

## Dietary beliefs in the Baltic republics

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### Abstract

*Objectives:* As beliefs and knowledge about the possible effects of foods on health can influence food behaviours, this study examined selected dietary beliefs in the Baltic countries and the association of beliefs related to salt intake and to types of fat with food behaviours.

*Design:* A cross-sectional study.

*Setting:* Data from three surveys conducted in Estonia, Latvia and Lithuania in the summer of 1997 were used to describe the prevalence of dietary beliefs in these countries and to investigate the association between beliefs and behaviours (using logistic regression).

*Subjects:* Representative national samples of adults were selected in each country (Estonia,  $n = 2018$ ; Latvia,  $n = 2308$ ; Lithuania,  $n = 2153$ ).

*Results:* Misunderstood concepts (myths) related to dietary salt, types of fat, meat consumption and bread and potatoes were observed in high proportions of the population. Education level was an important correlate of beliefs related to salt intake and types of fat, people with a higher education level being more likely to be familiar with these issues. Correct beliefs were not consistently associated with healthier behaviours (e.g. less frequent use of salt at the table and use of non-animal fats for cooking), except for salt intake in Estonia.

*Conclusions:* Several misunderstood dietary concepts (myths) are still prevalent in the Baltic countries. Correct beliefs related to salt intake and types of fat were not consistent predictors of healthier food behaviours. In-depth qualitative investigations are needed to better describe and understand dietary beliefs and attitudes in the Baltic countries, and to identify barriers to the adoption of healthy food habits.

### Keywords

Estonia  
Latvia  
Lithuania  
Beliefs  
Dietary salt  
Dietary fats

Dietary habits in Central and Eastern Europe are generally less favourable than those observed in western countries<sup>1,2</sup>. Diet tends to be relatively rich in saturated fat and poor in vegetables, fruits and antioxidants, and there is an acknowledged need for the development of food and nutrition action plans<sup>3–8</sup>. These dietary patterns are a legacy of postwar food policies in the Soviet Union, which transformed the diet into one of the most energy dense in the world<sup>3</sup>. Between 1961 and 1981 there were considerable increases in the per capita availability of sugar, meat and eggs (increases by 56%, 50% and 100%, respectively), while availability of staple foods such as cereals and potatoes declined by 24%<sup>9</sup>. However, in the

early 1990s, the transition towards market economies affected food availability. In the Baltic Republics, for example, per capita availability of meat, eggs and milk decreased by 26%, 18% and 20%, respectively, between 1992 and 1997, while availability of starchy roots increased by over 20%. Despite these changes, the dietary animal foods and fat intake remain high<sup>10</sup>, suggesting a need to develop and implement campaigns to improve dietary habits in these countries.

Understanding why people select unhealthy diets is a first step to improving diet in the Baltic republics. Several factors influence individual food choices, including cost, taste, availability, convenience, health concerns, current

**Table 1** Dietary beliefs by country

Group	Estonia			Latvia			Lithuania			P value*			
	n	Wrong (%)	Right (%)	Don't know (%)	n	Wrong (%)	Right (%)	Don't know (%)	n		Wrong (%)	Right (%)	Don't know (%)
<i>'More dietary salt in the diet is of no consequence to your health'</i>													
All men	902	68.0	20.3	11.8	1058	62.2	20.9	16.9	986	66.9	16.5	16.5	0.001
18–34 years	397	65.2	21.7	13.1	335	59.7	23.0	17.3	349	71.1	13.8	15.2	0.006
35–49 years	320	72.2	18.1	9.7	367	66.2	19.1	14.7	361	65.4	17.7	16.9	0.09
50+ years	185	66.5	21.1	12.4	356	60.4	20.8	18.8	276	63.8	18.5	17.8	0.36
All women	1116	76.3	15.1	8.5	1219	69.2	21.2	9.6	1161	73.6	17.5	8.9	0.002
18–34 years	459	77.6	15.0	7.4	339	73.8	20.1	6.2	358	76.5	17.6	5.9	0.39
35–49 years	376	77.9	15.2	6.9	387	73.6	18.4	8.0	407	73.5	18.2	8.4	0.62
50+ years	281	72.2	15.3	12.5	493	62.7	24.1	13.2	396	71.2	16.7	12.1	0.01
<i>'All fats give the same risk of various coronary diseases'</i>													
All men	902	39.7	36.8	23.5	1058	27.4	36.5	36.1	986	45.3	19.3	35.4	<0.001
18–34 years	397	44.6	33.8	21.7	335	27.8	32.8	39.4	349	47.3	17.8	35.0	<0.001
35–49 years	320	42.5	35.3	22.2	367	26.4	40.3	33.2	361	46.0	21.1	33.0	<0.001
50+ years	185	24.3	46.0	29.7	356	28.1	36.0	36.0	276	42.0	18.8	39.1	<0.001
All women	1116	46.5	35.6	17.9	1218	30.8	43.5	25.7	1162	58.1	20.7	21.2	<0.001
18–34 years	459	52.9	30.5	16.6	339	36.6	36.3	27.1	359	62.4	18.9	18.7	<0.001
35–49 years	376	46.8	40.7	12.5	387	32.0	44.2	23.8	407	59.5	22.6	17.9	<0.001
50+ years	281	35.6	37.0	27.4	492	25.8	48.0	26.2	396	52.8	20.5	26.8	<0.001
<i>'Meat is an essential component in everyday healthy diet'</i>													
All men	902	42.1	49.0	8.9	1058	33.0	51.0	16.0	986	44.5	43.3	12.2	<0.001
18–34 years	397	37.5	51.9	10.6	335	35.2	47.2	17.6	349	49.3	38.7	12.0	<0.001
35–49 years	320	47.5	45.3	7.2	367	32.4	54.5	13.1	361	40.7	47.9	11.4	0.001
50+ years	185	42.7	49.2	8.1	356	31.5	51.1	17.4	276	43.5	43.1	13.4	0.002
All women	1116	50.6	39.3	10.1	1219	50.1	36.3	13.5	1162	58.8	30.5	10.8	<0.001
18–34 years	459	46.2	42.3	11.6	339	52.8	31.0	16.2	359	61.6	27.0	11.4	<0.001
35–49 years	376	52.4	39.9	7.7	387	56.1	34.4	9.6	407	59.7	31.7	8.6	0.17
50+ years	281	55.5	33.5	11.0	493	43.6	41.6	14.8	396	55.3	32.3	12.4	0.003
<i>'Alcohol has a high calorie content'</i>													
All men	902	22.4	63.5	14.1	1058	18.4	47.7	33.8	986	10.3	55.9	33.8	<0.001
18–34 years	397	19.7	62.2	18.1	335	17.0	50.5	32.5	349	9.7	55.6	34.7	<0.001
35–49 years	320	27.5	62.8	9.7	367	19.6	49.1	31.3	361	8.9	61.5	29.6	<0.001
50+ years	185	19.5	67.6	13.0	356	18.5	43.8	37.6	276	13.0	48.9	38.0	<0.001
All women	1116	14.3	67.3	18.5	1219	17.2	45.3	37.5	1161	8.6	62.8	28.6	<0.001
18–34 years	459	14.6	68.4	17.0	339	14.8	54.0	31.3	359	9.2	70.2	20.6	<0.001
35–49 years	376	16.0	70.7	13.3	387	18.9	49.6	31.5	406	9.9	66.3	23.9	<0.001
50+ years	281	11.4	60.9	27.8	493	17.7	35.9	46.5	396	6.8	52.5	40.7	<0.001

\* P value for differences between countries based on chi-square tests.

knowledge and beliefs and attitudes towards foods<sup>11–13</sup>. In this study, we examined the distribution of different dietary beliefs in the Baltic countries. We then focused on beliefs related to two acknowledged risk factors for hypertension and cardiovascular diseases, that is, excess dietary salt and saturated fats<sup>14–16</sup>. We also investigated how these beliefs correlated with the reported addition of dietary salt at the table and the type of fats used for cooking.

## Methods

Details of the survey methods have been described previously<sup>17</sup>. In summary, the surveys were conducted during the summer of 1997. Each sought to include representative samples of the national population aged between 19 and 64 years (19–65 years in Lithuania) using national population registers as the sampling frames. In each country, a simple random sample of 3000 people

was drawn. In Estonia, sampling was stratified by age group. In Latvia, it was stratified by region; for Riga, sampling also took account of age groups. In Latvia and Lithuania, substitution was not permitted but the interviewers returned to an address on multiple occasions if they were unable to find the subject. In Estonia, substitution was allowed if the response rate in the county in question was less than 60%; substitutes were selected on the basis of place of residence (usually neighbours, especially in the countryside). Overall, less than 5% of individuals, in seven Estonian counties, were substituted. The response rates were 67.3% in Estonia (males 63.2%, females 70.9%), 77.7% in Latvia (males 77.2%, females 78.2%) and 72.7% in Lithuania (males 69.3%, females 75.8%).

Survey interviews were conducted in the respondents' homes in the national language or in Russian. They included a 24-hour recall of dietary intake, the administration of a standardized questionnaire and the measurement

**Table 2** Likelihood of believing that more dietary salt in the diet can have harmful health consequences (adjusted for all variables)

Variable	Men						Women					
	Estonia		Latvia		Lithuania		Estonia		Latvia		Lithuania	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age group												
18–34 years	1.00		1.00		1.00		1.00		1.00		1.00	
35–49 years	1.53	1.10;2.14	1.35	0.97;1.89	0.75	0.54;1.05	1.05	0.74;1.47	0.92	0.65;1.31	0.90	0.64;1.27
50+ years	1.25	0.84;1.87	1.02	0.72;1.43	0.84	0.57;1.24	0.93	0.63;1.36	0.55	0.39;0.76	1.00	0.68;1.47
Nationality												
Estonian/Latvian/Lithuanian	1.00		1.00		1.00		1.00		1.00		1.00	
Russian	0.51	0.36;0.72	0.76	0.56;1.04	0.67	0.42;1.08	0.51	0.37;0.71	0.98	0.73;1.30	0.67	0.41;1.10
Other	0.38	0.21;0.68	1.81	1.10;2.99	0.51	0.31;0.86	0.33	0.20;0.54	0.99	0.64;1.54	0.40	0.24;0.67
Area of residence												
Urban	1.00		1.00		1.00		1.00		1.00		1.00	
Rural	0.95	0.71;1.28	0.87	0.64;1.18	0.71	0.52;0.98	0.65	0.48;0.89	0.86	0.64;1.14	1.14	0.84;1.56
Education level												
Primary	1.00		1.00		1.00		1.00		1.00		1.00	
Secondary	1.64	1.06;2.52	1.09	0.75;1.59	1.23	0.80;1.88	0.93	0.57;1.51	0.91	0.63;1.31	1.72	1.10;2.69
Secondary special or university	1.96	1.24;3.09	1.77	1.22;2.56	1.71	1.16;2.54	1.47	0.88;2.46	1.25	0.87;1.80	1.82	1.21;2.75
Income level												
Level 1 (low)	1.00		1.00		1.00		1.00		1.00		1.00	
Level 2	0.86	0.58;1.26	1.59	1.17;2.17	0.80	0.56;1.14	1.19	0.85;1.67	1.18	0.88;1.58	1.16	0.83;1.62
Level 3	0.91	0.60;1.37	1.65	1.03;2.62	0.71	0.44;1.15	1.45	0.94;2.24	1.42	0.86;2.35	1.14	0.71;1.81
Level 4 (high)	1.56	0.90;2.73	2.32	1.28;4.19	0.79	0.52;1.18	0.76	0.41;1.42	1.30	0.66;2.56	1.37	0.91;2.04

of height and weight. The questionnaire was translated by professional translators from English. It covered demographic and socioeconomic characteristics, selected dietary habits and food beliefs, and health behaviours. Nationality was classified as that of the native population, Russian or 'other' – which essentially equated to Ukrainian or Belarussian, or, in Lithuania, to Polish. The income variable related to average income per family member per month. In each country, it was divided into four categories based on national criteria for the poverty level, with the poorest category considered to be living in severe poverty.

Data were analysed using the statistical package STATA version 6.0 (College Station, Texas). All individuals with missing information on age were excluded from the analyses ( $n = 18$ ), as were pregnant women (Latvia,  $n = 35$ ). In Lithuania, three respondents were over 65 years of age but were kept in the analyses. Between-country differences in dietary beliefs, in the type of fat used for cooking and the use of salt at the table were assessed using chi-square tests, stratifying by age and sex. The odds of believing that 'all fats do not give the same risk of various coronary diseases' and that 'more dietary salt in the diet is of consequence to health' were calculated using multiple regression analyses according to a range of demographic and socioeconomic variables; all variables were included simultaneously in the regression model. The relationship between these two beliefs and the likelihood of adding salt at the table or of using lard or butter for cooking was investigated, adjusting for demographic and socioeconomic variables. Statistical significance was taken as  $P < 0.05$ .

## Results

The samples included 2018 respondents in Estonia, 2308 in Latvia and 2153 in Lithuania. The proportions of men and women were similar to those found in the general adult population of each country<sup>18–20</sup>. However, in Estonia, respondents tended to be slightly younger than the general adult population; in Latvia and Lithuania they were slightly older. Distribution by area of residence and nationality was similar to that of the general population.

### Dietary beliefs

Dietary beliefs are described in Table 1. The belief that too much dietary salt can have possible harmful effects on health was slightly commoner in Estonia (73%) than in Lithuania (71%) or Latvia (66%). In each country, women were more likely to have answered correctly than men, and younger women more likely to be right than women aged 50 years and over. In men, the belief that too much salt can affect health decreased with age in Lithuania, but in Estonia and Latvia it was highest in middle-aged men.

More than half the Lithuanian respondents (52%) believed that all types of fat do *not* give the same risk of various coronary diseases. The corresponding figures for Estonia and Latvia were 43% and 29%, respectively. In each country, women and younger respondents were more likely to believe in the importance of considering the type of dietary fat consumed.

Meat was *not* considered to be an essential component in an everyday healthy diet by only 52% of Lithuanians, 47% of Estonians and 42% of Latvians. Women were more likely than men to believe that meat does not need to be

**Table 3** Likelihood of believing that all fats do not give the same risk of various coronary diseases (adjusted for all variables)

Variable	Men						Women					
	Estonia		Latvia		Lithuania		Estonia		Latvia		Lithuania	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age group												
18–34 years	1.00		1.00		1.00		1.00		1.00		1.00	
35–49 years	1.00	0.73;1.36	0.99	0.70;1.42	1.06	0.78;1.46	0.80	0.60;1.06	0.83	0.60;1.15	0.90	0.66;1.22
50+ years	0.46	0.31;0.69	1.17	0.81;1.69	0.96	0.67;1.38	0.57	0.41;0.79	0.64	0.46;0.88	0.85	0.61;1.20
Nationality												
Estonian/Latvian/Lithuanian	1.00		1.00		1.00		1.00		1.00		1.00	
Russian	1.45	1.03;2.05	0.63	0.45;0.88	0.69	0.43;1.11	1.75	1.31;2.35	0.57	0.43;0.77	1.24	0.76;2.00
Other	0.80	0.42;1.51	0.57	0.34;0.95	0.54	0.31;0.92	1.25	0.76;2.07	0.83	0.54;1.28	0.68	0.41;1.13
Area of residence												
Urban	1.00		1.00		1.00		1.00		1.00		1.00	
Rural	1.21	0.90;1.62	1.03	0.74;1.44	0.95	0.70;1.28	0.72	0.55;0.94	0.76	0.56;1.02	0.76	0.58;1.00
Education level												
Primary	1.00		1.00		1.00		1.00		1.00		1.00	
Secondary	1.35	0.84;2.15	1.34	0.86;2.07	1.20	0.78;1.82	1.24	0.78;1.99	0.91	0.61;1.36	1.56	1.03;2.35
Secondary special or university	1.95	1.20;3.16	1.60	1.05;2.43	1.61	1.10;2.36	1.57	0.97;2.53	1.36	0.93;2.00	1.80	1.23;2.63
Income level												
Level 1 (low)	1.00		1.00		1.00		1.00		1.00		1.00	
Level 2	1.84	1.23;2.74	1.24	0.88;1.76	1.13	0.81;1.59	1.42	1.05;1.91	1.01	0.75;1.37	1.19	0.88;1.61
Level 3	2.36	1.56;3.58	2.01	1.25;3.22	1.21	0.76;1.92	1.61	1.13;2.30	1.75	1.12;2.76	1.11	0.73;1.68
Level 4 (high)	2.50	1.52;4.11	1.43	0.81;2.52	1.40	0.96;2.05	1.57	0.91;2.73	1.29	0.70;2.38	1.56	1.09;2.24

consumed daily. Variations by age were observed but they differed by country and sex.

The majority of the respondents (66% of Estonians, 60% of Lithuanians and 46% of Latvians) said that alcohol has a high energy content. In Estonia and Lithuania, women were more likely than men to say that alcohol was high in calories, while the reverse trend was observed (but only slightly) in Latvia.

### **Predictors of dietary beliefs related to dietary salt and types of fat**

Table 2 shows the likelihood of believing that more dietary salt in the diet can have harmful health consequences by the levels of different demographic and socioeconomic characteristics. After adjusting for all other variables (taken simultaneously in the regression

model), age was not a significant predictor of this belief except in Latvia where women aged 50 years and over were less likely to know about the possible harmful effects of salt than young women.

Variations by nationality were observed in each country. In Estonia and Lithuania, individuals of Russian and 'other' nationalities were less likely to know about the possible health effects of salt than Estonian and Lithuanian nationals, respectively; however, in Lithuania, significance was reached only for differences between 'other' nationalities and Lithuanian nationals. Conversely, in Latvia, men of 'other' nationalities were more likely to believe that more dietary salt can have health consequences compared with Latvian nationals. There was a small tendency (except in Lithuanian women) for people living in rural areas to believe that salt is inconsequential

**Table 4** Proportion of respondents adding salt at the table by country, sex and age group

Group	n	Estonia			Latvia				Lithuania				P value*
		Never (%)	If food is not salty enough (%)	Almost always before tasting (%)	n	Never (%)	If food is not salty enough (%)	Almost always before tasting (%)	n	Never (%)	If food is not salty enough (%)	Almost always before tasting (%)	
All men	902	42.9	46.9	10.2	1062	22.4	64.1	13.5	986	37.0	52.8	10.1	<0.001
18–34 years	397	41.3	48.9	9.8	336	24.4	62.8	12.8	350	35.7	56.0	8.3	<0.001
35–49 years	320	40.9	46.9	12.2	369	20.9	63.4	15.7	360	34.7	52.8	12.5	<0.001
50+ years	185	49.7	42.7	7.6	357	22.1	66.1	11.8	276	41.7	48.9	9.4	<0.001
All women	1116	51.9	44.9	3.2	1232	40.8	47.6	11.6	1165	56.0	39.6	4.5	<0.001
18–34 years	459	45.5	51.0	3.5	339	40.1	53.4	6.5	359	52.7	43.2	4.2	0.007
35–49 years	376	53.5	43.9	2.7	396	40.7	48.0	11.4	410	54.4	40.7	4.9	<0.001
50+ years	281	60.1	36.3	3.6	497	41.5	43.3	15.3	396	60.6	35.1	4.3	<0.001

\* P value for differences between countries based on chi-square tests.

**Table 5** Type of fat used for cooking by country, sex and age group

Group	Estonia					Latvia					Lithuania					P value*
	n	Butter	Marg.	Veg. oil	Animal fat/lard	n	Butter	Marg.	Veg. oil	Animal fat/lard	n	Butter	Marg.	Veg. oil	Animal fat/lard	
All men	902	9.3	12.3	68.6	9.8	1060	5.9	9.8	72.9	11.4	987	6.2	8.1	50.8	35.0	<0.001
18–34 years	397	8.6	10.3	76.1	5.0	334	6.6	9.9	74.6	9.0	350	7.4	7.7	53.7	31.1	<0.001
35–49 years	320	11.9	13.1	62.8	12.2	369	8.7	9.5	72.9	8.9	361	5.5	6.9	52.9	34.6	<0.001
50+ years	185	6.5	15.1	62.7	15.7	357	2.2	10.1	71.4	16.3	276	5.4	10.1	44.2	40.2	<0.001
All women	1116	5.6	12.4	75.7	6.4	1232	4.0	7.0	81.9	7.1	1165	5.5	7.3	63.1	24.1	<0.001
18–34 years	459	6.1	13.3	77.1	3.5	341	7.6	5.9	79.8	6.7	358	5.6	5.9	67.0	21.5	<0.001
35–49 years	376	4.8	12.2	75.5	7.5	393	3.6	7.6	81.2	7.6	411	4.9	7.3	64.0	23.8	<0.001
50+ years	281	5.7	11.0	73.7	9.6	498	1.8	7.2	83.9	7.0	396	6.1	8.6	58.6	26.8	<0.001

Marg., margarine; veg., vegetable.

\* P value for differences between countries based on chi-square tests.

for health compared with people living in urban areas. However, statistical significance was reached only in Lithuanian men and Estonian women. Education level was positively associated with the belief that salt can have some health consequences in men from each country (test for trend  $P < 0.005$ ) and in Estonian and Lithuanian women (trend  $P < 0.05$ ). Income also was positively associated with this belief, but only consistently in Latvian men (test for trend  $P < 0.001$ ): men in the highest income category were more than twice as likely as men in the lowest one to believe more dietary salt to be harmful.

Table 3 shows demographic and socioeconomic correlates of the likelihood of believing that all fats do not give the same risk of various coronary diseases. Education level was the most consistent predictor. In each

country, educational achievement was positively related to this belief (test for trend  $P < 0.01$  in Estonia and Lithuania,  $P < 0.05$  in Latvia). Income level was also positively related, particularly in Estonian men ( $P$  value for trend  $< 0.001$ ) and women ( $P = 0.01$ ). In Latvia, respondents in the third income level category were significantly more likely than those in the lowest income category to know that all fats may not give the same coronary disease risk.

Variations in the odds of believing that all types of fat do not give the same risk of coronary disease were also observed by age and nationality, but few with area of residence. Age was inversely related to this likelihood in Estonians (test for trend  $P < 0.01$ ), and individuals aged 50 years and over were significantly less likely to believe

**Table 6** Likelihood of adding salt at the table (adjusted for all variables)

Variable	Men						Women					
	Estonia		Latvia		Lithuania		Estonia		Latvia		Lithuania	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age group												
18–34 years	1.00		1.00		1.00		1.00		1.00		1.00	
35–49 years	1.11	0.81;1.51	1.42	0.97;2.10	0.99	0.72;1.38	0.71	0.53;0.94	1.09	0.80;1.50	0.88	0.66;1.19
50+ years	0.73	0.50;1.06	1.19	0.80;1.77	0.81	0.56;1.17	0.49	0.35;0.68	0.96	0.70;1.30	0.71	0.50;0.99
Nationality												
Estonian/Latvian/Lithuanian	1.00		1.00		1.00		1.00		1.00		1.00	
Russian	0.91	0.65;1.27	0.72	0.50;1.02	1.12	0.69;1.83	0.76	0.56;1.02	0.90	0.69;1.18	2.17	1.36;3.47
Other	1.23	0.67;2.26	0.64	0.39;1.05	1.21	0.70;2.09	0.76	0.46;1.26	0.59	0.39;0.88	2.42	1.44;4.07
Area of residence												
Urban	1.00		1.00		1.00		1.00		1.00		1.00	
Rural	0.96	0.72;1.27	1.62	1.10;2.39	0.94	0.69;1.28	0.93	0.71;1.23	1.30	0.98;1.71	1.21	0.92;1.60
Education level												
Primary	1.00		1.00		1.00		1.00		1.00		1.00	
Secondary	0.90	0.59;1.39	0.85	0.52;1.37	1.27	0.83;1.95	0.69	0.43;1.09	0.97	0.67;1.40	1.45	0.95;2.20
Secondary special or university	0.68	0.43;1.06	0.71	0.45;1.13	1.06	0.72;1.56	0.83	0.52;1.33	0.74	0.52;1.06	1.07	0.72;1.57
Income level												
Level 1 (Low)	1.00		1.00		1.00		1.00		1.00		1.00	
Level 2	1.06	0.73;1.53	0.71	0.49;1.04	1.05	0.74;1.48	0.90	0.66;1.21	0.87	0.66;1.15	0.95	0.70;1.29
Level 3	1.30	0.88;1.93	1.27	0.72;2.25	1.31	0.80;2.15	0.99	0.69;1.41	0.94	0.60;1.46	0.97	0.64;1.48
Level 4 (High)	1.35	0.83;2.18	0.63	0.35;1.15	0.99	0.67;1.46	1.02	0.58;1.79	0.82	0.45;1.48	1.03	0.72;1.45
Dietary salt is of no consequence for health												
Wrong	1.00		1.00		1.00		1.00		1.00		1.00	
Right	2.06	1.44;2.96	1.12	0.75;1.69	1.05	0.72;1.51	2.55	1.79;3.64	1.45	1.06;1.98	0.88	0.63;1.21
Don't know	1.87	1.20;2.92	0.86	0.56;1.32	1.44	0.97;2.13	3.07	1.93;4.88	1.28	0.84;1.97	1.26	0.81;1.95

**Table 7** Likelihood of using lard or butter for cooking (adjusted for all variables)

Variable	Men						Women					
	Estonia		Latvia		Lithuania		Estonia		Latvia		Lithuania	
	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI	OR	95%CI
Age group												
18–34 years	1.00		1.00		1.00		1.00		1.00		1.00	
35–49 years	1.75	1.17;2.64	1.10	0.72;1.68	1.12	0.80;1.56	1.31	0.83;2.06	0.77	0.49;1.22	1.13	0.80;1.58
50+ years	1.54	0.93;2.54	1.15	0.74;1.78	1.24	0.85;1.81	1.24	0.73;2.08	0.55	0.34;0.89	1.14	0.78;1.66
Nationality												
Estonian/Latvian/Lithuanian	1.00		1.00		1.00		1.00		1.00		1.00	
Russian	2.60	1.75;3.88	1.68	1.13;2.48	0.86	0.52;1.41	2.16	1.41;3.31	1.08	0.70;1.66	1.38	0.83;2.29
Other	2.37	1.23;4.58	1.62	0.94;2.81	1.56	0.92;2.64	1.47	0.72;2.97	1.50	0.83;2.71	1.01	0.57;1.79
Area of residence												
Urban	1.00		1.00		1.00		1.00		1.00		1.00	
Rural	1.56	1.08;2.25	1.51	1.02;2.23	2.78	2.05;3.78	1.25	0.82;1.89	1.98	1.30;3.00	2.68	2.01;3.59
Education level												
Primary	1.00		1.00		1.00		1.00		1.00		1.00	
Secondary	0.50	0.30;0.81	0.82	0.50;1.35	0.69	0.45;1.06	0.44	0.25;0.79	0.62	0.35;1.09	0.91	0.58;1.43
Secondary special or university	0.52	0.31;0.87	1.00	0.62;1.60	0.68	0.46;1.01	0.41	0.22;0.76	0.98	0.58;1.65	0.95	0.63;1.44
Income level												
Level 1 (low)	1.00		1.00		1.00		1.00		1.00		1.00	
Level 2	0.49	0.31;0.78	0.79	0.53;1.19	0.92	0.65;1.30	0.60	0.37;0.95	0.69	0.44;1.06	0.76	0.54;1.05
Level 3	0.59	0.36;0.96	1.15	0.65;2.03	0.84	0.51;1.37	0.78	0.45;1.38	1.16	0.61;2.21	0.88	0.55;1.38
Level 4 (high)	0.97	0.53;1.76	1.56	0.84;2.89	0.97	0.65;1.44	1.86	0.90;3.84	1.24	0.54;2.87	0.65	0.43;0.96
All fats give the same risk of various coronary diseases												
Wrong	1.00		1.00		1.00		1.00		1.00		1.00	
Right	0.73	0.47;1.13	0.82	0.54;1.26	1.23	0.84;1.79	0.67	0.43;1.07	1.41	0.89;2.21	1.40	1.00;1.96
Don't know	1.05	0.67;1.64	0.81	0.53;1.24	1.49	1.08;2.04	0.96	0.58;1.58	1.20	0.72;2.00	1.15	0.82;1.62

that different types of fat can give different risks of coronary diseases than their younger counterparts (18–34 years).

The observed differences by nationality varied among countries. In Estonia, respondents of Russian nationality were more likely to believe that different types of fat can give different risks of coronary diseases than respondents of Estonian nationality; the reverse was true in Latvia. In Latvia and Lithuania, men of 'other' nationalities were less likely to have this belief than their counterparts of Latvian and Lithuanian nationality.

### ***Use of salt at the table and type of fat used for cooking***

The habit of using of salt at the table (if the food is not salty enough or almost always before tasting the foods) varied among countries (Table 4). Its prevalence was particularly high in Latvia compared with the other Baltic countries. Overall, in Latvia, 78% of men reported using salt at the table at least occasionally compared with 57% of men in Estonia and 63% in Lithuania. The corresponding figures for women were consistently lower: 59%, 48% and 44%, respectively. Overall, one in nine men and one in 16 women almost always used salt at the table before tasting the foods. Respondents aged 50 years and over were more likely to abstain from using salt at the table than younger respondents, except in Latvia. In this country, the men least likely to use salt at the table were aged 18–34 years.

In Estonia, 19% of the respondents reported using salt

that contains additives. This was the case in only 5% of Latvians and Lithuanians. The types of salt with additives most commonly used were iodized salt and Pansalt (low sodium content) in Estonia, and iodized salt in Latvia and Lithuania.

In all three countries, oil was the type of fat most commonly used for cooking (Table 5). Oil was more frequently used in Latvia (78%) and Estonia (73%) than in Lithuania (57%), and more often by women than men in each country. Lithuanians were more than three times as likely as respondents from the other countries to use lard for cooking (Lithuania, 29%; Estonia, 8%; Latvia, 9%). Higher proportions of Estonians than Latvians and Lithuanians reported cooking with butter and margarine. In each country, men more frequently reported using animal fats (lard or butter) for cooking than women (26% vs 18%). In general, the use of oil decreased with age and that of lard increased with age except in Latvian women; in these women, the use of oil increased with age and few differences were observed for the use of lard.

Predictors of the likelihood of using salt at the table (if the food is not salty enough or always) are described in Table 6. This likelihood was inversely related to age in women from Estonia and Lithuania ( $P$  value for trend  $<0.05$ ), but not in other groups. Variations by nationality were strongest among Lithuanian women: those of Russian or 'other' nationalities were more than twice as likely as women of Lithuanian nationality to add salt at the table at least occasionally. In Estonian men and women, there was an inverse relationship between the likelihood

of using salt at the table and educational achievement ( $P < 0.05$ ). A similar trend was observed in Latvia but it did not reach statistical significance. Finally, in Estonia, respondents who thought that it is wrong to believe that more dietary salt in the diet is of no consequence to health were less likely than other respondents to add salt at the table.

Predictors of the likelihood of using lard or butter for cooking are shown in Table 7. When adjusting for all other variables included in the model, a few differences in this likelihood were observed by age and nationality. Age was positively related to the use of these types of fat in Estonian men ( $P$  value for trend = 0.04), but it was negatively related to their use in Latvian women ( $P < 0.02$ ). Among Estonian men and women and among Latvian men, those of Russian nationality more often used animal fats for cooking than their counterparts of Estonian or Latvian nationality, respectively. Estonian men from 'other' nationalities were more than twice as likely as Estonian nationals to use butter and lard for cooking. Respondents in rural areas were generally more likely to use lard or butter for cooking than those in urban areas. In Estonia, education level was inversely related to the odds of using lard or butter for cooking; respondents having at least a secondary degree were approximately 40–60% less likely to use these types of fats for cooking than those with primary education. Income level was also associated with this likelihood in Estonian men: those in the second and third income categories less frequently reported using animal fats for cooking than men in the lowest income group. The belief that all types of fat give the same risk of various coronary diseases was not consistently associated with the use of lard or butter for cooking. Significant differences were observed only in Lithuania. Women who believed that all types of fat confer the same risk of coronary diseases and men who did not know whether this statement was true or false were 40–50% more likely to use animal fat for cooking than their counterparts who said that this statement was wrong.

## Discussion

A fundamental assumption of many nutrition promotion programmes is that many individuals will adopt a healthy diet if they are given clear information. However, knowledge and beliefs are not the only determinants of behaviours – other factors such as the availability and cost of food, their taste, and other psychological and environmental barriers to choosing and using these foods may have more impact on food choices. Nevertheless, several studies have reported that beliefs and knowledge were positively related to dietary behaviours<sup>12,13,21,22</sup>. In a prospective study, Patterson *et al.* also reported that the belief of a connection between diet and cancer preceded healthy dietary changes<sup>23</sup>.

In this study, we observed that more people knew

about possible harmful effects of excess dietary salt than about the differential risks of various types of fat. More than two-thirds of the respondents answered the question about salt correctly. However, this proportion was lower in Latvia than in Estonia and Lithuania, a finding that agrees with the higher use of salt at the table among Latvians. The belief that all types of fat do not give the same risk of various coronary diseases was generally low: in Latvia, less than a third of the respondents answered this question correctly compared with 53% of the Lithuanians. This last observation is surprising as Lithuanians were at least three times as likely as other participants to use lard for cooking (29% vs 9%), and 23% less likely to use oil for cooking (58% vs 75%). It should be noted that this difference in use of lard was also found in the FinnBalt surveys, which reported that it was used by 24.5% of Lithuanians in 1996<sup>7</sup> compared with 8.2% of Latvians in 1998<sup>24</sup>.

Socioeconomic status was an important predictor of dietary beliefs in the Baltic countries, an observation consistent with other studies<sup>21,25</sup>. In all groups of men and in Lithuanian women, higher educational achievement was associated with the belief that dietary salt may have possible harmful effects on health. We also observed that the belief that all types of fat do not give the same risk of various coronary heart diseases was positively related to education level and with income level in most groups of respondents. Variations in dietary beliefs by nationality and area of residence were also observed, but they tended to vary by country and sex.

Beliefs in the possible effects of dietary salt and types of fat were not consistently associated with healthier behaviours. In Estonia, men and women who believed that excess dietary salt is of *no* consequence for health and those who did not know if it is or not were about two to three times as likely as other respondents to add salt at the table, even after differences in education level and other demographic characteristics were taken into account. Elsewhere a similar significant finding was observed only in Latvian women: those who thought that salt does *not* influence health status were almost 50% more likely to use salt at the table than those who believed that it does.

Believing that different types of fat have different effects on the risk of coronary diseases was a poor predictor of the choice of fat used in food cooking. The likelihood of using lard or butter for cooking was increased significantly only in two groups of Lithuanian respondents: in men who did not know whether different types of fats provide the same risk of various coronary diseases and in women who believed that they do not. The generally high use of vegetable oil for cooking, particularly in Latvia and Lithuania, is thus probably related to other psychological and environmental factors, such as relative cost and increased availability.

The belief that meat is an essential component of an

everyday healthy diet was widespread in each Baltic country. This belief could lead to an overconsumption of meat, which could in turn lead to an intake of excess dietary saturated fat and protein. This phenomenon has been observed in Russia where the overconsumption of fat and protein in the form of meat and meat products remains high despite the price of these products<sup>26</sup>. This could be a legacy from the original high recommended daily intake in the Soviet Union in perpetuating a belief that high intakes of protein are necessary to maintain good health. As high animal protein diets are also likely to be high in fat, the perpetuation of this belief is of concern considering the high risk of obesity and cardiovascular diseases among the populations of the Baltic countries<sup>27</sup>.

In contrast, potatoes have an important role in a healthy diet as they are a good source of complex carbohydrate, dietary fibre and vitamin C<sup>28,29</sup>. However, in Estonia, 57% of the population either believed these are fattening or did not know whether they are or not, and only 35% believed that potatoes are a good source of vitamin C (data not shown). Results from the 24-hour recall (data not shown) indicated that the median intake of potatoes was around 200–225 g day<sup>-1</sup> in men and 125–150 g day<sup>-1</sup> in women. Data from the Food and Agriculture Organization food balance sheet statistics suggest that potato availability over the 30-year period between the 1960s and 1990s fell by approximately 25%, to an average of around 200 g day<sup>-1</sup> in 1991 in Europe<sup>9</sup>. Countries such as the Baltic states should thus be encouraged to increase or maintain their current levels of intake. Future information campaigns will need to address current popular beliefs.

Finally, we observed that the type of salt used by the participants in the surveys did not usually contain additives. When salt with additives was used, iodized salt was used less than 50% of the time in Estonia, 70% of the time in Latvia and 84% in Lithuania. Iodine deficiency remains one of the main nutritional deficiencies in Europe and survey data have suggested the presence of mild to moderate iodine deficiency disorders in Estonia and Lithuania, with a prevalence of goitre of 26–38% in Lithuania; in Latvia, data suggest that there is probably little or no iodine deficiency<sup>30</sup>. As the World Health Organization (WHO) recommends that salt intake be limited to 6 g day<sup>-1</sup> in view of its link with hypertension and cardiovascular diseases<sup>22</sup>, universal iodization should be promoted in the Baltic states to ensure that all salt used by food manufacturers (especially for the preparation of bread), the mass catering sector and households is iodized. In addition, the iodization of all animal fodder would ensure that iodine enters the human food chain via milk and milk products, while having the benefit of limiting the amount of salt consumed by the population. This approach would reduce current concerns regarding the quality of household and retail iodized salt, and would ensure that all the population have adequate

iodine intakes, particularly lactating women and breast-fed infants. For example, in the UK and the Nordic countries, it has been reported that around 45–70% of the iodine intake in humans originates from milk and milk products<sup>31,32</sup>.

### ***Advantages and limitations of the study***

The Baltic Nutrition and Health Surveys have the advantage of being based on samples of the general population of Estonia, Latvia and Lithuania, and their overall response rates were high. Their generalizability is thus an important strength. In addition, the interviews were made in the natural settings of the population, which is an additional advantage, and the response rate for each individual question in the surveys was high. However, the cross-sectional study design does not allow for inferences regarding cause and effect relationships. In addition, the study may have been affected by recall or reporting bias as the information is based on self-report; however, as the questions were generally non-stigmatizing, reporting bias should be small. One issue to be considered is the extent to which men, who often play little part in food preparation, would know about matters such as which types of fat are used in their home cooking. The survey was conducted mainly in peoples' homes so it was possible to seek clarification from other family members if they were unsure.

Finally, the surveys were not designed to specifically investigate food beliefs and thus the number of questions asked was limited.

### **Conclusions**

In conclusion, we observed that several erroneous beliefs are prevalent in the Baltic countries, including the belief that more dietary salt is of no consequence to health, that all fats give the same risk of various coronary diseases, that meat is an essential component in an everyday healthy diet, and that bread and potatoes are fattening. Education level was an important determinant of beliefs related to salt and types of fat, more highly educated people being more likely to be familiar with these issues. However, positive beliefs were not consistent predictors of healthier food behaviours. Although the belief that too much dietary salt can have negative effects on health tended to predict less frequent use of salt at the table in Estonia, believing that all types of fat do not give the same coronary disease risk was a poor predictor of the type of fat used for cooking in most subgroups of respondents.

In-depth qualitative investigations are now needed to better describe and understand dietary beliefs and attitudes in the Baltic countries, and to identify barriers to the adoption of healthy food habits. Nutritionists and policy makers would benefit from this information when developing nutrition education activities designed to



change dietary habits and help prevent cardiovascular diseases in these countries.

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