denmark. *BJN* 1999;81(2):S43-S48.
48. Johansson L, Drevon CA, Bjorneboe GE. The Norwegian diet during the last hundred years in relation to coronary heart disease. *EJCN* 1996;50:277-283.
49. Pratala R, Berg MA, Puska P. Diminishing or increasing contrasts? Social class variation in Finish food consumption patterns, 1997-1990. *EJCN* 1992;46:279-287.
50. Thompson RL, Margetts BM, Speller VM, McVey D. The Health Education Authority's health and lifestyle survey 1993: who are the low fruit and vegetable consumers? *J Epidemiol Community Health* 1999;53:294-299.

51. Lindstrom M, Hansos BS, Wirfalt E, Ostergren P. Socioeconomic differences in the consumption on vegetables, fruits and fruits juices. *Eur J of Public Health* 2001;11:51-59.
52. Grabauskas V, Klumbiene J, Petkeviciene J, Dregval L, Saferis V, et al. Suaugusių Lietuvos žmonių gyvensenos tyrimas, 2000 (Health Behaviour Among Lithuanian Adult Population, 2000). Helsinki, 2001.
53. Helakorpi S, Patja K, Pratala R et al. Health behaviour among Finish adult population, Spring 2003. Helsinki, Finland, 2003.
54. Prattala R, Heliostat V, Mykkanen H. The consumption of rye bread and white bread as dimensions of health lifestyles in Finland. *Public Health Nutrition* 2000;4:813-819.
55. Turrell G. Determinants of gender differences in dietary behavior. *Nutrition research* 1997;17:1105-1120.
56. Wardle J, Parmanter K, Waller J. Nutrition knowledge and food intake. *Appetite* 2000;34:269-275.
57. Biloukha O, Utermohlen V. Healthy eating in Ukraine: attitudes, barriers and information Sources. *Public Health Nutrition* 2001;4(2):207-215.
58. Caraher M, Dixon P, Lang T, et al. The state of cooking in England: the relationship of cooking skills to food choice. *British Food J* 1999;101(8):590-609.
59. Hjartaker A, Lund E. Relationship between dietary habits, age, lifestyle, and socio-economic status among adult Norwegian women. *The Norwegian Women and Cancer Study. EJCEN* 1998;52:565-572.
60. Dobson A, Mishra G, Brown W, Reynolds R. Food habits of young and middle-aged women living outside the capital cities of Australia. *Aust NZJ Public Health* 1997;21:711-715.
61. Johansson L, Solvoll K, Bjorneboe GE, Christian AD. Dietary habits among Norwegian men and women. *EJCEN* 1997;41:63-70.
62. Volatier JL, Verger P. Recent national French food and nutrient intake data. *BJN* 1999;81(Suppl.2):S57-S59.
63. Buss AE, Worsley A. Consumers' health perceptions of three types of milk: a survey in Australia, 2003. *Appetite* 2003;40:93-100.
64. Pudule I, Grinberga D., Villerusa A, et al. Health behaviour among Latvian adult population, 2002. Helsinki, Finland, 2003.

65. Fraser GE, Welch A, Luben R, et al. The Effect of Age, Sex, and Education on Food Consumption of a Middle-Aged English Cohort-EPIC in East Anglia, 2000. *Prev Med* 2000;30:26-34.
66. Woo J, Leung SSF, Ho SC, et al. Influence of educational level and marital status on dietary intake, obesity and other cardiovascular risk factors in a Hong Kong Chinese population. *EJCN* 1999;53:461-467.
67. Schafer RB, Schafer E, Dunbar M, Keith PM. Marital food interaction and dietary behavior. *Soc Sci Med* 1999;48:787-796.
68. Umberson D. Family status and health behaviours: social control as a dimension of social integration. *J of Health and Social Behaviour* 1987;28:306-319.
69. Calnan M. 'Lifestyle' and its social meaning. *Advances in Medical Sociology* 1994;4:69-87.
70. Hannon PA, Bowen DJ, Moinpour CM, McLerran DF. Correlations in perceived food use between the family food preparer and their spouses and children. *Appetite* 2003;40:77-83.
71. Kemmer D, Anderson AS, Marshall DW. Living together and eating together: changes in food choice and eating habits during the transition from single to married or cohabiting. *Sociological Review* 1998;46(1):48-72.
72. Shi L. Sociodemographic characteristics and individual health behaviors. *Southern Medical J* 1998;91:10.
73. Martikainen P, Brunner E, Marmot M. Socioeconomic differences in dietary patterns among middle-aged men and women. *Soc Sci Med* 2003;56:1397-1410.
74. Kearney M, Kearney JM, Dunne A, Gibney MJ. Sociodemographic determinants of perceived influences on food choice in a nationally representative sample of Irish adults. *Public Health Nutr* 2000;3(2):219-226.
75. Harnack L, Story M, Martinson B, Neumark-Sztainer D, Stang J. Guess who's cooking? The role of men in meal planning, shopping, and preparation in US families. *Journal of the American Dietetic Association* 1998;98: 995-1000.
76. Groth MV, Fagt S, Brundsted V. Social determinants of dietary habits in Denmark. *EJCN* 2001;55:959-966.
77. Turrell G, Patterson C, Oldenburg B, et al. The socioeconomic patterning of survey participation and non-response error in a multilevel study of food

- purchasing behaviour: area- and individual-level characteristics. *Public Health Nutr* 2003;6:181-189.
78. Pratala RS, Groth MV, Oltesdorf US, et al. Use of butter and cheese in 10 European countries. A case of contrasting educational differences. *Eur J of Public Health* 2003;13:124-132.
  79. WHO: global strategy on diet, physical activity and health. Fifty-seventh Health Assembly, WHA 57.17, 22 May 2004, <http://www.who.int/dietphysicalactivity/goals/en>.
  80. Waxman A. WHO's global strategy on diet, physical activity and health. *Scand J of Nutr* 2004;48(2):58-60.
  81. Valsta LM. Food-based dietary guidelines for Finland – a staged approach. *BJN* 1999;81(2):S49-S55.
  82. Petkeviciene J. Sveikos mitybos gairės. Metodines rekomendacijos (Lithuanian dietary guide and recommendations). Kaunas, 2000.
  83. Kasmel A, Lipand A, Markina A. Health behaviour among Estonian adult population, Spring 2002. Tallin, Estonia, 2003.
  84. The NORBAGREEN 2002 study. Consumption of vegetables, potatoes, fruit, bread and fish in the Nordic and Baltic countries. Copenhagen: Nordic Council of Ministers, 2003.
  85. Roos E, Pratala R. Meal pattern and nutrient intake among adult Finns. *Appetite* 1997;29:11-24.
  86. Mainland DD. Health and the demand for food in Scotland: economic and demographic effects. *British Food J* 1998;100(6):273-277.
  87. Turrini A, Saba A, Cialfa E, D'Amicis A. Original Communication Food consumption patterns in Italy: the INN-CA Study 1994-1996. *EJCN* 2001;55:571-588.
  88. Kowrygo B, Gorska-Warsewicz H, Berger S. Evaluation of Eating Patterns with Different Methods: The Polish Experience. *Appetite* 1999;32:86-92.
  89. Puska P, Helasoja V, Pratala V, et al. Health behaviour in Estonia, Finland and Lithuania 1994–1998. *Eur J of Public Health* 2003;13:11-17.
  90. Perrin AE, Simon C, Hedelin G, et al. Ten-year trends of dietary intake in a middle-aged French population: relationship with educational level. *Eur J Nutr* 2002;56(5):393-401.

91. Winkler G, Doring A, Keil U. Trends in dietary sources of nutrients among middle-aged men in southern Germany. Results of the MONICA Project Augsburg: dietary surveys 1984/1985 and 1994/1995. *Appetite* 2000;3:37-45.
92. Mitchell J. The British main meal in the 1990s: has it changed its identity? *British Food J* 1999;101(11):871-883.
93. Popkin BM, Siega-Riz AM, Haines PS, Jahns L. Where's the Fat? Trends in U.S. Diets 1965–1996. *Prev Med* 2001;32:245-254.
94. Hulshof KFAM, Brussaard JH, Kruizinga AG, Telman J, Lowik MRH. Socio-economic status, dietary intake and 10 y trends: the Dutch National Food Consumption Survey. *Eur J Clin Nutr* 2003;57:128-137.
95. Worsley A. Income differences in food consumption in the 1995 Australian National Nutritional Survey. *EJCN* 2003;57:1198-1211.
96. Turrell G, Hewitt B, Patterson C, et al. Socioeconomic differences in food purchasing behaviour and suggested implications for diet-related health promotion. *J Hum Nutr Dietet* 2002;15:355-364.
97. Kearney JM, McElhone S. Perceived barriers in trying to eat healthier – results of a pan-EU consumer attitudinal survey. *BJN* 1999;81(2):S133-S137.
98. Nutrition and Lifestyle in the Baltic Republic. Summary Report. Food and Nutrition Policy Unit, 1998.
99. Department of Health. Low income, food, nutrition and health: strategies for improvement. A report by the Low Income Project team for the Nutrition Task Force. London: Department of Health, 1996.
100. Smith AM, Smith C. Dietary intake and lifestyle patterns: correlates with socio-economic, demographic and environmental factors. *Hum Nutr Diet* 1994;7:283-294.
101. Lappalainen R, Martinez JA, Saba A, Holm L, Kearney M. Institute of European Food Studies – Pan-EU survey of consumer attitudes to food, nutrition and health. *European Journal of Clinical Nutrition* 1997;51(2):S36-S40.
102. Steele P, Dobson A, Alexander H, Russel A. Who eats what? A comparison of dietary patterns among men and women in different occupational groups. *Australian J Public Health* 1991;15:286-295.
103. Tjønneland A, Gronbek M, Stripp C, Overvad K. Wine intake and diet in a random sample of 48,763 Danish men and women. *Am J Clin Nutr* 1999;69:49-54.

104. Wirfalt AKE, Jeffery RW. Using cluster analysis to examine dietary patterns: nutrient intakes, gender, and weight status differ across food pattern clusters. *Am Diet Assoc.* 1997;97(3):272-279.
105. Kim SW, Moon SJ, Popkin BM. The nutrition transition in South Korea. *Am J Clin Nutr* 2002;71:44-53.
106. Bowman SA. Food shoppers' nutrition attitudes and relationship to dietary and lifestyle practices. *Nutrition Research* 2005;25:281-293.
107. Tomlinson JK. Changes in tastes in Britain, 1985-1992. *British Food Journal* 1999;100(6):295-301.
108. Roininen K, Lahteenmaki L, Tuorila H. Quantification of consumer attitudes to health and hedonic characteristics of foods. *Appetite* 1999;33:71-88.
109. Parmenter K, Waller J, Wardle J. Demographic variation in nutrition knowledge in England Health education research. *Theory and practice* 2000;15(2):163-174.
110. Hunt CJ, Nichols RN, Pryer JA. Who complied with national fruit and vegetable population goals? Findings from the dietary and nutritional survey of British adults. *Eur J Public Health* 2000;10:178-184.
111. Lopez-Azpiazu I, Martinez-Gonzalez MA, Kearney J. Perceived barriers of, and benefits to, healthy eating reported by a Spanish national sample. *Public Health Nutr* 1999;2(2):209-215.
112. Feunekes GIJ, Graaf C, Meyboom S et al. Food Choice and Fat Intake of Adolescents and Adults: Associations of Intakes within Social Networks. *Prev Med* 1998;27:645-656.
113. Feunekes GIJ, Stafleu A, de Graaf C, van Staveren WA. Family resemblance in fat intake in the Netherlands. *Eur J Clin Nutr* 1997;51:793-799.
114. Pollard J, Greenwood D, Kirk S. Lifestyle factors affecting fruit and vegetable consumption in the UK Women's Cohort Study. *Appetite* 2001;37:71-79.
115. Pomerleau J, McKee M, Robertson A. Dietary beliefs in the Baltic republics. *Public Health Nutr* 2000;4(2):217-225.
116. Siega AM, Popkin BM, Carson T. Differences in Food Patterns at Breakfast by Sociodemographic Characteristics among a Nationally Representative Sample of Adults in the United States. *Prev Med* 2000;30:415-424.

117. Buttriss JL. Food and nutrition: attitudes, beliefs, and knowledge in the United Kingdom. *Am J Clin Nutr* 1997;65:1985S-1995S.
118. Puska P, Vartiainen E, Tuomilehto J, et al. Changes in premature deaths in Finland: successful long-term prevention of cardiovascular disease. *Bulletin of the World Health Organization*, 1998;76:419-425.
119. Pietinen P, Lahti-Koski M, Vartiainen E, Puska P. Nutrition and cardiovascular disease in Finland since the early 1970s: a success story. *J Nut, Health and Aging* 2001;5:150-154.
120. The First Action Plan for Food and Nutrition Policy. WHO European Region 2000-2005. World Health Organization, 2001.
121. Valstybės žinios (Government News). Lithuania 2003;101.

## **LIST OF ABBREVIATIONS**

CI	confidence interval
EU	European Union
NCD	chronic noncommunicable diseases
OR	odds ratio
WHO	World Health Organization

