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# Changes in cardiovascular risk factors and health behaviours from 1992 to 1997 in the Republic of Karelia, Russia

TIINA LAATIKAINEN, LAURA DELONG, SVETLANA POKUSAJEVA, MIHAIL UHANOV, ERKKI VARTIAINEN, PEKKA PUSKA *

**Background: In Russia rapid changes have taken place both in total and chronic disease mortality during recent years. Little reliable information is available on the trends in conventional risk factors in Russia. Methods: Chronic disease risk factors and health behaviours were studied in the Republic of Karelia, Russia in 1992 and 1997, in population surveys connected with the National FINRISK Study in Finland. Independent random population samples (n=1000) of people aged between 25 and 64 years were drawn in both survey years. Surveys included a self-administered questionnaire, physical measurements and laboratory analyses. Results: The levels of systolic blood pressure, total serum cholesterol, and high-density lipoprotein cholesterol decreased among both genders from 1992 to 1997, but the difference between the survey years was statistically significant only among women. Both self-reported alcohol consumption and serum gamma-glutamyl transferase levels increased significantly in both men and women. There was a significant shift in the type of fat used on bread and in cooking, from butter use to use of margarine and vegetable oil, among both genders. Conclusions: As a whole the risk factor levels in the Republic of Karelia are high. However, some slight improvement in risk profile was seen. Positive changes in dietary habits, such as change in the quality of fat and associated reduction in serum cholesterol levels may have contributed to the decline in cardiovascular disease mortality seen in Russia since 1995. However, since smoking and elevated blood pressure levels as well as alcohol consumption are still highly prevalent, there is a great need for effective interventions.**

**Keywords: chronic disease, epidemiology, health behaviour, population risk factors, Russia**

Certain biological and behavioural risk factors are strongly related both to all-cause and cardiovascular disease (CVD) mortality. Important biological risk factors for CVD are high blood pressure, body mass index, elevated serum cholesterol or otherwise unfavourable lipid profile.[1,2] Health behaviours shown to be of major importance in CVD risk are smoking, alcohol consumption, physical inactivity and dietary habits.[3–7] One obstacle presented by behaviours targeted in CVD intervention is that they are difficult to change. These behaviours are embedded in a social and cultural environment. However, major reductions in the occurrence of CVD are possible and call for intervention aimed towards general changes in health-related lifestyles in the community.[8,9] For a preventive community-based project, information not only on biological risk factors, but also on related behaviours and their determinants and trends is essential.[10]

* T. Laatikainen[1], L. DeLong[2], S. Pokusajeva[3], M. Uhanov[3], E. Vartiainen[1], P. Puska[1]
1 National Public Health Institute, Helsinki, Finland
2 Emory University School of Medicine, Atlanta, USA
3 Central Hospital of Pitkäranta, Republic of Karelia, Russia
**Correspondence:** Tiina Laatikainen, PhD, National Public Health Institute – KTL, Department of Epidemiology and Health Promotion, Mannerheimintie 166, FIN-00300 Helsinki, Finland, tel. +358 9 47448936, fax +358 9 47448338, e-mail: Tiina.Laatikainen@ktl.fi

The Republic of Karelia (RKR), formerly part of the Soviet Union, is now an autonomous part of the Russian Federation. Located in northwest Russia, the RKR is neighboured in the west by Finland, in the north by the Murmansk region of Russia, in the east by the Archangels and Vologda regions, and in the south by the Leningrad region. One of the 17 districts of the RKR, Pitkäranta, is typical of the Republic according to statistical information.[11,12] In 1990 there were 27,500 inhabitants, approximately 3.4% of the population of the RKR (798,400). In 1989, 74% of the population was Russian, 10% Karelian, 7% Belarussian, 4% Ukrainian, 2% Finnish and 3% others.[12,13]

As is the case in many parts of the Russian Federation, chronic disease and, in particular, CVD mortality rates are high in the Republic of Karelia. The 1991 age-adjusted all-cause mortality in the age group 35–64 years per 100,000 population was 1,624 among men and 552 among women. The CVD mortality for the same age group per 100,000 population in 1991 was 540 among men and 148 among women.[14,15] The highest peak in CVD mortality in Russia was seen in 1994. Since then the trend has started to decline.[16]

In 1992 a baseline study concerning chronic disease risk factors was carried out in the area of Pitkäranta in the Republic of Karelia, Russia. Later a cardiovascular disease prevention programme called the 'Pitkäranta Project' was

established in the area in collaboration with the Health Ministry of the Republic of Karelia and the Central Hospital of Pitkäranta from Russia and the KTL (National Public Health Institute) and the North Karelia Project in Finland. The aim of the programme has been to decrease chronic disease, especially CVD mortality and morbidity, by changing major risk factor levels in the population through general changes in lifestyle.

Until 1997 the main action carried out in the area of Pitkäranta was the establishment of the Pitkäranta Project organisation and the education of the persons responsible for running the programme. Additionally, the education of health personnel and other persons involved as lay leaders was organised. Many health education materials have been produced both for health personnel and for the population. The first intervention activities in this area were smoking cessation interventions such as the establishment of the first smoking cessation groups in the Republic of Karelia.

The aim of this paper is to assess the changes in biological and behavioural chronic disease risk factors in the Republic of Karelia between the years 1992 and 1997. The goals were to serve both the evaluation of the first intervention activities completed and the planning of future preventive activities.

The surveys were carried out in connection with a large population risk factor survey in Finland (the National FINRISK Study), during the spring of 1992 and again in 1997. The levels of key cardiovascular risk factors in the 1992 survey have previously been published.[15,17,18]

## MATERIALS AND METHODS

The study population were 25–64-year-old people in the district of Pitkäranta in the Republic of Karelia. In both surveys an independent stratified random sample was drawn from the population registers so that every 10-year age group had an equal number of men and women. The total sample size in both survey years was 1,000 people with 125 people in each age- and sex-specific group. People who had died or moved permanently out of the area before the survey were excluded from the original sample. The participation rate was somewhat higher in 1992 with 77% of men and 92% of women, than in 1997 with 62% of men and 88% of women *(table 1)*.

The surveys were carried out in the months of March and April at the Central Hospital of Pitkäranta and local health centres. The surveys included a self-administered questionnaire, physical measurements and laboratory analyses of blood samples. A specially trained survey team carried out the survey. The survey methods followed the WHO MONICA Project protocol[19] and were identical in both survey years. The standardised questionnaire, with mainly precoded answers, included questions about health behaviours, socio-economic factors, medical history and psychosocial factors.

Blood pressure was measured after 15 minutes of rest in a sitting position from the right arm of the subject. Systolic blood pressure (SBP) was the appearance of the Korotkoff sounds, and the fifth phase was recorded as the diastolic blood pressure (DBP). Blood pressure was measured twice and the average value was used in the present analysis. SBP ranges used in reporting follow the new WHO/ISH definitions and classifications.[20]

A venous blood specimen was taken to determine serum total cholesterol, high-density lipoprotein (HDL) cholesterol, triglyceride and GGT levels. The subjects were asked to fast for at least 4 hours before the examination and to avoid any fatty food during the day of the examination. Serum cholesterol and HDL was determined using an enzymatic method (CHOD–PAP, Boehringer Mannheim, Monotest). Before analysis HDL-cholesterol was precipitated from the sample by the PTA-precipitation method. All laboratory analyses were made from fresh serum samples at the Department of Biochemistry of the National Public Health Institute of Finland in Helsinki, standardised against national and international reference laboratories.

Smoking was assessed using a standard set of questions in the self-administered questionnaire. Based on responses the participants were classified into three categories. Current smokers were classified as those who had smoked regularly for at least one year and had smoked during the previous month. Ex-smokers were classified as those who had smoked regularly, but had stopped smoking at least one month before the survey. Never smokers were those who had never smoked regularly.

Alcohol consumption patterns were determined through the questionnaire by questions concerning drinking habits. Alcohol consumption was classified using two different methods. The first variable (*Alc1*) represents the self-reported amount of alcohol in grams per week (g/wk) consumed during the week previous to the survey date, assessed by the previous week's recall. The second variable (*Alc2*) represents the calculated average amount of alcohol in grams per week consumed over the year previous to the survey date, assessed by the quantity-frequency set of questions. Estimated alcohol content per portion was 12.5 g for beer (0.3 l) and 12.0 g each for wine (12 cl) and spirits (4 cl). Serum gamma-glutamyltransferase (GGT) was measured to help assess alcohol consumption. GGT values of more than 80 U/l among men and 50 U/l among women according to the European

**Table 1** Survey sample and participants

| | 1992 | | 1997 | |
|---|---|---|---|---|
| | Males | Females | Males | Females |
| Original sample | N=500 | N=500 | N=500 | N=500 |
| Examined | n | n | n | n |
| Age (years) | | | | |
| 25–34 | 90 | 114 | 69 | 113 |
| 35–44 | 94 | 117 | 77 | 112 |
| 45–54 | 91 | 110 | 78 | 111 |
| 55–64 | 105 | 114 | 85 | 104 |
| Total | 380 | 455 | 309 | 440 |
| Participation rate (%) | 77 | 92 | 62 | 88 |

Committee for Clinical Laboratory Standards (ECCLS) were regarded as elevated values.[21]

The means and frequencies were computed and analysed by gender and survey year. A $\chi^2$-test was used for the frequencies and a t-test for the means. Statistical analyses were performed using SAS (Statistical Analysis System, version 6.07).

## RESULTS

### *Blood pressure*

The mean systolic blood pressure (SBP) decreased among both men and women from 1992 to 1997, but the difference was statistically significant only among women. Among men the values were 145 mmHg in 1992 and 143 mmHg in 1997 and among women they were 148 mmHg and 140 mmHg, respectively. For both men and women a significant shift was seen into the optimal SBP range of less than 120 mmHg. Elevated systolic values (≥140 mmHg) were observed in 54% of men and 51% of women in 1992 and in 46% of men and 40% of women in 1997 *(table 2)*.

There was no change in the mean diastolic blood pressure (DBP) among women, but a statistically significant increase among men from 1992 to 1997. Mean DBP values for men were 84 mmHg in 1992 and 86 mmHg in 1997. The percentage of men with elevated diastolic blood

**Table 2** Five-year changes in blood pressure, serum lipids and body mass index, by gender

| | | Men (%) | | | | Women (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| Risk factor | Value | 1992 n=380 | 1997 n=309 | Difference | | 1992 n=455 | 1997 n=440 | Difference | |
| Systolic blood pressure (mm Hg) | | | | | | | | | |
| | <120 | 8 | 17 | +9 | $\chi^2$ =15.010 | 15 | 27 | +12 | $\chi^2$ =24.111 |
| | 120–139 | 38 | 36 | –2 | p=0.002 | 35 | 33 | –2 | p<0.001 |
| | 140–159 | 33 | 24 | –9 | | 20 | 17 | –3 | |
| | ≥160 | 21 | 22 | +1 | | 31 | 23 | –8 | |
| | Mean | 145.4 | 143.2 | –2.2 | t-test | 147.5 | 140.2 | –7.3 | t-test |
| | SD | 23.5 | 26.9 | +3.4 | p=0.2484 | 29.6 | 29.8 | +0.2 | p<0.001 |
| Diastolic blood pressure (mm Hg) | | | | | | | | | |
| | <80 | 39 | 35 | –4 | $\chi^2$ =9.704 | 42 | 43 | +1 | $\chi^2$ =0.809 |
| | 80–89 | 31 | 27 | –4 | p=0.021 | 29 | 27 | –2 | p=0.847 |
| | 90–99 | 18 | 19 | +1 | | 16 | 17 | –1 | |
| | ≥100 | 11 | 19 | +8 | | 13 | 13 | 0 | |
| | Mean | 83.7 | 86.1 | +2.4 | t-test | 83.0 | 83.3 | +0.3 | t-test |
| | SD | 13.0 | 14.1 | +1.1 | p=0.0192 | 13.6 | 13.8 | +0.2 | p=0.7156 |
| Total serum cholesterol (mmol/l) | | | | | | | | | |
| | <5.0 | 43 | 51 | +8 | $\chi^2$ =8.035 | 43 | 48 | +5 | $\chi^2$ =7.311 |
| | 5–6.49 | 48 | 38 | –10 | p=0.045 | 42 | 42 | 0 | p=0.063 |
| | 6.5–7.99 | 8 | 9 | +1 | | 13 | 8 | –5 | |
| | ≥8.0 | 1 | 1 | 0 | | 2 | 2 | 0 | |
| | Mean | 5.19 | 5.09 | –0.1 | t-test | 5.32 | 5.10 | –0.22 | t-test |
| | SD | 0.93 | 1.09 | +0.2 | p=0.2475 | 1.14 | 1.05 | –0.09 | p=0.0038 |
| HDL (mmol/l) | | | | | | | | | |
| | ≥1 | 89 | 78 | –11 | $\chi^2$ =14.184 | 92 | 89 | –3 | $\chi^2$ =3.552 |
| | <1 | 11 | 22 | +11 | p<0.001 | 8 | 11 | +3 | p=0.059 |
| | Mean | 1.38 | 1.29 | –0.09 | t-test | 1.44 | 1.35 | –0.09 | t-test |
| | SD | 0.36 | 0.37 | +0.01 | p<0.001 | 0.34 | 0.31 | –0.03 | p<0.001 |
| Triglyceride (mmol/l) | | | | | | | | | |
| | <2 | 91 | 85 | –6 | $\chi^2$ =5.177 | 89 | 88 | –1 | $\chi^2$ =0.090 |
| | ≥2 | 9 | 15 | +6 | p=0.023 | 11 | 12 | +1 | p=0.764 |
| | Mean | 1.20 | 1.35 | +0.15 | t-test | 1.21 | 1.26 | +0.05 | t-test |
| | SD | 0.72 | 0.75 | +0.03 | p=0.0127 | 0.72 | 0.68 | –0.04 | p=0.3149 |
| BMI (kg/m$^2$) | | | | | | | | | |
| | <25 | 54 | 57 | +3 | $\chi^2$ =0.348 | 37 | 33 | –4 | $\chi^2$ =1.806 |
| | 25–29.9 | 34 | 33 | –1 | p=0.840 | 29 | 33 | +4 | p=0.405 |
| | ≥30 | 12 | 11 | –1 | | 34 | 34 | 0 | |
| | Mean | 25.2 | 24.8 | –0.4 | t-test | 28.0 | 28.0 | 0 | t-test |
| | SD | 4.1 | 3.8 | –0.3 | p=0.2462 | 5.8 | 5.8 | 0 | p=0.9852 |

pressure (DBP ≥90 mmHg) increased from 29% in 1992 to 38% in 1997 *(table 2)*.

*Serum lipids*

Among both men and women, mean total serum cholesterol decreased from 1992 to 1997, but statistically significantly only for women from 5.32 mmol/l to 5.10 mmol/l. In 1992, 57% of men and women had at least moderately high cholesterol values (≥5.0 mmol/l), while in 1997 these proportions were 48% and 52%, respectively. In 1992, 9% of men and 15% of women had values higher than 6.5 mmol/l, while in 1997 the proportion was 10% for both men and women. There was a significantly higher proportion of men with optimal total serum cholesterol values (<5.0 mmol/l) in 1997 compared to 1992 *(table 2)*. Also mean HDL levels decreased significantly from 1992 to 1997 among both men (1.38 mmol/l to 1.29 mmol/l) and women (1.44 mmol/l to 1.35 mmol/l). From 1992 to 1997 the proportion of subjects having low HDL cholesterol (<1 mmol/l) increased both among men and women *(table 2)*.

Mean triglyceride values increased among both men and women from 1992 to 1997, but statistically significantly only for men, from 1.20 mmol/l to 1.35 mmol/l. The proportion of men having triglyceride level 2 mmol/l or more increased from 9% to 15% *(table 2)*.

*Smoking*

There was no significant change in smoking rates between 1992 and 1997. Of men, 65% in 1992 and 63% in 1997 were classified as daily smokers. However, the number of daily female smokers increased from 11% to 15%, with the proportion of women who have never smoked decreasing from 86% to 80% *(table 3)*.

*Body Mass Index (BMI) and physical activity*

There was no significant change in the mean BMI either among men or women between the years 1992 and 1997. The proportion of men who were obese (BMI ≥30 kg/m$^2$) was 12% in 1992 and 11% in 1997. The proportion of obese women (34%) was much greater compared to men in both survey years *(table 2)*. Leisure time physical activity is very rare in the Republic of Karelia. Less than 20% of subjects reported having at least moderate activity. There was no change in leisure time physical activity between the survey years either among men or women *(table 3)*.

**Table 3** Five-year changes in smoking, physical activity, alcohol consumption and serum gamma-glutamyltransferace, by gender

| | Men (%) | | | | | Women (%) | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1992 n=380 | 1997 n=309 | Difference | | | 1992 n=455 | 1997 n=440 | Difference | |
| Smoking | | | | | | | | | |
| Never | 20 | 23 | +3 | $\chi^2$ =0.862 | Never | 86 | 80 | –6 | $\chi^2$ =5.689 |
| Ex-smoker | 15 | 14 | –1 | p=0.650 | Ex-smoker | 3 | 5 | +2 | p=0.058 |
| Current | 65 | 63 | –2 | | Current | 11 | 15 | +4 | |
| Physical activity | | | | | | | | | |
| Moderate[a] | 18 | 19 | +1 | $\chi^2$ =1.372 | Moderate[a] | 13 | 15 | +2 | $\chi^2$ =2.078 |
| None[b] | 65 | 68 | +3 | p=0.503 | None[b] | 70 | 71 | +1 | p=0.354 |
| Alcohol consumption in g/week (Alc1) [c] | | | | | | | | | |
| 0 | 41 | 32 | –9 | $\chi^2$ =13.456 | 0 | 66 | 53 | –13 | $\chi^2$ =16.824 |
| 1–168[e] | 56 | 59 | +3 | p=0.001 | 1–84[f] | 33 | 44 | +11 | p<0.001 |
| ≥169 | 3 | 9 | +6 | | ≥85 | 1 | 3 | +2 | |
| Mean | 45.2 | 65.0 | +19.8 | t-test | Mean | 9.4 | 15.0 | +5.6 | t-test |
| SD | 59.5 | 84.0 | +24.5 | p<0.001 | SD | 31.8 | 25.1 | –6.7 | p=0.0039 |
| Alcohol consumption in g/week (Alc 2) [d] | | | | | | | | | |
| 0 | 8 | 7 | –1 | $\chi^2$ =4.496 | 0 | 19 | 13 | –6 | $\chi^2$ =6.619 |
| 1–168[e] | 88 | 84 | –4 | p=0.106 | 1–84[f] | 80 | 86 | +6 | p=0.037 |
| ≥169 | 4 | 8 | +4 | | ≥85 | 1 | 1 | 0 | |
| Mean | 43.4 | 70.8 | +27.4 | t-test | Mean | 7.2 | 9.4 | +2.2 | t-test |
| SD | 72.5 | 113.1 | +40.6 | p<0.001 | SD | 16.8 | 16.7 | +0.1 | p=0.0592 |
| GGT (U/l) | | | | | | | | | |
| High ≥80 | 3 | 4 | +1 | $\chi^2$ =0.096 | High ≥50 | 9 | 8 | –1 | $\chi^2$ =0.335 |
| Normal <80 | 97 | 96 | –1 | p=0.757 | Normal <50 | 91 | 92 | +1 | p=0.563 |
| Mean | 27.0 | 33.6 | +6.6 | t-test | Mean | 22.3 | 26.6 | +4.3 | t-test |
| SD | 20.4 | 25.5 | +5.1 | p<0.001 | SD | 23.7 | 23.5 | –0.2 | p=0.0063 |

a: Leisure time physical activity at least two times per week
b: Leisure time physical activity only few times a year or less
c: Alcohol consumption assessed by last weeks' recall
d: Alcohol consumption assessed by quantity-frequency questionnaire
e: 168 g/wk of alcohol is approximately 14 drinks/wk or 2 drinks/day
f: 84 g/wk of alcohol is approximately 7 drinks/wk or 1 drink/day

*Self-reported alcohol use and GGT levels*

A very significant change was observed in the self-reported mean alcohol consumption (*Alc2*), which had increased by 27.4 g/wk among men and 2.2 g/wk among women. Similarly, the amount of alcohol consumed during the week previous to the survey (*Alc1*) increased from 1992 to 1997 from 45.2 g/wk to 65.0 g/wk among men and from 9.4 g/wk to 15.0 g/wk among women.

Mean GGT levels increased concurrently along with alcohol use by 6.6 U/l among men and 4.3 U/l among women. The proportions corresponding to high GGT values were 3% in 1992 and 4% in 1997 among men, and 9% and 8%, respectively, among women.

*Dietary habits*

The type of fat used on bread shifted significantly from butter to margarine. In 1997 50% of men and 53% of women reported using mainly margarine on their bread compared to 1992 when the respective rates were 5% and 3%. Similarly, the use of vegetable oil in cooking increased significantly from 32% to 74% among men, and from 37% to 84% among women *(table 4)*.

The use of fresh vegetables increased among both men and women, but the increase was statistically significant only among women. In 1997 17% of women reported daily use of fresh vegetables while the respective rate in 1992 was 11%. Also the use of fruit increased significantly among both men and women. In 1992 only 2% of men and 4% of women reported daily use of fruit while the respective rates in 1997 were 7% and 18%. Use of berries decreased among both men and women.

## DISCUSSION

Although the Republic of Karelia is geographically very close to North Karelia in Finland, contacts have until now been infrequent and little was known about the levels of CVD risk factors in this part of Russia. At the beginning of the 1990s co-operation between Finland and the Republic of Karelia increased and also several projects were established in the health sector. The collaboration between the Ministry of Health and the Central Hospital of Pitkäranta in the Republic of Karelia and the KTL and the North Karelia project in Finland has created the necessary facilities for comparative health research in the area.

As a whole, both CVD mortality and risk factor levels in Russian Karelia are high compared to neighbouring Finland and other parts of the western world.[22,23] The main unhealthy behaviours and risk factors among the male population are a very high prevalence of smoking, high blood pressure, high alcohol consumption, physical inactivity and rare use of fresh vegetables, fruit and berries, and among women obesity, high blood pressure, physical inactivity and rare use of vegetables, fruit and berries.

During the first five-year period of the Pitkäranta project, emphasis was placed on the general education of health personnel and the population. Some interventions were specially addressed to decrease smoking prevalence among men and possibly to avoid any increase in smoking prevalence among women,[24] which is now occurring in many countries especially in eastern Europe.[25] There was a slight decrease in smoking prevalence among men, but the difference between the years was not statistically significant. Fortunately, this prevalence did not increase as would have been predicted from earlier results, which showed very high smoking prevalence in 1992 among men in the youngest 25 to 34 years age group.[26] Among women there was a slight increase in smoking prevalence. We can only conjecture that the increase could have been

**Table 4** Five-year changes in dietary habits, by gender

| | Men (%) | | | | Women (%) | | | |
|---|---|---|---|---|---|---|---|---|
| | 1992 n=380 | 1997 n=309 | Difference | | 1992 n=455 | 1997 n=440 | Difference | |
| Fat used on bread | | | | | | | | |
| Nothing | 24 | 11 | –13 | | 18 | 8 | –10 | |
| Margarine | 5 | 50 | +45 | $\chi^2$ =183.3 | 3 | 53 | +50 | $\chi^2$ =287.0 |
| Butter | 71 | 39 | –32 | p<0.001 | 80 | 38 | –42 | p<0.001 |
| Fat used in cooking | | | | | | | | |
| Vegetable oil | 32 | 74 | +42 | | 37 | 84 | +48 | |
| Margarine | 18 | 15 | –3 | $\chi^2$ =140.9 | 21 | 11 | –10 | $\chi^2$ =228.2 |
| Butter | 50 | 11 | –39 | p<0.001 | 43 | 5 | –38 | p<0.001 |
| Use of vegetables | | | | | | | | |
| Daily | 10 | 11 | +1 | $\chi^2$ =3.6 | 11 | 17 | +6 | $\chi^2$ =21.4 |
| Very rarely[a] | 37 | 30 | –7 | p=0.162 | 37 | 23 | –14 | p<0.001 |
| Use of fruit | | | | | | | | |
| Daily | 2 | 7 | +5 | $\chi^2$ =68.8 | 4 | 18 | +14 | $\chi^2$ =196.3 |
| Very rarely[a] | 67 | 36 | –31 | p<0.001 | 70 | 24 | –46 | p<0.001 |
| Use of berries | | | | | | | | |
| Daily | 7 | 3 | –4 | $\chi^2$ =68.9 | 10 | 7 | –3 | $\chi^2$ =176.8 |
| Very rarely[a] | 63 | 35 | –28 | p<0.001 | 64 | 24 | –40 | p<0.001 |

a: Less than once a month

even higher without any anti-smoking activities. However, the smoking prevalence in the Republic of Karelia among women seems to be a little lower than in other areas of Russia.[27]

The decline in serum total cholesterol levels between 1992 and 1997 may be explained by the dietary changes seen between the survey years.[28–30] In 1992 most people used butter for cooking, which has now been replaced by vegetable oil. Similarly, the fat used on bread has markedly shifted from butter to margarine. However, because of the poor economic situation in the Republic of Karelia, dietary habits have little dependence on personal choices. Rather supply and/or variety of foodstuffs and also price largely determine diet. The recent change in use of fat products is likely due to the availability of new margarine products and the lower price of vegetable oil compared with butter, but also as a result of an effective health education programme. The observed change is very beneficial for lowering the risk factor level and in future preventive activities, effort could be focused on maintaining the present tendency.

A clear decrease was also seen in the levels of systolic blood pressure among women and also a slight decreasing trend among men. However, there was no change seen in BMI levels or physical activity, and alcohol consumption had increased rather than decreased. Increased alcohol consumption can partly explain the increased level of diastolic blood pressure among men.[31,32] The decrease in systolic blood pressure levels is most likely due to the progress in hypertension screening and improved treatment facilities. The difference between men and women could be explained by the fact that women usually more easily adopt new innovations and more actively use health services and seek help for symptoms. The contribution of a possible change in diet, which could have influenced blood pressure levels, was almost impossible to draw out from this kind of study, where a real nutrition interview was not used.

There was a clear increase in self-reported alcohol consumption rates among both men and women, which is also in accordance with estimated alcohol consumption trends reported in other parts of Russia.[33] Although self-reported data always underestimates real consumption we can obtain valuable information on consumption trends by repeating exactly similar questionnaires in population surveys.

Changes in risk factor levels during the first five-year period of the Pitkäranta Project have been rather small. This was easily predictable when keeping in mind the difficulties faced in the early phase of the programme. Until now the health care system in the Republic of Karelia has been specialist oriented and the health care strategy has focused almost exclusively on the medical care system without any population-based activities or approaches to health promotion.[34] Extensive education concerning both the methods of epidemiological research and population-based health promotion programmes was needed before establishment of any feasible interventions or monitoring systems. However, the first five years have given very valuable experiences to all collaborators in the Pitkäranta Project.

However, some very interesting changes are seen in risk factor levels and especially in health behaviour. The very dramatic change in the type of fat used both in cooking and as spread on bread has led to somewhat decreased serum cholesterol levels. Simultaneously, the ischaemic heart disease mortality rates have begun to decrease after the sharp peak in rates in 1994. Similar experiences have been reported from Poland by Zatonski.[35] In the early 1990s there was a remarkable decrease in ischaemic heart disease mortality in Poland. No major changes were seen in other major risk factors, such as smoking or alcohol use, but a marked switch was seen in fat use from animal fats to vegetable fats. Dietary fat can influence blood lipids and several other factors like blood coagulability and myocardial susceptibility.[36,37]

Comparison of the surveys from 1992 and 1997 gives a very interesting and useful picture of the change in risk factors and health-related habits in Russian Karelia. The results show the unhealthy reflections of isolation and economic problems. The high frequency of smoking, high blood pressure levels, high proportion of overweight women, physical inactivity and heavy alcohol consumption are reflected in high chronic disease mortality rates.

The present economic problems and restricted supply of foodstuffs and the emerging marketing of western cigarettes all pose further threats to the future health of the peoples of the Republic of Karelia. With better economic possibilities the situation could actually become even worse unless a determined chronic disease prevention and intervention policy can be launched to favourably influence the future health-related habits and choices of people in Russian Karelia.

The main aim of these surveys has been to form a baseline for preventive and health-promoting activities, planned in co-operation with the health authorities of the Republic of Karelia and the Central Hospital of Pitkäranta and with the KTL and the North Karelia Project in Finland. Once sufficient information concerning the chronic disease risk in the target area has been defined, further planning of effective disease prevention and health promotion programmes can be started. Although the health promotion work should ultimately be carried out by the community itself there are many lessons that can be learned from earlier studies, and international collaboration can give fresh ideas and support to the programme. These risk factor surveys serve as a baseline database for the establishment of an internationally comparable health monitoring system in the Republic of Karelia. The monitoring surveys serve the needs of both evaluation and further planning of intervention activities.

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