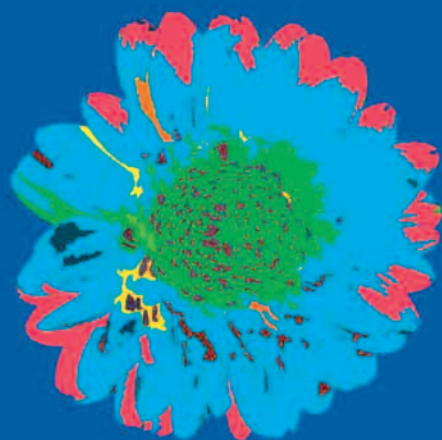


NUTRITION IN FINLAND



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Nutrition in Finland

*Published by
National Public Health Institute (KTL)
Mannerheimintie 166
FI-00300 Helsinki
Finland
Phone +358-9-47 441
Fax +358-9-4744 8591
E-mail Merja.Paturi@ktl.fi*

*Graphic design
Tarja Brola Oy*

*Printing house
Painoprisma Oy*

*Cover graphic
Tarja Brola*

*Photos
Futureimagebank.com
Maria Kuronen, National Public Health Institute
(page 3)*

Revision Interga Oy

*Produced by
Finnish National Nutrition Surveillance System*

Expert committee

*Pirjo Pietinen, Chair
National Public Health Institute (KTL)*

*Leena Etu-Seppälä
Finnish Diabetes Association*

*Seppo Koskinen
National Public Health Institute (KTL)*

*Johanna Mäkelä
National Consumer Research Centre*

*Annika Nurttila
Finnish Food Safety Authority Evira*

*Kirsti Parkkinen
Haaga Institute Polytechnic*

*Pirjo Pöyhä
City of Espoo, Department of Services*

*Leena Räsänen
University of Helsinki*

*Merja Paturi, Secretary
National Public Health Institute (KTL)*

2006

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FOREWORD

Nutrition is a major determinant of good health. A large international study published in World Health Report 2002 showed convincingly that public health, particularly in the developed world, is overwhelmingly dependent on how we eat, drink, and move. Most of the top 10 health risk factors are closely linked with nutrition.

Finland has for a long time and in many ways been active in promoting public nutrition for better health of its people. For example, a free school lunch has been part of the daily lives of school children for over 50 years. Many actions have been taken to overcome nutritional deficiencies: iodization of salt to prevent goiter, adding selenium to fertilizers, and fortifying milk and fat spreads with vitamin D.

Since the 1970s, the emphasis has been on promoting a balanced diet in order to prevent cardiovascular and related chronic diseases. The comprehensive work has resulted in major success in the form of greatly reduced cardiovascular disease rates. Activities have covered public policies, health services, private sector, civic society, and the media. There is no doubt that awareness of and interest in the relationships between diet, nutrition, and health are quite high among the Finnish population.

In spite of the great achievements we still face many challenges. Among them are increases in body weight, growing commercial influences, mixed messages in the media, the impact of the European Union policies, and the more general global influences.

In the Finnish administrative system, the Ministry of Social Affairs and Health is responsible for issues pertaining to healthy nutrition, while the Ministry of Agriculture and Forestry is in charge of Food Safety Policies, and the Ministry of Trade and Commerce deals with industry and com-



merce related issues. Other ministries are also involved, concerning, e.g., food and nutrition in schools, Defence Forces, etc.

For more than 50 years, the National Nutrition Council has existed as an expert body providing the authorities and the public at large with expert recommendations and guidelines. The Council has also acted as an intersectoral body to promote collaboration between various stakeholders. In 2005, the Council published revised national Nutrition Recommendations that comply with the latest Nordic and WHO/FAO recommendations.

Over the past decades, the Finnish nutrition-related activities have concerned extensively different policy-making areas and sectors of society. It is our view that this is the only way for gaining major achievements in public health nutrition. This is why Finland chose “Health in All Policies” as the main health topic during its EU Presidency in autumn 2006. The concept is very much in line with the principles of the new Public Health Programme of the EU.

Finland has, by any international standard, a comprehensive national health monitoring system. As part of that, dietary habits, nutrition and nutrition-related health issues are well monitored. Much of the work is carried out by the National Public Health Institute (KTL), which is the responsible research and expert agency under the Ministry of Social Affairs and Health.

This booklet aims at giving the readers an overview of the current nutrition situation in Finland. The majority of the material has been compiled by the KTL, but also other national partners have contributed. I wish to express my gratitude to all partners involved, and hope our readers will find the information useful.

*Pekka Puska, Professor
Director General,
National Public Health Institute (KTL)
Chair, National Nutrition Council*



FINLAND AND ITS PEOPLE

*Seppo Koskinen, Chief Physician
National Public Health Institute (KTL)*

Population

In 2006, there are 5.26 million inhabitants in Finland; only 17 persons per square kilometre, which is a lower population density than in any other EU member state. Half of the population live in five south-western regions that cover only 14% of the total land area. The capital, Helsinki, together with its three neighbouring cities represents only 0.2% of the total area of Finland, but nearly 19% of its population. In contrast, less than 4% of the Finns live in the northernmost third of the country, with an average of 2 inhabitants per sq km.

Over the past decades, Finland's population has grown by 0.3 per cent a year on average. Just over one half of this increase is attributable to the excess of birth over death, and less than half to inward migration. However, growth of population has only been recorded in the metropolitan Helsinki area and in other larger cities. In Lapland and eastern Finland, by contrast, population has continuously declined. Un-

less there is a significant increase in either net migration or fertility rate from the current levels, the Finnish population will begin to dwindle in the 2020s.

Fertility was at an exceptionally high level in Finland after World War II in the late 1940s, when the total fertility rate stood at 3.4 children per woman. Subsequently, the figure dropped sharply, hitting its lowest level at 1.5 children in 1973. Since then, the total fertility rate has been steadily at around 1.7–1.8, the same as in most other Nordic countries and in the UK, and considerably higher than the EU average, which is currently below 1.5.

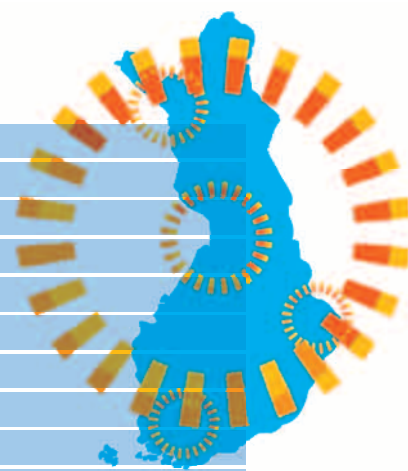
Mortality has declined in all age groups. The relative mortality decline has been greatest among children. Older people account for a growing proportion of deaths: today 60 per cent of all deaths are in the age group 75 or over, while the corresponding proportion in the early 1970s was only one third.

Migration, particularly to Sweden, slowed the population growth until the 1970s, but since then immigration has exceeded emigration. The number of foreign

nationals resident in Finland increased from 25,000 in 1990 to 108,000 in 2004. In spite of the growing trend, the number of foreigners as a proportion of the total population is exceptionally low in Finland when compared to the other EU countries, no more than 2 per cent.

Children aged under 15 account for 17.5 per cent of the total Finnish population, while adults aged over 65 account for 16 per cent. At present, the proportion of elderly people is slightly smaller than in most other West European countries, but it is estimated to grow rapidly, reaching 23 per cent by the year 2020, when the post war baby boom generation will have reached retirement age, and 26 per cent by the year 2030. The size of the oldest section of the population, aged 85 or over, increases particularly rapidly, and is expected to be twice the current number (89,000 at year-end 2006) by the year 2030 and three times the current number by the year 2040 (Figure 1).

• Form of government: Republic
• Capital: Helsinki
• Currency: euro
• Neighbouring countries: Sweden, Norway, Russia and Estonia across the Gulf of Finland
• Area: 338 000 sq km
• Forest 75%, water 10%, cultivated land 8%
• Population: 5.26 million
• Population density: 17 inhabitants per sq km
• Official languages: Finnish (91%), Swedish (6%)
• Religions: Lutheran 86%, Orthodox 1%
• Labour force distribution: services 64%, industry and construction 28%, agriculture and forestry 8%
• Exports by industries: metal and engineering 43%, paper and wood 39%, chemical, textile and clothing etc. 18%
• Main trading partners: Germany, Sweden, United Kingdom
• Gross domestic product (GDP) per inhabitant (in purchasing power standards): estimated at 28.100 € in 2006; exceeds the EU25 average by 4.000 € and the EU15 average by 2.000 €
• Member of the European Union since 1995



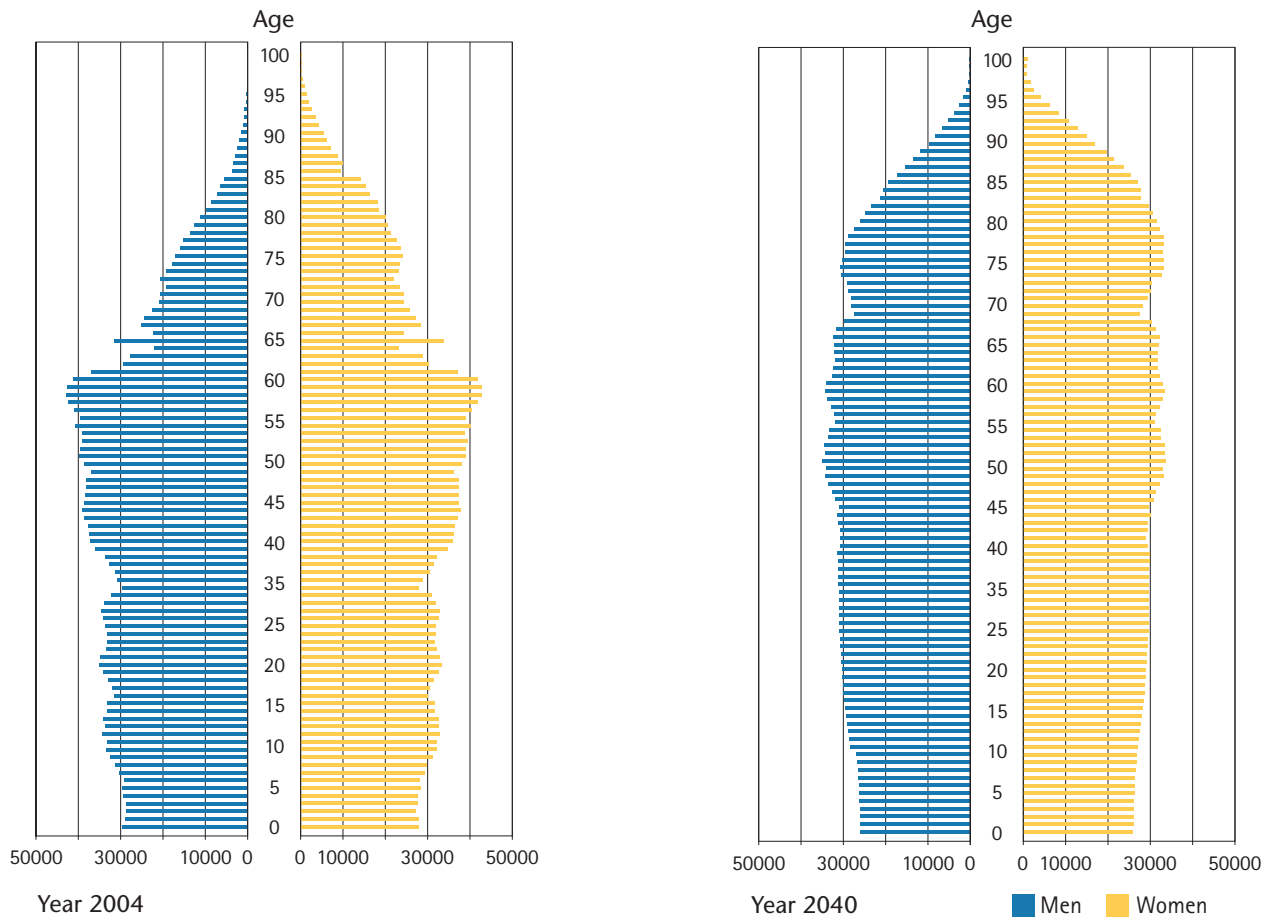


Figure 1. Population age structure at the end of 2004 and 2040. Source: Statistics Finland.



Social and health services

In Finland, the organization and financing of social and health services and the related preventive work have been considered a public responsibility for a long time. The main responsibility for arranging services lies with the 431 municipalities. The Government determines the general guidelines and directs the service system at the national level. Most of the numerous municipalities are very small; more than half of them have a population of less than 5,000. The small size sometimes causes problems in providing services, because smaller units tend to suffer from limited financial resources and insufficient expertise necessary for successfully developing the system. However, smaller municipalities often cooperate in the provision of services.

Finnish health policy is aimed at reducing diseases and premature deaths, extending the active and healthy lives of the people, ensuring the best possible quality of life for all, and reducing differences in health between various population groups. The dimension of health is assumed to be emphasized in all aspects of public decision making. Finnish health policy relies both on efficient and accessible health care services, available to the entire population, and on broadly based health promotion activities.

The total expenditure on social security is about 27 per cent of the GDP, and the total expenditure on health is 7.3 per cent. Both figures are slightly below the EU aver-

age. Moderate wages in the sector contribute to the fairly low total expenditure.

Families and children

Since the 1970s, marriage rate has fallen and the age at which people get married has risen. At the same time, however, common-law marriages have become more common: today, 22 per cent of all couples living together are not married. At current divorce rates, 50 per cent of all marriages in Finland break up, which is a much higher figure than in most other countries. In common-law marriages, the separation rate is even higher.

Of all people in Finland, four out of five live in a family. Family is here defined as including the married and cohabiting couples who live together, regardless of whether or not they have children, and households consisting of one adult and his or her children (Table 1).

The average size of families has decreased from 3.7 persons in 1960 to the current figure of 2.8. Correspondingly, in 1960 only 4 per cent of Finns lived alone; since then, the proportion of persons living alone has risen to 18 per cent. People move out of their childhood home at a relatively young age: 66 per cent of women and 38 per cent of men aged 20 no longer live with their parents.

Women are entitled to a maternity leave and allowance (generally 60–70 per cent of regular earned income) for a period of four months. After that period, either

parent can continue on parental leave for six more months and receive parental allowance. Furthermore, fathers are entitled to an additional 3–5 weeks' paternal leave and allowance. After the parental allowance or extended paternity allowance period, either parent can take a child care leave – entitling to a monthly allowance of 300 euros and with full employment security to look after a child under age 3.

Nearly 60 per cent of children aged 1–6 years are in day care which in nine out of ten cases is provided by the municipality. Day-care fees vary according to the family's level of income, from free-of-charge services to 200 euros per month. The municipality shall also arrange afternoon activities for children during their first school year. These arrangements contribute for their part to the high female labour force participation rate in Finland even in childbearing age. Nearly 80 per cent of all women aged 25–34 belong to the labour force, and only 14% of them work part time.

Education and working life

An important trend in the development of Finnish society has been the constantly improving educational level: when reaching the working age, people are better educated than the previous generation (Figure 2). Among those born before the 1940s, well over one half have no more than basic education, whereas among those born in the 1960s or later, the proportion of those with basic education only is less than 20 per cent.

On the basis of the latest PISA survey, the results produced by the Finnish education system are excellent. Finnish children aged 15 appear to perform exceptionally well in different areas. This is largely due to the facts that in Finland the proportion of poor performers is low, differences between schools are small, and the association between children's performance and their parents' socioeconomic status is weak.

While in the year 1950 one half of the economically active population in Finland received their earning from agriculture and forestry, the corresponding figure dropped down to 12 per cent by 1980 and to 5 per cent by 2004. At the same time, the proportion of trade and service industries has risen sharply: today they account for more



Table 1. The population of Finland by family status at the end of 2005. Source: Statistics Finland.

	Proportion (%) of persons aged 0–17 years	Proportion (%) of persons aged 65 or over	Proportion (%) of the whole population	Average number of persons in family in the whole population
Married couple without children	-	43.8	18.3	2.0
Cohabiting couple without children	-	2.5	6.9	2.0
Registered female couple without children	-	0	0	2.0
Registered male couple without children	-	0	0	2.0
Married couple with children	67.1	4.3	35.1	3.9
Cohabiting couple with children	15.9	0.1	7.9	3.6
Mother and children	15.0	2.8	7.3	2.5
Father and children	2.0	0.6	1.3	2.3
Registered female couple with children	0	-	0	3.6
Registered male couple with children	0	-	0	3.0
Persons living alone	-	37.9	18.5	
Others not belonging to a family	-	5.0	3.1	
Persons in institutions and nonclassified	-	3.0	1.5	
Total	100	100	100	

than two thirds of the total economically active population. This growth has been particularly rapid within the information and communication technology sector.

In the 1980s, the unemployment rate in Finland was around 5 per cent, well below the EU average. The figure rose sharply during the recession in the early 1990s, peaking at 16.6 per cent in 1994, when it was among the highest in Europe. In early 2006, the unemployment rate was 8.2 per cent, slightly below the average level in the EU25.

Income inequalities have considerably widened in Finland since the early 1990s. In 1990–2002, the disposable income among the decile with the highest income per consumption unit increased by 26 per cent, while the corresponding increase in

disposable income for the decile with the lowest income was no more than 2 per cent. The widening of income inequalities has mostly been due to the increase in capital income. Despite this widening, the income inequalities are still internationally at a relatively low level. Today, approximately 11 per cent of Finnish people fall below the EU poverty line (less than 60% of median income), while the corresponding figure in the EU25 is 15 per cent. The lower than average poverty rate is largely due to social income transfers. If there were no social income transfers, the poverty rate would be 29 per cent in Finland (and 24 per cent in the EU25). Unemployment benefits and social security have by and large cancelled out the adverse effects of unemployment on income.

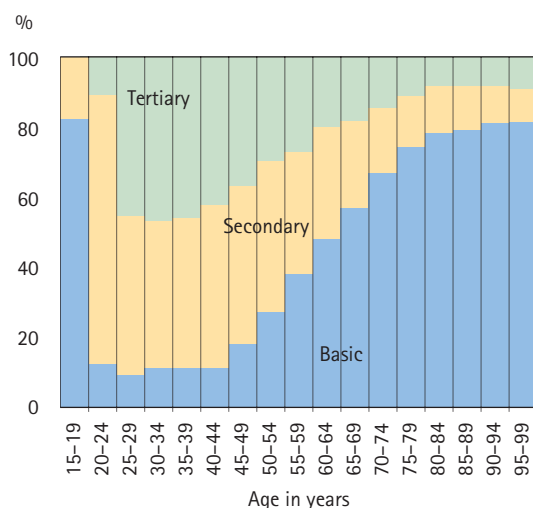


Figure 2. Education level among men and women aged 15 or over at the end of 2004. Source: Statistics Finland.



HEALTH OF THE FINNISH POPULATION

Seppo Koskinen, Chief Physician
National Public Health Institute (KTL)

Mortality is rapidly declining

The health of the population in Finland has improved significantly during the past decades. In the early 1970s, male life expectancy was 66–67 years in Finland. This was less than in any other West European country, and as much as 5.5 years less than in Sweden. By 2004, the life expectancy of Finnish men had increased to 75.3 years, just over the average for the EU25 and lagging only 3 years behind the Swedish figure. During the same period, the life expectancy of Finnish women climbed from the average level to one of the highest in West Europe (82.3 years in 2004, exceeding the EU average by more than one year).

The rapid decline in child mortality has continued, and the present level is only a quarter of the figures of the early 1970s. Infant mortality (3/1,000) and the risk of death of a one-year-old child before age 15 (2/1,000) are now among the lowest in the world. Mortality in the middle-aged population has decreased by around one half in three decades, mainly by virtue of a decrease in cardiovascular diseases, and mortality has also declined considerably in the elderly population. (Figure 1).

Nonetheless, mortality among adults is still clearly higher in Finland than in countries with the lowest mortality rates.

In addition to cardiovascular diseases, the major causes of premature mortality are cancer, accidents, suicides, and alcohol related deaths. Cardiovascular mortality is approaching the average West European level, and cancer mortality is now lower in Finland than in any other European country (Table 1). Finland has also had good success in the prevention of suicides, which have decreased by almost one third from 1990 to 2004. However, compared with the rest of West Europe, suicide mortality is still relatively high in Finland. Also other external causes of deaths from injury and poisoning are still much more common in Finland than in the EU on average. Alcohol is estimated to account for 6–9 per cent of all deaths, but among young men the figure is close to 50 per cent. Contrary to the other main causes of premature mortality, the number of alcohol related deaths has increased. From 2003 to 2004 the increase was particularly rapid, about 12 per cent, which is probably largely due to easier access to alcohol brought about by the simultaneous abolishment of import quota, considerable reduction in prices, and unrestricted import of cheap alcohol

from Estonia, which became a member of the EU in 2004.

Mainly favourable trends in morbidity and functional capacity

The overall improvement of public health is indicated by the decreasing incidence of many common diseases, reduced prevalence of many functional disabilities, and growing proportion of people regarding their health as good (Table 2). The improvements are the net result of many changes in our lives at the national level. Living conditions have become healthier, and positive developments can also be seen in lifestyles, exemplified particularly by the improvement in eating habits and a rapid reduction of smoking among men (Table 3). The positive changes in eating habits have contributed to favourable changes in such measures as serum cholesterol and blood pressure levels. Moreover, people have better access to increasingly effective health care services.

However, there is still much room for improvement, and there are also certain worrying trends and unsolved problems. New threats to public health are on the horizon: asthma, allergies, diabetes, obesity, and alcohol use have clearly in-



Figure 1. Age-standardised mortality in age group 35–64 years by cause of death in 1978–2004. Source: Statistics Finland.

creased. Among conscripts, for example, the number of asthma diagnoses increased almost tenfold within three decades. The incidence of type 1 diabetes has quadrupled since the beginning of the 1950s, and it is estimated that the number of persons with type 2 diabetes as a proportion of the population aged 30 or over has increased 10-fold during the past 50 years. Alcohol related deaths have been estimated to have quadrupled during the period from 1980 to 2004. There is also some evidence of an increase in mental disorders, depression in particular, although truly reliable trend data are lacking.

Health inequalities remain large

Socio-demographic disparities in health remain an important public health problem in Finland. These have so far been rather resistant to health policy efforts. In eastern and northern Finland male life expectancy is 4 years and female life expectancy 2–3 years shorter than in the most advantageous western regions of the country. These regional differences are primarily due to deaths caused by cardiovascular diseases, accidents and violence, and alcohol. Also morbidity continues to be higher in eastern and northern Finland. In absolute terms, the east-west disparities in health have reduced owing to the favourable development in all parts of the country, but the relative differences have remained stable in many indicators of health.

In 2004, life expectancy of Finnish males was 7 years less than that of women. This is an exceptionally wide margin in West Europe – even though there has been a reduction of nearly two years in the disparity since the late 1970s. Alcohol use and smoking explain half of the difference between male and female life expectancy. Compared to mortality differences, the variation in morbidity between women and men is much smaller.

People with higher educational level and social status live longer and have better health than people who have a low level of education and occupy lower social status positions. Finland has more pronounced socio-economic mortality differences than many other western European countries, and these differences have increased by more than one year since the 1980s. At the

turn of the millennium, the life expectancy of a 35-year-old male upper white-collar employee was about 6.0 years longer than that of a blue-collar labourer; in women the corresponding difference was 3.2 years. The mortality differences between education and income groups are equally clear and consistent (Figure 2).

Socio-economic morbidity differences in Finland are at about the same level as in West Europe on average, and they have remained more or less unchanged over the past decades. Limitations in functional capacity vary by socio-economic status in much the same way as morbidity and mortality. Men with a tertiary education can look forward to 10.9 more years of good health and women to 8.4 more years of good health than men and women with no more than basic education.

Married people are in much better health than single, divorced, or widowed persons. The differences have continued to increase over the past few decades, and they are particularly pronounced among men. More than one third of all deaths among Finnish people of working age would be avoided, if mortality among other marital status groups were as low as among married people. The differences are due to both health-related selection and to the beneficial health effects of couple relationships.

Major challenges

In addition to new and increasing health problems, and the persistent or even widening health disparities, there are further major challenges to health policy in Finland: the ageing of the population, changing needs and expectations, and problems in financing health care and health promotion.

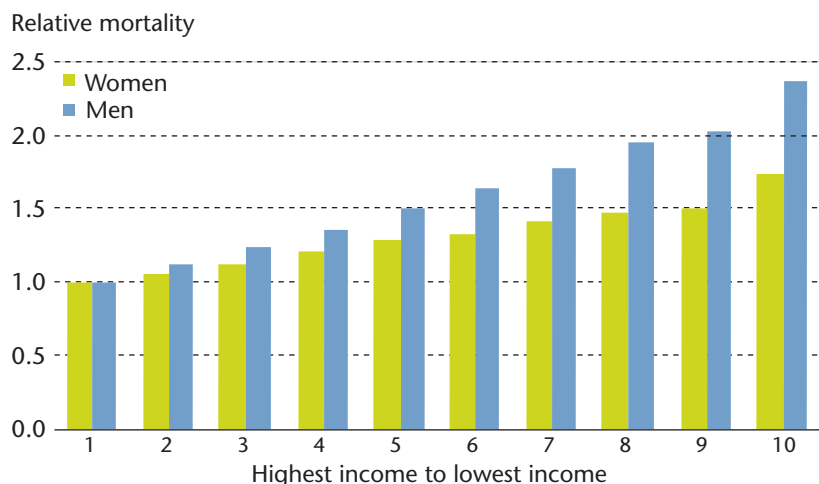


Figure 2. Relative age-adjusted mortality of persons aged 30 or over by income decile in Finland in 1991–1996 (highest income decile = 1.00). Source: Martikainen et al. 2001.

Table 1. Life expectancy at birth and age standardised mortality by cause of death in the population under years 65 years in Finland and in the EU in 2002. Source: Eurostat: Health in Europe, 2005.

	Women			Men		
	Finland	EU25	EU15	Finland	EU25	EU15
Life expectancy at birth (years)	81.5	81.1	81.6	74.9	74.8	75.8
Mortality by cause, ages under 65 (deaths/100,000)						
- all diseases of the circulatory system	23.5	28.5	23.4	86.8	81.9	66.7
- ischaemic heart disease	9.2	10.1	8.1	52.5	43.5	36.2
- cerebrovascular diseases	8.4	7.9	6.4	13.8	13.6	10.3
- all malignant neoplasms	51.5	65.6	62.4	60.0	97.5	89.8
- larynx, trachea, bronchus, lung	5.6	8.5	8.0	15.3	32.2	28.6
- breast	13.1	16.6	16.8			
- all external causes of injury and poisoning	23.9	15.4	14.0	84.3	54.3	45.1
- transport accidents	3.9	4.6	4.3	12.5	16.8	15.1
- suicide	9.6	4.7	4.5	29.2	16.5	13.8

Table 2. Age-standardised prevalence (%) of average or worse self-rated health and any chronic illness in Finnish general population in 1978–80 and 2000–01, persons aged 30–64 and 65 or over. Source: Aromaa and Koskinen 2004.

		Women		Men	
		1978–80	2000–01	1978–80	2000–01
Self-rated health	30–64	42.8	27.7	47.3	32.3
Average or worse	65+	69.5	64.1	71.1	62.6
Any chronic illness	30–64	48.2	44.3	48.2	42.0
	65+	83.0	80.4	81.6	80.4

Table 3. Age-standardised prevalence (%) of selected risk factors in Finnish general population in 1978–80 and 2000–01, persons aged 30 or over. Source: Aromaa and Koskinen 2004.

	Women		Men	
	1978–80	2000–01	1978–80	2000–01
Daily smoking	13.3	18.0	35.5	28.8
Serum cholesterol ≥ 6.5 mmol/l	61.9	28.3	60.3	29.6
Obesity (BMI ≥ 30 kg/m ²)	17.4	23.3	11.7	20.5
High blood pressure (systolic ≥ 160 mmHg or diastolic ≥ 95 mmHg)	36.0	18.4	38.1	24.1



OBESITY PREVENTION – A CHALLENGE ALSO IN FINLAND

Marjaana Lahti-Koski, Manager, Health promotion and development
Finnish Heart Association

Obesity is a growing problem in Finland. Mean body mass index (BMI) and the prevalence of obesity have increased both in men and women over the last few decades (Figure 1). In 2002, mean BMI was 27.0 kg/m² for men and 25.9 kg/m² for women aged 25–64 years. In total, 66% of men and 49% of women had BMI of at least 25 kg/m². The prevalence of obesity (BMI>30 kg/m²) was about 20%. Independently of changes in BMI, abdominal obesity increased both in men and women from the late 1980s to the late 1990s.

Both in men and women, the upward trend has been most prominent in the youngest age group (25–34 years). However, trends in obesity are of the greatest concern in children and adolescents, among whom the increase in the prevalence of overweight has been even more rapid than in adults. Both in boys and girls the prevalence of overweight has more than doubled in 20 years (Figure 2). Currently, about 20% of boys and 10% of girls aged 12–18 years are considered overweight on the basis of self-reported information on weight and height. Nationwide data on weight and height of younger Finns are not available. Based on studies with small sample sizes and local surveys, up to 10–20% of school age children are estimated to be overweight.

Education is a strong determinant of normal weight, especially in women (Figure 3). This social gradient has recently increased. Women with low education show the most unfavourable trends in obesity. In men, BMI has increased regardless of education. The prevalence of obesity, however, is highest among men with the lowest education.

In parallel with the alarming development of obesity, the consumption of fatty and sweet snacks, soft drinks, and alcohol

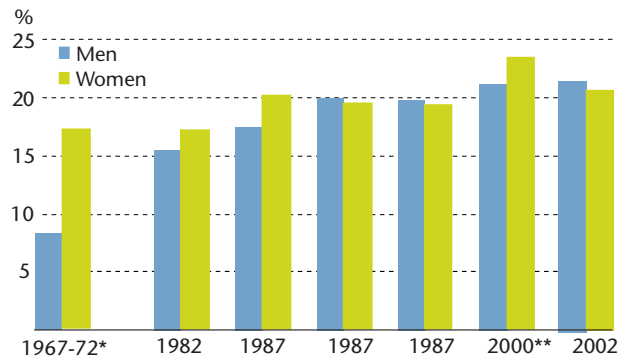


Figure 1. Prevalence of obesity (BMI>30kg/m²) in men and women aged 25–64 years in Finland. Sources: Lahti-Koski et al. 2000, FINRISK Studies 1982–2002, *Ris-sanen et al. 1988, **Aromaa, Koskinen 2004.

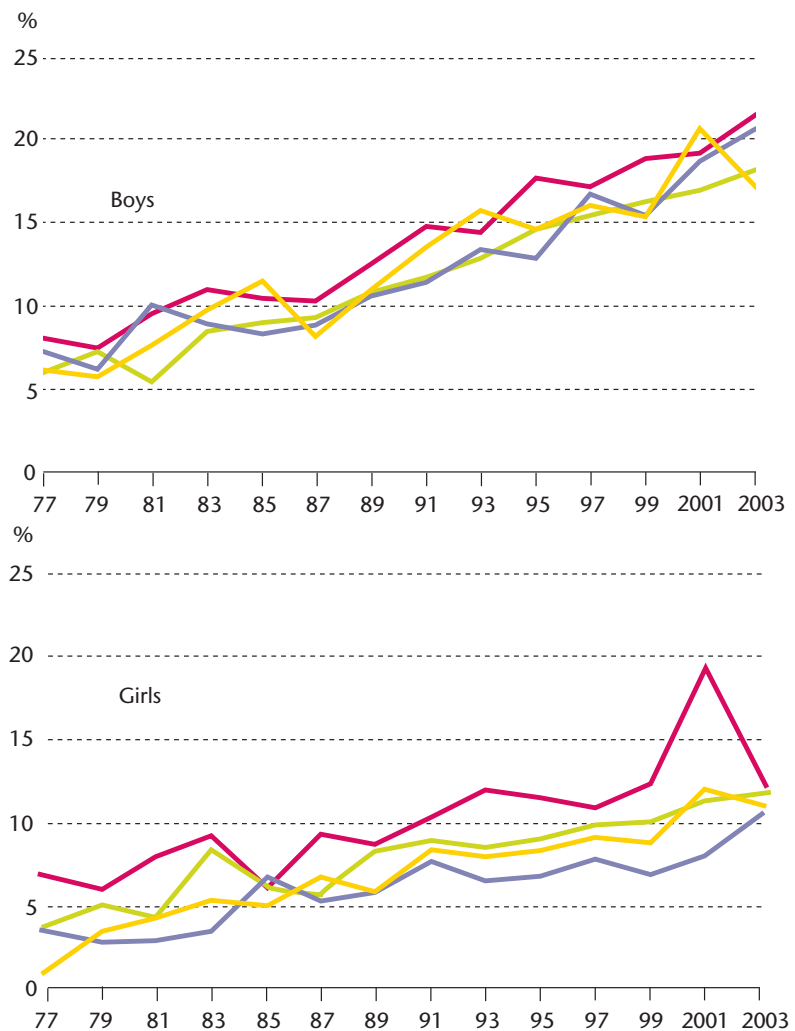


Figure 2. Prevalence of overweight (%) in boys and girls aged 12–18 years, 1977–2003. Sources: Kautiainen et al. 2002, the adolescent health and lifestyle survey.

has increased. Further reasons behind the increased prevalence of obesity are thought to include changes in the living environment, decreased physical activity, larger portion sizes, as well as an increase in eating habits that are not in accordance with the current dietary recommendations. There also appears to be a relation between the time spent watching TV or playing computer games and obesity in children and adolescents.

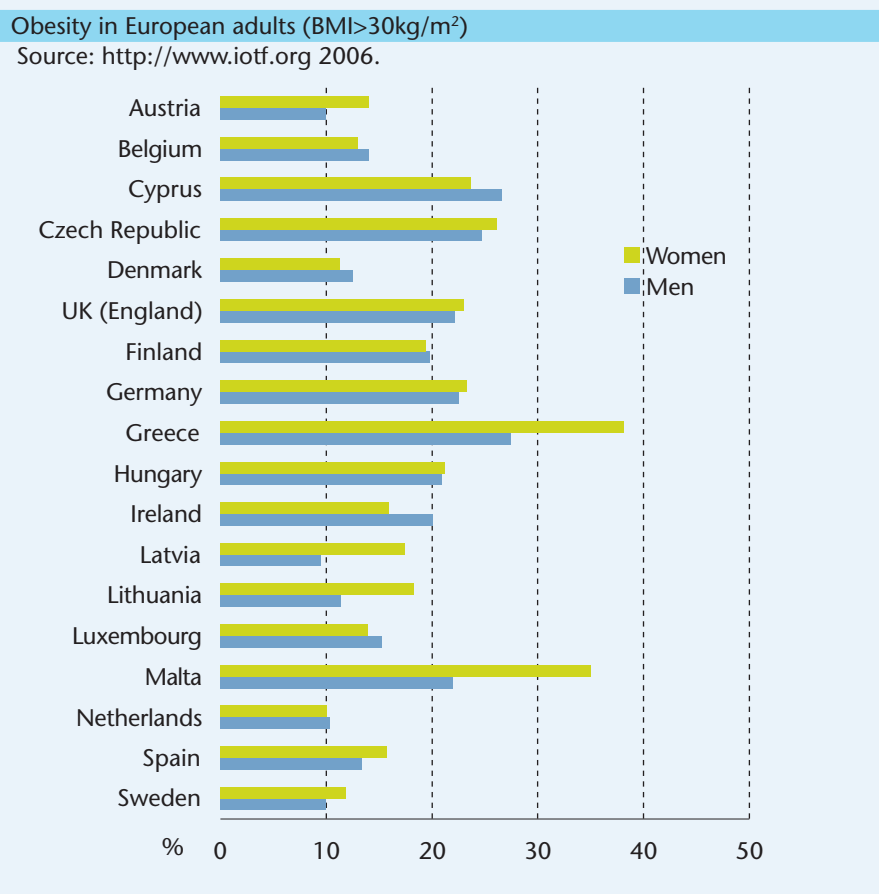
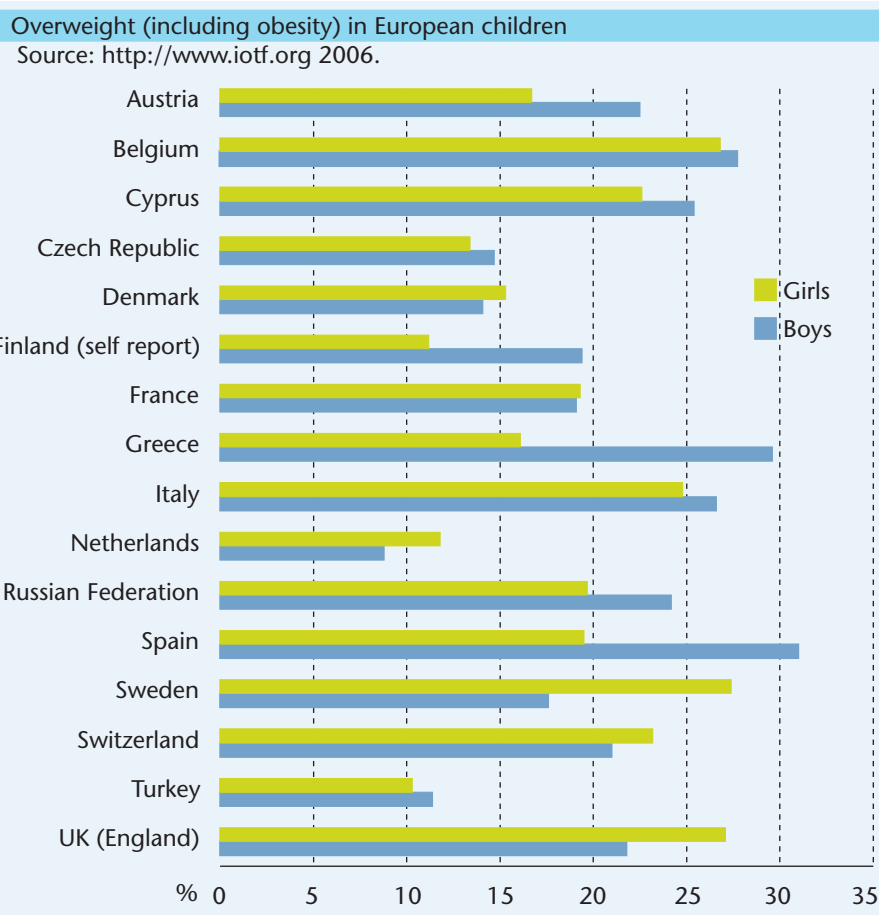
Consensus meeting and Current Care Guidelines

The Finnish Medical Society Duodecim and the Academy of Finland arranged a consensus meeting on obesity in October 2005. According to the consensus statement, the increase in obesity and obesity-related morbidity will lead to remarkable problems in public health and economics unless the unfavourable development is defeated. The huge challenge of preventing and treating obesity is recognized, and a large-scale, multidisciplinary collaboration between various stakeholders is emphasized in the statement.

Treatment of obesity is a great challenge for health care professionals, who must recognize obesity as a major determinant of several illnesses and weight loss as a primary care in obesity-related illnesses. However, as obesity develops over a long period of time and is difficult to treat, once developed, more effort should be invested in its prevention.

Prevention should begin early in life, in childhood and adolescence. Creating living conditions that promote healthy food choices and physical activity is of great importance. Therefore, governmental actions are needed together with actions implemented by municipalities, health care, food industry and trade, non-governmental organizations and media. Measures suggested in the consensus statement include taxation and other legislation related to food (e.g. lowering the VAT of healthy food), promoting the development and marketing of healthy food, and obesity prevention at day care and schools. The role of health professionals working at child health clinics and schools is highly acknowledged.

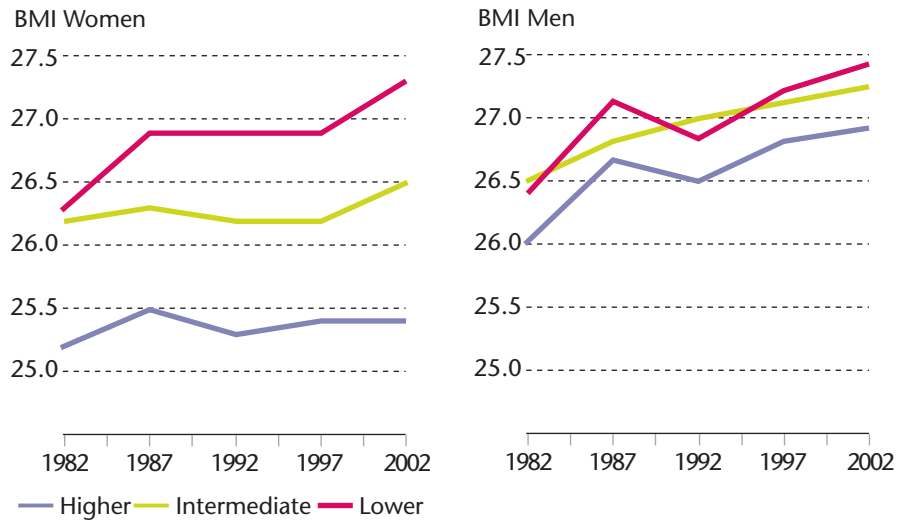
According to the Current Care guidelines for childhood obesity, prevention of



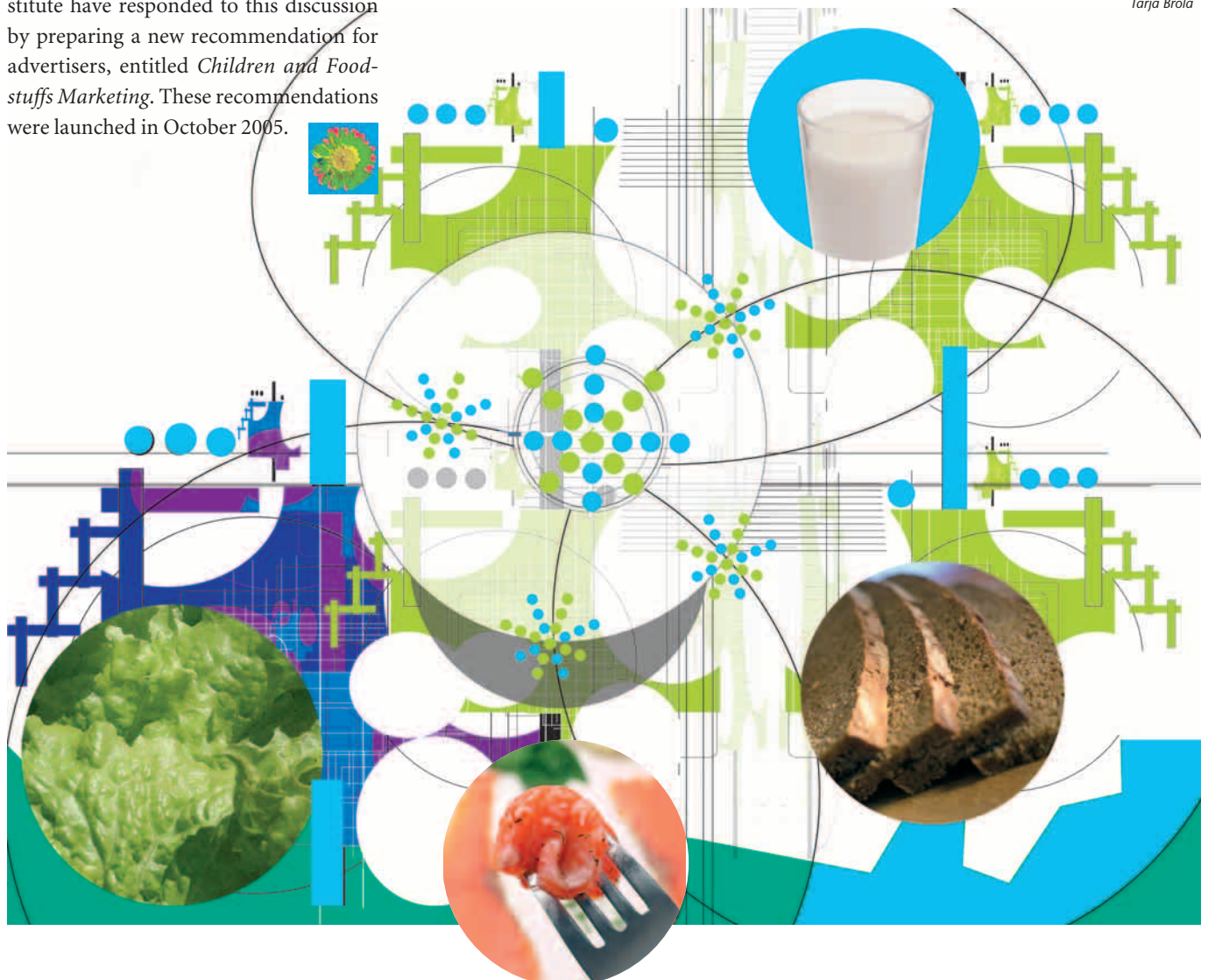
obesity should preferably focus on health related rather than weight related issues. It should be multidimensional, ranging from a child's close family environment to municipal and national measures. The cornerstones of prevention include guidance towards recommended eating habits, limiting the time spent watching TV or playing computer games by agreeing on a suitable daily amount, increasing physical activity, and focusing on the knowledge and attitudes of school staff and pupils. A multidisciplinary approach should be employed when striving towards these goals through co-operation between health care officials, child care providers, school staff, and those organizing sports and other leisure time activities.

Furthermore, the increasing obesity among children and young people has stimulated discussion as to whether restrictions should be placed on food marketing aimed at children. The Finnish Consumer Agency and Consumer Ombudsman together with the National Public Health Institute have responded to this discussion by preparing a new recommendation for advertisers, entitled *Children and Foodstuffs Marketing*. These recommendations were launched in October 2005.

Figure 3. Body mass index (BMI, kg/m²) by years of education (tertiles) in women and men. Source: FINRISK 2002 study.



Tarja Brola



THE FINNISH DIET

Pirjo Pietinen, Professor
National Public Health Institute (KTL)

There is a long history of nationwide dietary studies in Finland. In the 1970s data were collected by the Social Insurance Institution of Finland (Kela), and since then, the national FINDIET studies have been carried out by the National Public Health Institute (KTL) in 1982, 1992, 1997 and 2002. The Finnish diet has changed significantly during the past decades from being high in saturated fat and low in vegetables to a modern European diet that is close to recommendations in many ways (Figures 1 and 2). Based on the National FINDIET 2002 Study, fat comprised 35% of energy in men and 32% in women in 2002. Saturated fat accounted for 13–14% of energy, polyunsaturated fats for approx. 5%, and trans-fatty acids only for 0.5%. However, the favourable changes seem to have levelled off, which is reflected in the serum cholesterol levels.

The main sources of saturated fats used to be milk and butter used on bread, but the situation has changed. Most people choose either skim or low-fat milk, prefer soft vegetable margarines on bread, and use vegetable oils, mostly local canola oil, in cooking. In women these changes have been more rapid than in men. (Figures 3–7) Other products, such as cheeses and meat products, have become important sources of saturated fats.

The intake of sucrose has increased in young women, and is now 12% of energy (9% in men). The recommendation is 10% or less. Increasing sucrose intake has become a matter of concern, especially in children, because of increased consumption of sugary beverages and sweets.

Dietary fibre intake in Finland has always been internationally relatively high, above 20 g per day. However, the recommended 25–30 g is only reached in eastern Finland, which is known to have the highest consumption of rye bread, the best source of fibre.

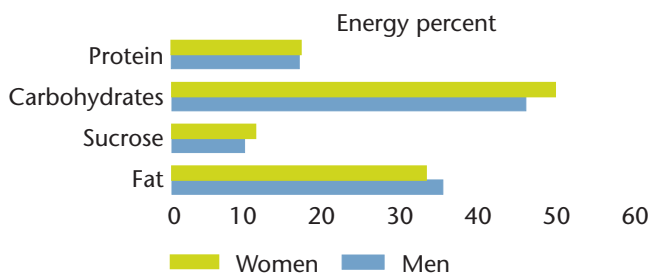


Figure 1. Intake of protein, carbohydrates, sucrose and fat as a percentage of total energy intake in Finland. Source: The National FINDIET 2002 Study.

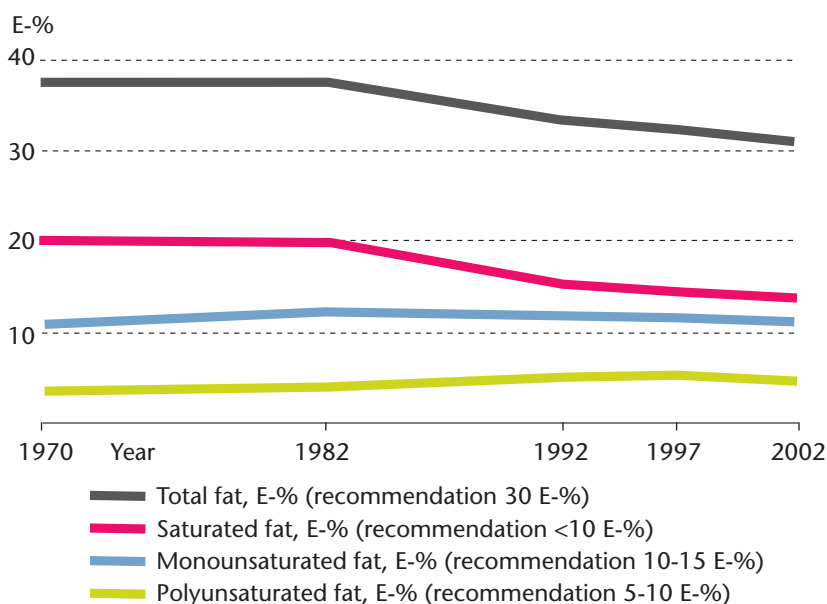


Figure 2. Fat intake as a percentage of energy (E-%). Sources: Pietinen et al. 1996, the National FINDIET 1997 and 2002 Studies .

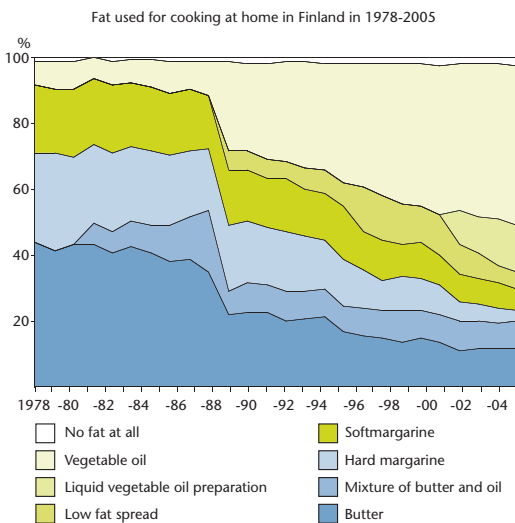
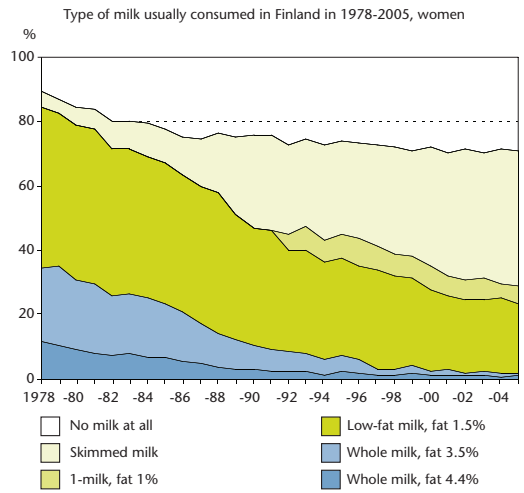
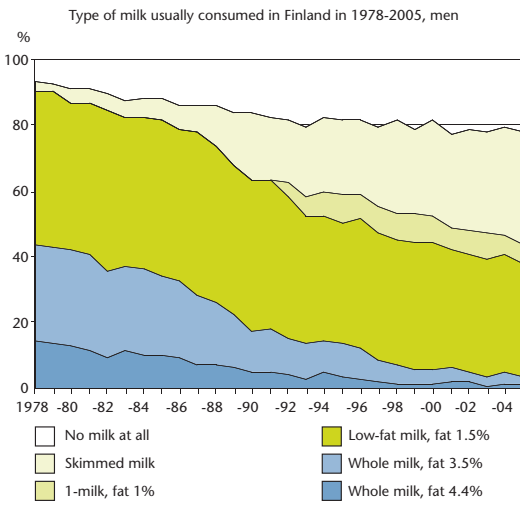
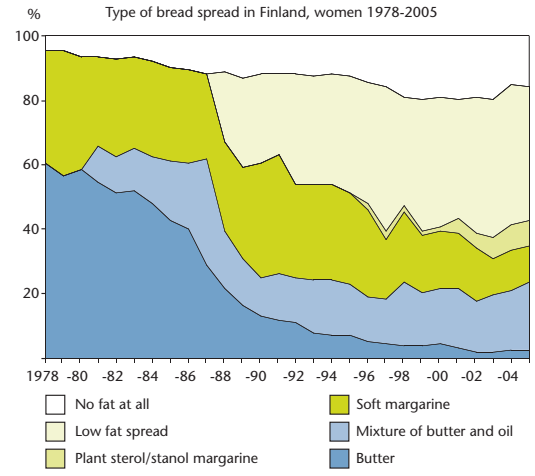
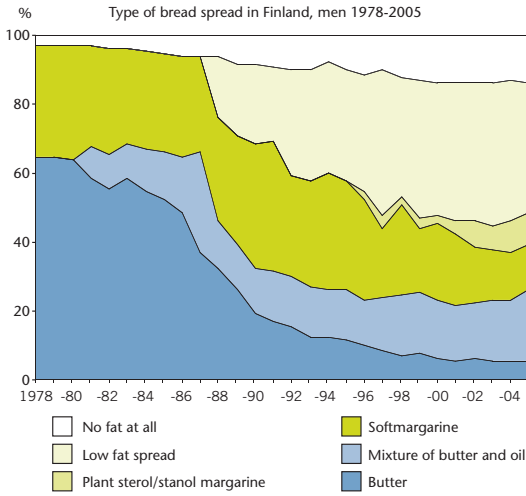
The intake of vitamins and minerals is generally adequate. Because of very low natural selenium intake, fertilizers have been fortified with selenium since the mid-1980s, and since then the intake has been satisfactory.

The Finnish diet has traditionally been quite salty, and consequently, high blood pressure is a commonly found risk factor. However, there has been a remarkable decrease in salt intake since the late 1970s when special attention started to be paid to this problem. Systematic work has been done to lower salt intake by educating the public and by working with the food indus-

try to reduce the salt content of processed foods. In addition, national legislation was revised to enable the labelling of low-salt products, such as bread, sausages, cheese, and breakfast cereals.

Salt intake in the population has been monitored in connection with our national FINRISK surveys (Figures 8 and 9). While in 1979 salt intake was 13 g in men and 10.5 g in women, it has decreased to 9.5 g in men and to about 7 g in women in 2002. The Finnish recommendation given by the National Nutrition Council is 7 g for men and 6 g for women.

NUTRITION IN FINLAND



Figures 3-7. Health behaviour and health among the Finnish adult population, 1978-2005. Source: National Public Health Institute.

NUTRITION IN FINLAND

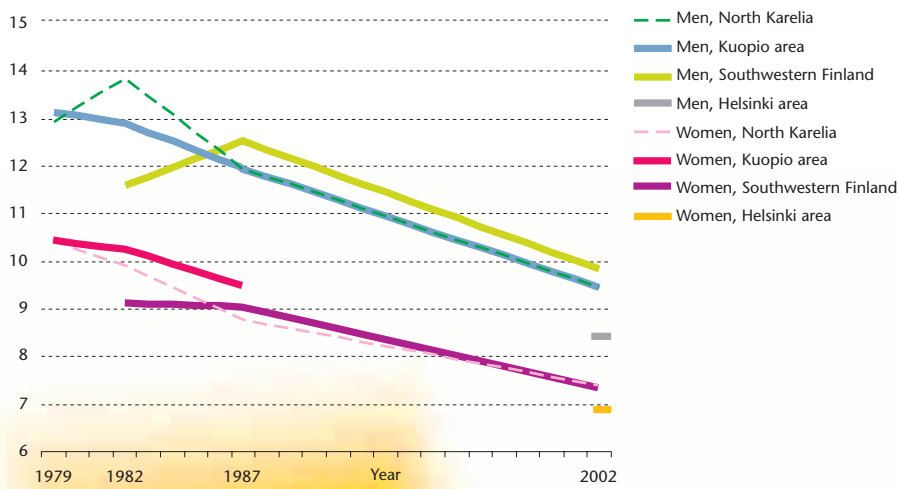


Figure 8. 24-h sodium excretion as NaCl. Source: Laatikainen et al. 2006.

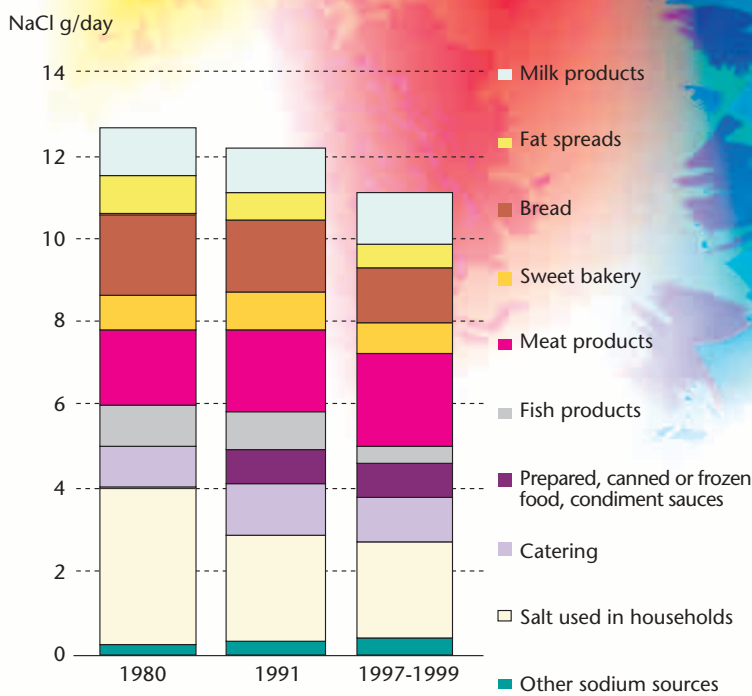


Figure 9. Sources of salt. Food Balance Sheets 1980–1999. Source: Reinivuo et al. 2006.

EATING PATTERNS AND FOOD CONSUMPTION

Johanna Mäkelä, Head of research
National Consumer Research Centre
Merja Paturi, Senior researcher
National Public Health Institute (KTL)
Leena Räsänen, Professor
University of Helsinki

Food habits have changed remarkably in Finland during the past decades. Earlier the Finnish diet was largely based on grains, milk products, and potato. The consumption of grain and starch products has declined, while the consumption of animal products has increased. The consumption of vegetables and fruit has also increased steadily. In everyday life the supply of foods has broadened significantly. Globalisation materialises on the supermarket shelves: shopping carts are filled not only with foods of domestic origin but also with those imported from all over the world. Products that once were luxuries have been transformed into everyday goods (for example, kiwi fruit). The Finnish people have access to better, safer and healthier food than ever. The problems of the diet have changed over from scarcity to excess.

The Finnish food culture has adopted foreign and ethnic influences. Pizza and sushi are familiar and more popular than one could imagine a few decades ago. Some feel that the original, authentic Finnish foods and food habits are disappearing. On the other hand, Finland has for centuries received, accepted and remoulded influences from both east and west. In an era when culinary influences and trends travel faster than ever, the interest in regional foods and dishes is increasing. In some cases, historically rather local foods transform into national dishes and emblems that serve as messengers of the Finnish food culture abroad. A good example is *karjalanpiirakka*, the Carelian pasty, which recently received the EU's Traditional Speciality Guaranteed label (TSG).

Traditional Finnish foods, such as rye bread, crispbread, berries, sour milk prod-

ucts, and smoked fish have remained in our core diet. The meaning of food to the Finnish identity has not vanished – rather on the contrary. New potatoes in summertime or strawberries from own field are highly valued. Mushrooms or wild berries picked from the vast forests emphasize the connection with the Nature. Seasonality in food traditions is also appreciated. The meaning of food to our identity is also nicely manifested by the wish lists Finns living abroad send to their fellow countrymen. Rye bread, milk chocolate, salted liquorice, and xylitol chewing gum travel across the world to those who long for these Finnish specialities.

According to the National FINDIET 2002 Study, the average daily diet consists of six eating occasions, including one main meal. About 60% of the daily energy derives from the main meals, and the rest from snacks. Snack-dominated eating is typical for one fifth of men and one quarter of women. This eating pattern is associated with urbanization in both genders, and with physical work in men. Higher intake of sucrose and lower intake of micronutrients are characteristic of this eating pattern.

The traditional eating pattern with a warm lunch and a dinner is changing gradually towards only one warm meal and snacking. A warm lunch eaten at work or

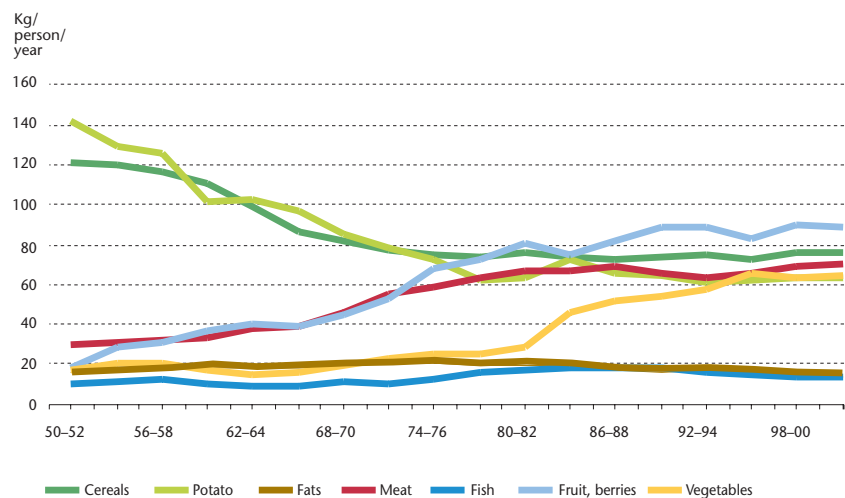


Figure 2. Food consumption of selected foods in Finland, in 1950 – 2004. Source: Food Balance Sheets.

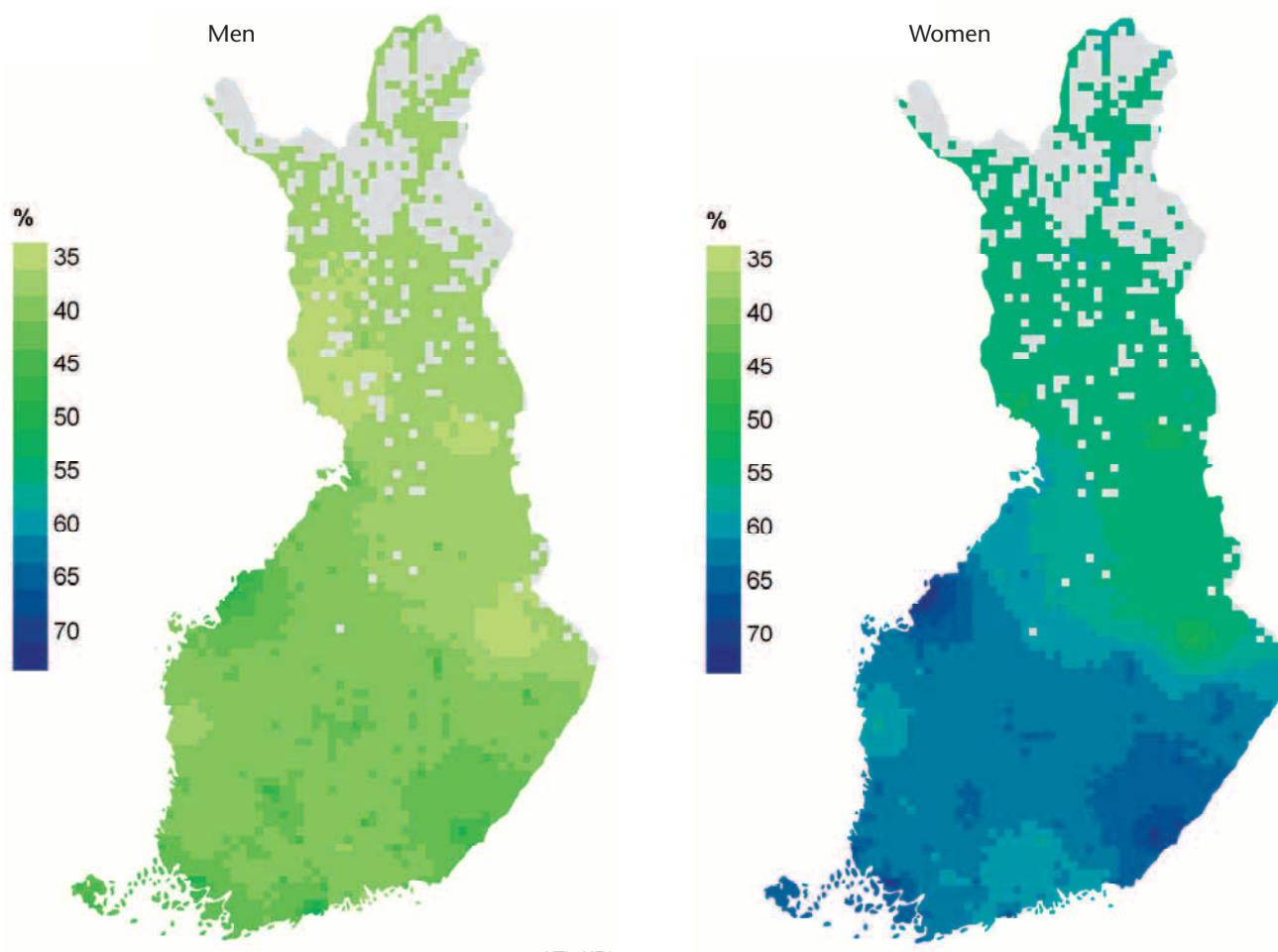


Figure 1. Proportions (%) of women and men eating vegetables and fruit in accordance with the dietary recommendations: >400 g/day. Source: Similä et al. 2005.

school is more common than a warm dinner at home. After work or school, family members come home and have a snack or a dinner, in many cases at different times, and then go to their hobbies and activities. Convenience in eating is also appreciated in Finland. The selection of ready-made dishes has broadened remarkably during the last decade; for example, microwave meals show a yearly increase of 10 per cent. Semi-finished products like marinated meat strips or frozen vegetables have made cooking easier and faster. During the weekends, however, family meals are prepared with more time and effort. Many young Finns also appreciate cooking skills and gather to prepare and enjoy a meal together.

Differences in food consumption between social groups diminished in the 20th century. Along with the rise of income and

living standards, the share of food in total expenditure has declined. The differences between social groups have, however, not completely disappeared. In terms of nutrients, different social groups eat quite similarly, whereas certain differences still exist on the food item level. Cultural preferences and choices vary. People with higher education and better income consume more meat, cheese, vegetables and fruit, while people with lower income eat more sausages, grain products, butter, and potatoes. There are also differences between genders, and age groups. Middle-aged and older women eat more vegetables, fruit, and berries than men.

Men tend to consume more bread, potatoes, milk, meat, and sausages than women. Younger people consume more sweets and soft drinks, and less fruit, fish and porridges than their parents.

There are regional differences in food consumption (Figure 1). For example, vegetables, fruit, and unsweetened fruit juices are more commonly used in urban areas than in rural areas. Berries are consumed more frequently in eastern Finland and unsweetened fruit juices in southern Finland, compared to the other regions. Women consume more vegetables, fruit, berries, and fruit juices than men. The overall consumption of vegetables, fruit, and berries reaches the recommended 400 grams per day most commonly in central and southern Finland and least commonly in the northern parts of Finland.

Changes in the food consumption

Food Balance Sheets describe changes over time (Figure 2). Most of the more drastic changes happened during the period from

the 1950s to the 1970s, but also thereafter certain trends can be seen. During the past 50 years, the annual consumption of grain has decreased by almost 50 per cent. One third of this is eaten as rye; Finland is known as a country of sour rye bread. Other types of whole grain bread made with wheat, oats and barley are also typical. Potato consumption has halved since the 1950s. In the last few years, a slight growth has been observed. In the same time, a multitude of frozen potato products has been brought to the market.

The consumption of vegetables has increased steadily. Women eat vegetables in larger quantities and more frequently than men; only 30% of men eat fresh vegetables daily. Work site and school canteens always serve fresh vegetables as part of a meal. Lettuce, with its many varieties, is grown all year round in greenhouses, although it is also imported to some extent.

The consumption of fruits and berries increased until the 1990s, but then levelled off. The total consumption is about 87 kg per capita, of which the proportion of berries is 25%. Compared to the situation 20 years ago, there is an enormous widening both in quantity and quality in fruit and berry supply throughout the year.

The consumption of liquid milk products has decreased since the 1950s from 350 kg to 190 kg per capita. At the same time the amount of cheese consumed has increased from 2.5 kg to 17 kg per capita per year. Skim milk (<0.5 % fat) is steadily growing in popularity; it is currently selected by 38% of women and 35% of men. Cheeses with lower fat content were also chosen more often in 2004 than ten years ago. In the same period, there has been a huge growth in the selection of low-fat cheeses.

Meat consumption doubled from the 1950s to 1980s. Since then the consumption has been rather stable. Pork is still the most popular meat, accounting for 50% of the consumption. The fat content of pork has remarkably decreased. The consumption of poultry doubled in the 1990s, but seems to slow down, being now 16 kg per capita. The consumption of fish is growing, and is at the same level as that of poultry. There is a growing tendency towards buy-

ing more expensive parts of meat and fish, such as fillets.

Butter used to be the main fat used on bread and in baking and cooking. In the 1980s, there was a drastic change when soft vegetable margarine and butter-oil mixtures replaced butter on bread. The use of vegetable oils is also increasing, about 60% of consumers report vegetable oil or similar products as their first choice in cooking.

Alcohol consumption shot up by 10% upon the tax reduction on alcohol in 2004.

In terms of 100% alcohol per capita, the consumption increased from 9.4 litres to 10.3 litres. The consumption distribution is very skewed: 10% of the Finnish population, that is 300,000–500,000 inhabitants, drink half of the total amount of alcoholic beverages. The increase in the consumption was 1.2% in 2005. In the 1990s, the consumption of spirits fell under 30 per cent of 100% alcohol. In the same time, the consumption of wine increased clearly.



Consumers in Finland try to eat in a healthier way:

- by eating more of vegetables and fruit (68% of consumers)
- by avoiding fat (59%)
- by decreasing the use of salt (54%)
- by eating more of fish and poultry (52%).

Source: Ruokatieto 2005.

Fineli® - the Finnish food composition database at www.fineli.fi

- A website containing nutrient values of Finnish foods and foodstuffs
- Originally compiled for nutrition research purposes
- Search tools for 50 nutrient factors from 1,800 foods
- The website has over 3,000 visitors daily
- Also available in English and in Swedish
- Updated on an annual basis
- Maintained by the National Public Health Institute (KTL)
- In collaboration with Agri Food Finland, University of Helsinki (Food Chemistry), University of Turku (Food Chemistry).

FUNCTIONAL FOODS – TOWARDS BETTER HEALTH?

Sirpa Sarlio-Lähteenkorva, Senior Officer
Finnish Food Safety Authority Evira

It is well recognised that a balanced and varied diet is a prerequisite for good health. Moreover, individual foods can have additional health benefits besides their nutritional properties. Foods that are marketed with health-related claims referring to specific health effects are commonly called functional foods. The market for functional foods is increasing along with the ageing of the population. Developing safe, healthy and tasty foods with scientifically substantiated health benefits is the challenge.

There is no internationally accepted definition for 'functional food'. However, a commonly used definition (1) states that foods can be regarded as functional, if they can be satisfactorily demonstrated to *beneficially affect one or more target functions in the body, beyond adequate nutritional effects in a way that is relevant to either an improved state of health and wellbeing and/or reduction of risk of disease*. Functional foods must achieve their effects when consumed in amounts that are expected to be present in a normal diet. A functional food is not a pill or a capsule, but a part of normal diet.

In Finland, many functional ingredients have been successfully developed, studied and commercialised. Xylitol, a non-fermentable sugar alcohol for improved dental health, was one of the pioneering substances intensively studied in Finland in the early 1970s. Other examples range from plant stanol ester, that can influence blood cholesterol levels by reducing the absorption of cholesterol from intestine, to various probiotics, such as Lactobacillus GG for improved gut health.

According to a recent international evaluation of food research by the Academy of Finland, Finland has been a leader in developing and conducting experimen-

tal studies to provide hard evidence of the health benefits of functional foods and food components, and has played a primary role in stimulating health claims in foods both nationally and internationally.

Health claims will be evaluated at Community level

Currently, the safety of novel ingredients is evaluated at the Community level before they can enter the common market. Many of the ingredients evaluated under novel food regulation (258/97/EC) since 1997 have been developed because they are expected to have health benefits. These include various ingredients such as plant sterols, salatrims, isomaltulose and D-tagatose.

However, potential health effects and claims of novel foods or any other food are not being evaluated at the Community level yet. This will change in the future when the new EU Regulation on nutrition and health claims will be adopted, and then all claims

will be evaluated at the Community level before they can be used in marketing. This will increase consumer protection, create more equal conditions of competition, and enhance the control of food marketing. The said Regulation on nutrition and health claims will be endorsed during the Finnish EU Presidency. Finnish Food Safety Authority Evira, supported by the Ministry of Trade and Industry, has already started to investigate the health claims used in the marketing of foodstuffs in Finland, and the research evidence on which such claims are based. The results of the investigation will be utilised in preparing a national list of acceptable claims used on foodstuffs, as required by the forthcoming regulation.

(1) *European Consensus Group: Concepts of Functional Foods in Europe: Consensus Document, British Journal of Nutrition, Volume 81, Supplement 1, 1999.*



EATING OUTSIDE HOME

Ritva Prättälä, Senior Researcher
Susanna Raulio, Researcher
National Public Health Institute (KTL)

Meals prepared outside home have a significant impact on Finnish nutrition. According to the Directory of Catering Kitchens, 769 million meals were served by large-scale catering kitchens in Finland in 2005, equating to 147 meals per person. The number of meals eaten outside home has increased since the late 1990s when the corresponding figure was 135 meals per person. Around 34% of Finns eat at least one meal outside home every day.

The majority of these meals were served at schools (Table 1). The share of cafeterias was 20% and that of restaurants and hotels 15%. Old people's homes and day care centres, hospitals and staff canteens accounted for about 10% each.

Because of the long tradition of catering services, Finland has been a pioneer in regard to practical dietary guidelines, product development, and quality control directed to catering kitchens. By offering models for healthy eating, catering services have supported national dietary recommendations.

Unique school meals

School meal service in Finland is one of a kind in the world: free school lunches are served at comprehensive schools as well as at upper secondary schools and vocational institutes every working day. According to the recommendations, the school lunch should meet one third of the students, daily nutritional requirements.

As early as in the 1940s, a law was passed that required the municipalities to arrange a free lunch for all pupils at elementary schools. The same benefit was gradually introduced to all levels of primary and secondary education. According to the current law, the students must be provided with a proper meal on every school day. In addition, university students have had subsidized meals since 1979.

Workplace lunches

Finnish adults have a long tradition of eating a warm lunch during the workday. The first recommendations for workplace lunches were given in the 1970s. Workplace canteens or restaurants are supported in Finland by different tax agreements and subsidies to promote their use among employees. The frequency of having a warm lunch at the workplace or staff canteen has been fairly stable in Finland over the last two decades (Figure 1). Today, 40% of eco-

nomically active women and 35% of men eat a warm lunch at workplace. Workplace canteens are used more often by the higher educational groups, while workers with lower educational level more often eat a packed lunch or snack during the working day. Having a warm meal during working hours seems to improve the quality of diet: those having their lunch at workplace canteen eat potatoes, fish, and vegetables more often than the others.



Table 1. Catering kitchen locations and shares of all meals served in 2005. Source: A.C. Nielsen 2005.

Location	Meals served, %
Comprehensive school	21
Cafeterias ^{x)}	20
Restaurants and hotels	15
Old people's homes and children's homes	11
Hospitals	9
Staff canteens	8
Vocational institutes	7
Day care centres	4

Living conditions support school and workplace lunches

Circumstances in Finland have made school and workplace meals a necessity, since women generally have full-time jobs, and the distances to schools and workplaces are often long in our sparsely populated country. The traditional Finnish pattern of having three or four warm meals daily was determined by rural work schedules and the high energy need of manual labour. Today, the work is in general physically less demanding, and people eat fewer warm meals. About 24% of adults aged 25–64 report eating daily breakfast, prepared lunch, and prepared dinner. More Finns eat only one warm meal instead of two, slightly preferring lunch. Catering systems at schools and workplaces have their influence on the Finnish meal patterns, since about 60% of 15–64-year-old Finns report having a possibility to have a prepared lunch either at school or workplace. The great majority of 11–15-year-old school children report eating a meal in school canteen every day; among this age group a warm lunch is more common than a warm dinner at home.

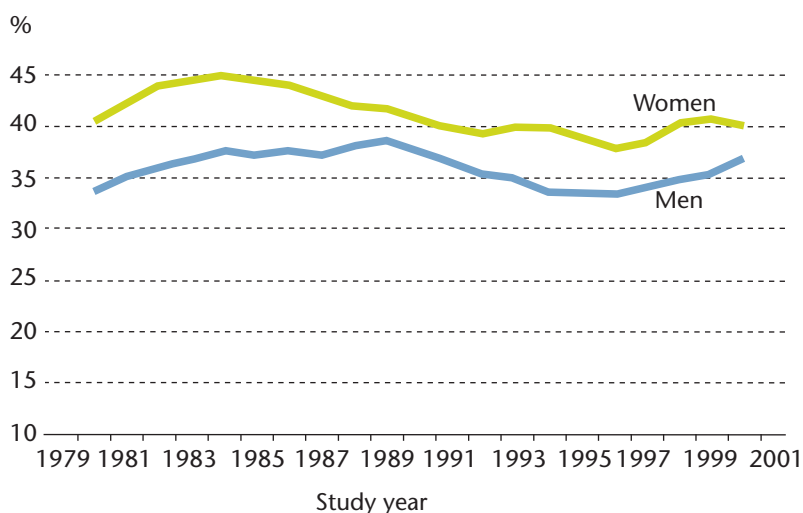
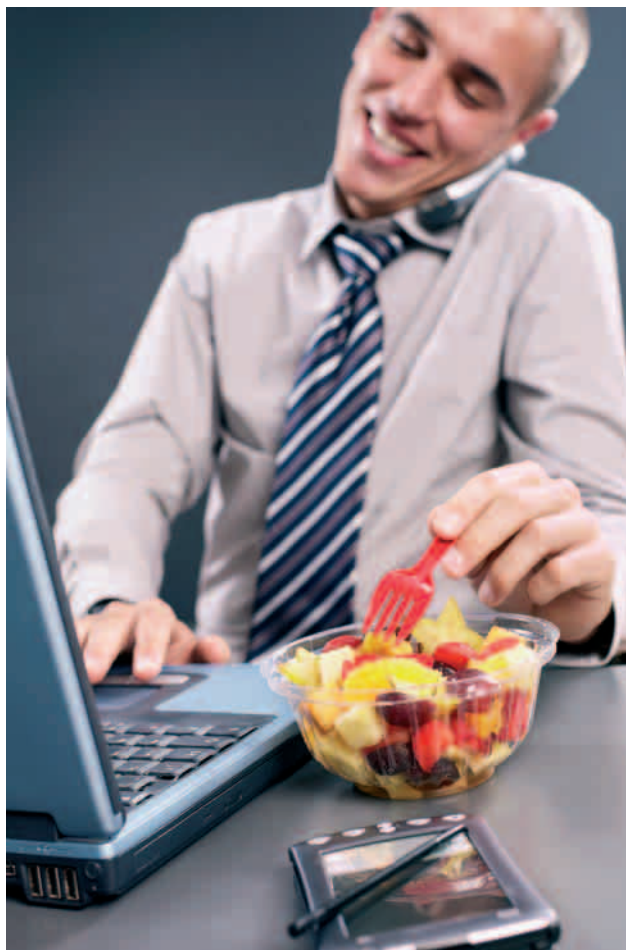


Figure 1. Having lunch at a staff canteen (%) in Finland, 1979–2001, three-year moving average, adjusted for age. Source: Raulio et al. 2005.

FOOD SAFETY

NUTRITIONAL RISK ASSESSMENT OF FORTIFIED FOODS

*Tero Hirvonen, Senior Researcher
National Public Health Institute (KTL)*

Food fortification targeted to the whole population has a long history in Finland. Eradication of endemic goiter by means of added iodine in salt is a well-known success story. Finnish soil has very low concentration of iodine, and voluntary iodization of salt started in 1949 because of the high prevalence of goiter. As a result, goiter due to iodine deficiency almost disappeared. Similarly, rickets disappeared in the 1960s thanks to the fortification of margarines with vitamins A and D, which started in 1955. Due to the country's northern latitude, there are only three months in year when the level of UVB radiation is sufficient for dermal pro-vitamin D synthesis. Therefore, insufficiency of vitamin D in winter would be inevitable without food fortification.

In the 1970s white flours were fortified with iron and thiamine, but this was discontinued in 1993 since the benefits of iron fortification were questioned. The effects of flour fortification were not systematically monitored. Fortification of milk

with vitamin D started in 2003. This has halved the proportion of population with low vitamin D status. It is noteworthy that in Finland any food fortification has been carried out based on a consensus between the authorities and food industry. As a result, almost all retail milk and margarines are nowadays fortified with vitamin D and household salt with iodine.

In the beginning of the 21st century, the concern of excessive nutrient intakes increased with the appearance of new fortified foods to the market. It was suspected that food fortification in conjunction with the use of food supplements and high intake of nutrients from natural sources could lead to excessive intakes. Research results indicated that those who use fortified products also more frequently use food supplements. It was also known that the intake of vitamins and minerals is higher among food supplement users than among others.

In 2003, a research project for the purpose of nutritional risk assessment was launched as a response of excessive nutrient intakes. The aim was to investigate the safety and efficacy of food fortification. The

nutritional risk assessment project aimed at producing information for the risk management of food fortification. So far it has been found that fortification with vitamin D is not associated with any risk of exceeding the maximum intake level, and as regards group B vitamins, the risk is rather small. However, fortification with group B vitamins does not seem to markedly increase the intake of these vitamins, owing to the low market share of products fortified with vitamin B. Risks of overdose with group B vitamins may exist in the high doses of food supplements (especially those with pyridoxine) rather than in food fortification. Fortification with vitamin D seems to be more efficient since almost all milk and margarines are today fortified with vitamin D. Unlike vitamin D and group B vitamins, fortification with calcium confers a marked risk that a significant proportion of the population may exceed the tolerable upper intake level, since dietary calcium intake is high on average. On the other hand, food fortification with calcium diminishes markedly the proportion of population with low calcium intake. Therefore, proper targeting of fortified foods by food labelling and consumer information could increase the safety and efficiency of food fortification.

Figure 1 shows the effect of the extent of calcium fortification on calcium intake. Ideally, the whole population should lie between the recommended daily intake and the tolerable upper intake level. When the extent of fortification (that is, the proportion of fortification in potentially fortifiable foods) increases, the proportion of population below the recommended intake decreases. However, when the extent of fortification reaches 50%, the proportion of those exceeding the tolerable upper intake level increases markedly, especially in men.

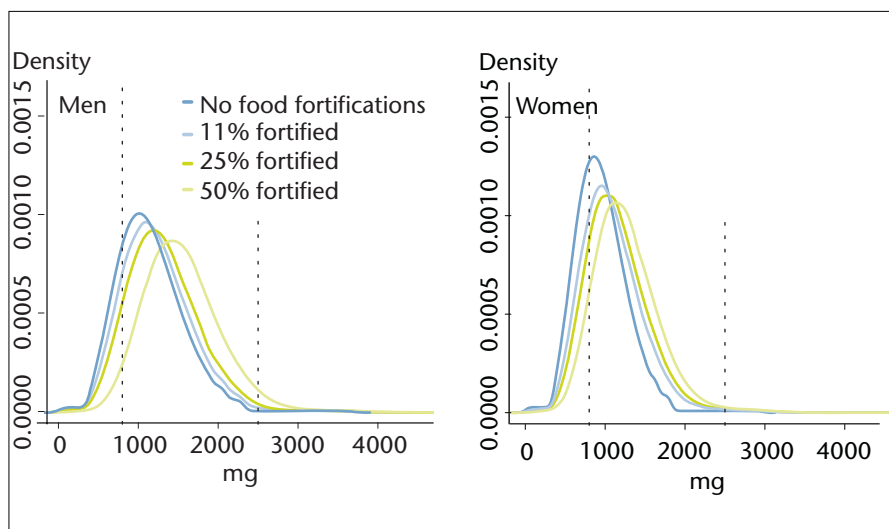


Figure 1. Effect of fortification proportion on calcium intake. Vertical dashed lines indicate the recommended intake (800mg/day) and tolerable upper intake level (2500 mg/day). Source: Hirvonen et al. 2006.



FORTIFICATION LEGISLATION AND CONTROL IN TRANSITION

*Annika Nurttila, Senior Officer
Finnish Food Safety Authority Evira*

Before Finland joined the EU in 1995, a permission to add nutrients to foodstuffs was granted only if a nutritional need was shown in the population or in a subpopulation. The leading principle was that the food to be enriched should have a sound nutritional profile, e.g. enrichment of sweets was not regarded as acceptable.

Upon joining the EU the situation changed in Finland. The principle that permission to enrich foodstuffs was granted only if the nutritional need had been proven could no longer be applied. Free movement of goods in the EU can only be restricted on very specific grounds (such as, public health concerns). The new Finnish Food Act (23/2006, 8 §) states that adding vitamins, minerals and other comparable

substances with a nutritional and physiological effect to food is only permitted, if it does not present a hazard to human health. Furthermore, if no separate provisions are given in the legislation, addition of these substances is only possible with a permit from the Finnish Food Safety Authority Evira. Detailed provisions are given in two decrees: the Decree on addition of vitamins and certain other substances to foodstuffs (281/1972) and the Decree of the Ministry of Trade and Industry on addition of vitamins and certain other substances to foodstuffs (917/2002).

The harmonization process concerning the fortification legislation in the EU is expected to be completed during the year 2006. The Proposal for a Regulation of the European Parliament and of the Council on the addition of vitamins and minerals and of certain other substances to foods

(9857/05 Rev 3 with some amendments), if accepted, will lay a common ground for fortification of foodstuffs in the EU. In Finland, a notification procedure will most probably supersede the currently applicable permit procedure.

In food control of fortified products, the main focus should be on in-house control and effective control of in-house control. In Finland, controls projects (e.g., multivitamin juices, breakfast cereals) have shown great discrepancies between the declared and analysed amounts of added nutrients. As the market situation most probably will change due to the common EU legislation, effective monitoring of the evolution of the market of fortified foodstuffs is a necessity, and a monitoring system should be developed in the coming years.



FOOD CONTROL

*Taina Niskanen, Senior Officer
Finnish Food Safety Authority Evira*

To protect the consumer and to ensure the safety of food, the food control measurements in Finland extend from stable to table. Food laws contain rules and regulations that concern both the production environment and conditions, and the food itself. Control of foodstuffs has switched over from testing primarily the final product towards ensuring hygienic operations in the different stages of the production chain, especially in primary production. Food control is implemented through inspections, sampling and examinations, guidance and counselling, as well as through coercive measures through which the authorities ensure the foodstuffs' compliance with regulations. Food safety and quality is based on the obligation of the enterprises to use in-house control, backed up by official inspection. The authorities are responsible for controlling

that the in-house control is planned and implemented as prescribed in laws. Official inspections are one of the more traditional food safety measures. Inspections provide an assurance for industry and the public. Regular inspections assist the food industry in identifying potential weaknesses and correcting them.

A special programme to control salmonella

Salmonella infections among animals have in Finland been subject to rigid control for decades, and the number of salmonella outbreaks has always been very low. Upon joining the European Union, Finland was allowed to impose the same salmonella controls upon imports from other EU countries as are applied to domestic products. Finland has the right to demand that fresh beef, pork, and poultry meat imported to Finland shall be examined for salmonella in the country of

origin and accompanied by a certificate of examination. This, however, was granted on the condition that Finland launches a special control programme for salmonella. The objective of the salmonella control programme is to keep the incidence of salmonella at the level of no more than 1% in production animals, meat, and eggs. The control programme successfully ensures the supply of salmonella-free foodstuffs to market, and only a minor part of human salmonellosis are domestically acquired. The discovery of salmonella always leads to measures prescribed by law, including the slaughter of the infected animals under specially controlled conditions, disinfection procedures on the farm, restriction of use of the contaminated products, and withdrawal of contaminated foodstuffs from the market. The salmonella control programme ensures that the incidence of salmonella in Finnish livestock and foodstuffs is minimal.

Food poisonings and waterborne outbreaks

The key objective of food poisoning investigations is to identify the cause and the source of the poisoning. Rapid action is required from the authorities when suspicions arise of epidemic food poisoning. Upon receiving notification of food poisoning or suspected food poisoning in their own area, municipal health protection authorities shall immediately instigate an investigation of the case. Systematic collection of information about foodborne outbreaks in Finland began in 1975 (Figure 1). Obligatory reporting involves definite communicable diseases and foodborne agents. The data about foodborne outbreaks is recorded in the National Food Poisoning Register. Finland is committed to the WHO (World Health Organization) Surveillance Programme for Control of Foodborne Infections and Intoxications in Europe and the EU Member States' Zoonoses monitoring and data collection programme, which includes data about foodborne outbreaks and intoxications. By the end of 2005, there have been 1,650 reported outbreaks out of which approx. 90 outbreaks (5%) were waterborne (Figure 1). While before the year 1983 there were 40–80 outbreaks registered annually, during the years 1984–1996 there were only a few more than 30 outbreaks on average. The surveillance system on food- and waterborne outbreaks was revised in 1997.

The number of reported outbreaks in 1997 and 1998 doubled when compared to the early 1990s. It appears as though the real number of outbreaks would be increasing in Finland, but this is partly explained by the improvements in the investigation and reporting system. Since the criteria for classification were further developed in 1999, the number of recorded outbreaks has constantly decreased. In 2003, the number of outbreaks was only 33, almost 60 per cent less than in 1998. During the past years, the number of outbreaks has slightly increased again. The reason for this development is still not clear since foodborne outbreaks are connected with several factors, such as changes in consumer behaviour, internationalisation, the free movement of goods, and improved analytical methods.

Trends in microbiological risks and risk foods

The most common vehicle reported in foodborne outbreaks is meat, but new consumer habits, such as the increased use of ready-to-eat fresh produce, shellfish and other minimally processed food, have led to significant outbreaks. Improper temperature during preparation or storage is a common contributor to foodborne outbreaks. In recent years, poor hygiene in take-away kitchens has also been to blame in many cases. Improved analytical methods have resulted in the identification of new causative agents. For example, noroviruses are today among the most commonly reported agents in foodborne epidemics.

Ensuring the safety of food

On the basis of identified causative agents, risk foods or raw material information and recommendations are distributed to the entrepreneurs, producers, and consumers. Information received about foodborne outbreaks, their contributing factors and causative agents is analysed and actively used in the education and training of people handling food. Since 2005, a hygiene proficiency certificate has been required of all food handlers whose work entails special risks related to food hygiene or who handle perishable foodstuffs. New control programmes are established and other measures taken in order to control epidemics caused by the most significant zoonoses. Creating a national system for the monitoring and surveillance of pathogenic bacteria other than salmonella, e.g. campylobacter, yersinia, and listeria, in production animals and foodstuffs is one of the key actions to be taken in the following years. At the moment, domestic foodstuffs are considered relatively safe, the most concerning factors seem to be food poisoning microbes and diseases caused by products of animal origin. However, food scandals blown up in the media easily shake consumers' confidence in the ability of the official food control measures to guarantee the safety of foodstuffs. Consumers are interested in food safety issues, and it is important that information about actions taken in the field is openly discussed between the authorities and consumers.

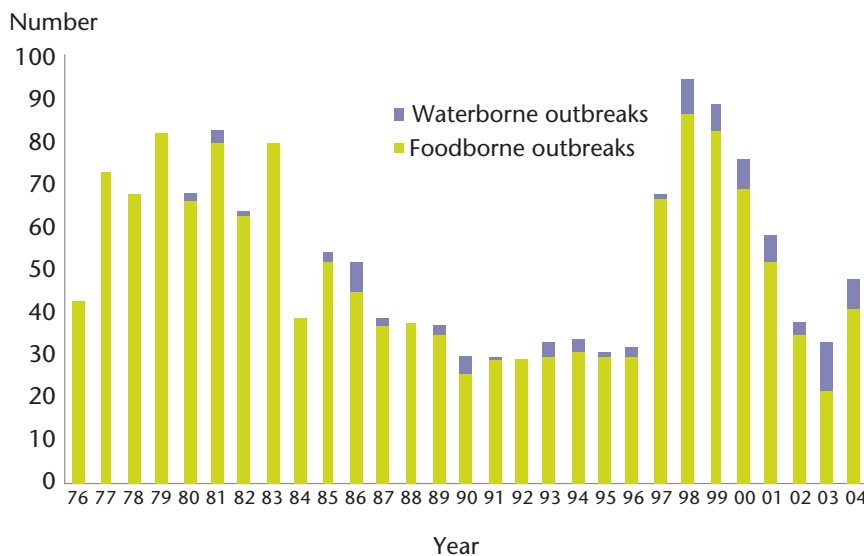


Figure 1. Reported foodborne and waterborne outbreaks in Finland in 1975–2004.

CHEMICAL RISKS



*Liisa Rajakangas, Senior Adviser
Ministry of Trade and Industry*

Exposure to chemical substances is calculated on the basis of the results of various control programmes in Finland. Concentrations of, for example, cadmium, lead and dioxins in domestic foodstuffs are very low and tolerable intake levels are seldom exceeded. However, exposure levels for some consumer groups may rise close to these limits, or even higher. Unusually high exposure may also be related to local food or water. High exposure to certain chemicals may also be connected to traditional methods of food preparation, such as of smoking fish.

There is extensive legislation on the potential chemical risks related to foodstuffs, most of which is harmonised EU legislation. There are laws on contaminants, pesticides, residues of veterinary drugs, packaging materials, food additives, flavourings, fortification, drinking water, etc, and they are constantly revised. The European Food Safety Authority (EFSA) assesses chemical compounds on the basis of new information and, if necessary, legislation can be amended rapidly.

Risks related to the Finnish way of life and environment

The Finnish Food Safety Authority Evira has issued dietary advice concerning the consumption of certain domestic species of fish in order to avoid risks related to dioxin, methyl mercury and cesium-137. In coastal areas, fishermen and their family members are at risk of dioxin exposure, while those who fish in the lakes may be exposed to methyl mercury and, in some parts of Finland, cesium-137.

Exposure to polycyclic aromatic hydrocarbons (PAH) is higher in Finland than in many other EU countries. Meat products, cereal products and coffee are the main source PAHs. A country with thousands of lakes, Finland also has hundreds of thousands of holiday cottages where people barbecue food and smoke fish caught in their neighbouring lakes during the summer. As a result, levels of exposure to

PAHs are too high. Finns also like to grill sausages which leads to high exposure to nitrite, particularly for children, although the amount of nitrite used in Finnish sausages is considerably below the maximum level allowed in the EU. Concentrations of cadmium in Finnish foodstuffs are among the lowest in Europe. However, a study on exposure to cadmium has revealed that Finnish female smokers who eat plenty of seafood and predominantly vegetarian food are at risk of exceeding the maximum weekly cadmium intake.

Due to lack of current data on children's food consumption, there has been very little research on children's exposure to chemical substances. However, studies on the intake of additives have confirmed that levels of benzoic acid, used as a preservative, run close to the acceptable daily intake (ADI) for children.

Pesticides and veterinary drug residues

In Finland, the use of pesticides is relatively low in comparison to countries with a warmer climate, and exceeding the maximum residue levels is rare in domestic products. For this reason, the greatest exposure to pesticides comes from imported fruit and vegetables. Each year, 5–8% of inspected consignments of imported products exceed the maximum limits. Residues of veterinary drugs in domestic food are very rare (random sampling).

Drinking water

Drinking water is fresh and safe to use throughout the country. However, because drinking water is locally supplied, the residents are exposed to substances contained therein on a daily basis. Some areas in Finland have relatively high levels of arsenic

and/or fluoride, as well as uranium in drinking water coming from private wells. Drinking water in Finland is often rich in humus. Therefore, research in Finland focuses on water purification agents and on substances in drinking water suspected of being carcinogenic.

Packaging materials

Throughout Europe, monitoring and exposure calculations for substances present in packaging materials are insufficient. In the future, at least the use and intake of packaging material components with an endocrine effect (endocrine disrupters) should be studied.

Contaminants in fish - dietary recommendations

The National Nutrition Council recommends that fish should be eaten at least twice a week and different fish species should be varied in the diet.

Despite the favourable nutritional qualities of fish, salmon and herring caught in the Baltic Sea may subject consumers to higher than normal levels of dioxins and PCB. Also, higher than normal levels of methyl mercury can be derived from predatory fish caught in inland waters, particularly pike. The older the fish, the more contaminants will have been accumulated in it. For these reasons, the Finnish Food Authority Evira has given special recommendations concerning the eating of fish by children, adolescents, and people at fertile age, in particular.

*Read more at: www.evira.fi
Food>Information on food>Dietary advice on fish consumption*

PREVENTION OF CHRONIC DISEASES

NEW NUTRITION RECOMMENDATIONS

Raija Kara, Secretary General
National Nutrition Council

In Finland, national nutrition recommendations for the whole population are issued by the National Nutrition Council. The Council is an expert body under the Ministry of Agriculture and Forestry. The members of the Council are appointed for three-year terms, and they represent various authorities handling nutrition issues, consumer, health promotion and catering organizations, food industry, trade, and agricultural organizations. The Council's main tasks are to monitor and improve the nutritional situation in Finland by providing Nutrition Recommendations, initiating Action Programmes, and following up their implementation and effects on the nutritional situation. The Council also submits proposals, reports and statements

concerning the nutritional and health situation in Finland.

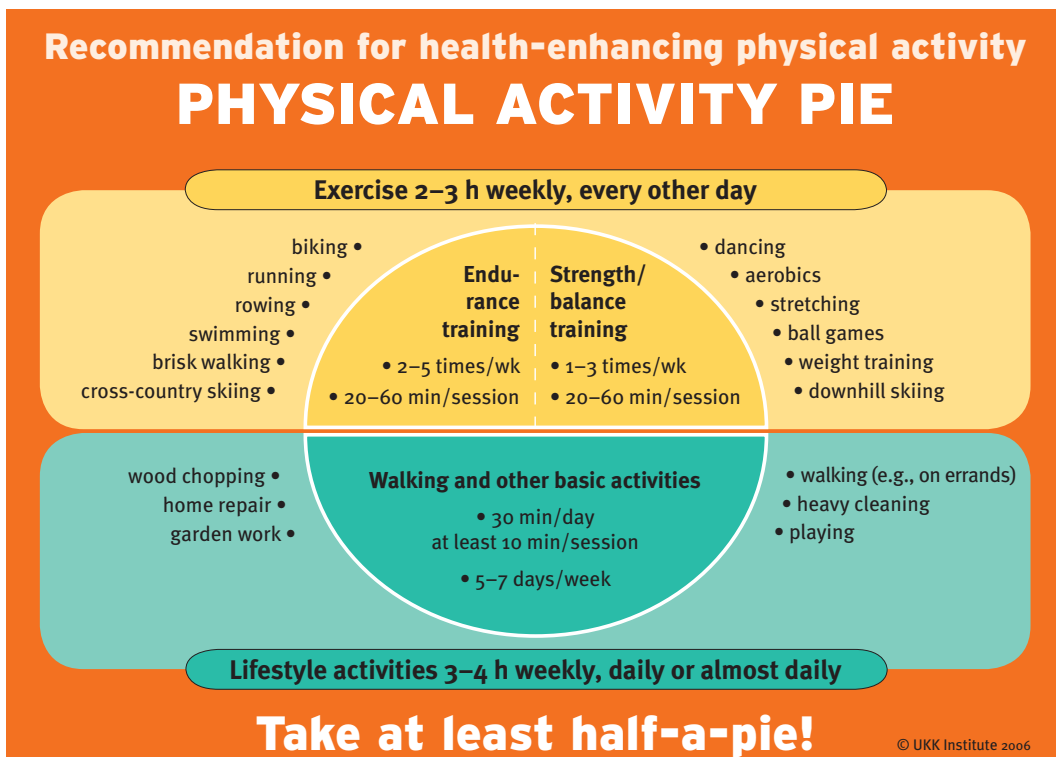
New recommendations in 2005 emphasize physical activity together with good nutrition

The goal of the Nutrition Recommendations is to define the appropriate nutrient intakes for population groups and to evaluate the goals for improving public health. The recommendations form a base for national food and nutrition policy. They can be used for planning large-scale catering, as basic material for nutrition education and training, and as reference values when estimating food consumption and nutrient intake for research purposes, catering and other uses.

The Finnish Nutrition Recommendations were renewed in 2005. They are

based on the latest Nordic Nutrition Recommendations approved in 2004 by the Nordic Council of Ministers. As the most important diet-related health problems in our country are cardiovascular diseases, obesity, diabetes, osteoporosis, and dental caries, it is important for Finns:

- ♦ to have a balance between energy intake and energy expenditure
- ♦ to have a balanced nutrient intake
- ♦ to increase the intake of carbohydrates with high fibre content
- ♦ to decrease the intake of refined sugars
- ♦ to decrease the intake of hard fat (saturated and trans fat) and to increase the proportion of soft fats (mono- and poly-unsaturated fats)
- ♦ to decrease the intake of salt (sodium)
- ♦ to have moderate alcohol consumption.



Recommendations on physical activity are also included in the new version. The adult population should undertake a minimum of 30 minutes of daily physical activity of moderate intensity. For the prevention of weight gain, more physical activity, about 60 minutes at a time, may be needed. For children and adolescents, there should be a minimum of 60 minutes of physical activity every day.

Short food-based guidelines

Food-based dietary guidelines help in choosing food items that are in line with the recommendations. The guidelines aim at an increased consumption of vegetables, fruit, berries, potatoes, whole-grain cereal products, low-fat milk products, fish, and lean meat. The importance of using soft fats, e.g., vegetable oils and margarines, is emphasized. The guidelines also aim at limiting the consumption of salt and salty foods, as well as sugar and sugary foods.

Food plate model is used to give the consumers simple advice on how to build a nutritious meal in compliance with the recommendations.

Action programme for implementing the national Nutrition Recommendations

The latest action programme was launched in 2003. It presents a number of proposals for measures to support the implementation of Nutrition Recommendations in the different fields of nutrition policy. The role of municipalities and civic organizations in carrying out the measures is emphasized in the programme. Opportunities for the Government to influence the nutrition policy are mainly restricted to guidance and information. Putting the measures into practice will require close co-operation at the national and local levels. The action programme is targeted at the entire population, so the contribution of all parties is important in promoting the implementation of the Nutrition Recommendations.



PREVENTION OF TYPE 2 DIABETES FINLAND IS THE LEADING COUNTRY IN THE WORLD

*Leena Etu-Seppälä, General Secretary (DEHKO)
Finnish Diabetes Association*

How to stop the huge increase of type 2 diabetes is the fundamental question health care providers and decision makers around the world face at the moment. Prevention is the golden word – and the only way to go. Finland with its National Programme for the Prevention and Care of Diabetes (DEHKO 2000–2010) and FIN-D2D Project (2003–2007) shows the first practical model to offer a solution. Undiagnosed type 2 diabetes, pre-diabetes, and an increased prevalence of risk factors for cardiovascular diseases are common in the population in Finland, as in the whole world.

The Finnish Diabetes Prevention Study (DPS), started in the late 1990s, was the first randomized study in the world to show that the onset of type 2 diabetes can be delayed and even avoided by lifestyle modifications among middle-aged individuals with impaired glucose tolerance. During the first three years, the participants in the study received support by a nutritionist and they were offered individually tailored supervised training. The dietary and physical activities related to lifestyle modifications necessary for the prevention of type 2 diabetes were relatively simple, and the positive effects have been shown to last at least ten years. (Tuomilehto et al. 2001)

Simultaneously with the DPS study, the Finnish Diabetes Association and diabetes experts were preparing a National Diabetes Programme. As the results of the study were encouraging, prevention of type 2 diabetes was included in the programme. Thus, prevention is an essential element in the National Programme for the Prevention and Care of Diabetes (DEHKO 2000–2010) both in its title and as one of its three main action areas. The two other main areas are developing care and treatment of diabetes and supporting diabetics' self-care.

The next step was to prepare an action plan for the prevention in practice. In 2003, the Programme for the Prevention of Type



2 Diabetes (2003–2010) was published. The prevention programme comprises three concurrent strategies:

1. *Population Strategy* is a long-term strategy aiming to prevent obesity and type 2 diabetes at population level.
2. *High Risk Strategy* consists of screening of people at high risk and management of the risk factors by lifestyle counselling.
3. *Early Diagnosis and Management Strategy* consists of prevention of complications among newly diagnosed people with type 2 diabetes by appropriate treatment of the disease and cardiovascular risk factors.

FIN-D2D for implementing the prevention programme

The implementation of the Programme for the Prevention of Type 2 Diabetes started right after the programme was published. Five hospital districts representing a population of 1.5 million Finns agreed to join with the Finnish Diabetes Association and the National Public Health Institute for an implementation project, entitled FIN-D2D Project for 2003–2007. The implementation is carried out within the primary health care and occupational health services. The

FIN-D2D focuses especially on the High Risk Strategy and the Early Diagnosis and Management Strategy, but the Population Strategy is also strongly visible in the implementation.

The FIN-D2D 2003–2007 is a unique combination of partnership and innovative financial resourcing: The main contributors are the five hospital districts, the Ministry of Social Affairs and Health, Finland's Slot Machine Association RAY (a governmental organization), National Public Health Institute KTL, and the Finnish Diabetes Association.

The goals of the FIN-D2D are the following:

1. To reduce the incidence and prevalence of type 2 diabetes and to reduce the prevalence of cardiovascular risk factors
2. To identify individuals with undiagnosed diabetes
3. To generate regional and local models for the prevention of type 2 diabetes
4. To evaluate the effectiveness, feasibility, and cost-effectiveness of the preventive activities in the health care
5. To increase awareness of type 2 diabetes and its risk factors among the population.

The key elements in the project are screening the population and interventions. Screening with the Finnish Diabetes Risk Score (FINDRISC) aims at finding people at high risk for type 2 diabetes. The screening tests are intended for use in individuals aged 26 years or more. The risk score (comprises eight scored questions) is a measure indicating the probability of developing type 2 diabetes over the following 10 years. The test can be self-administered, or given by a health care provider in connection with a normal visit.

Persons who have an elevated risk based on the score receive written information regarding health-promoting lifestyle and diet. They are also offered local physical activity possibilities and nutrition education services. Persons who are considered being at high risk for type 2 diabetes are referred to lifestyle intervention in primary and occupational health care in order to prevent the onset of diabetes. In addition, individuals who have a history of elevated

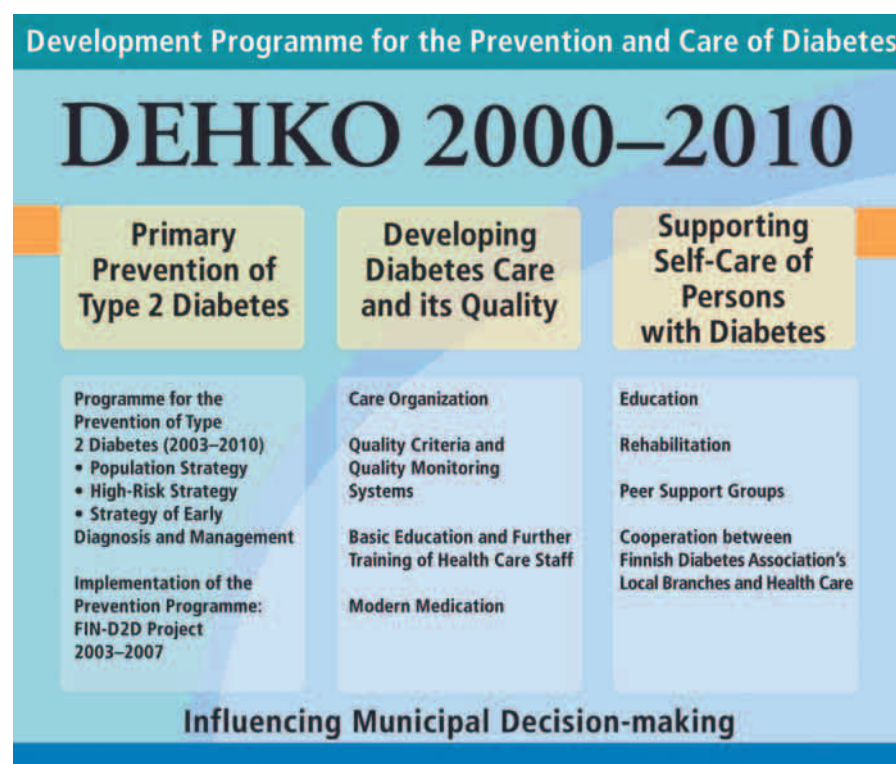
blood glucose, coronary heart disease, or glucose abnormality during pregnancy are at high risk for type 2 diabetes and they are referred to lifestyle intervention.

DEHKO and FIN-D2D are pioneers in the prevention of type 2 diabetes

The year 2007 will be the last year of the DEHKO's FIN-D2D Project in action, and thereafter the preventive measures of type 2 diabetes should be part of everyday activities in the primary health care and occupational health services, first in the 5 hospital districts involved in FIN-D2D, and then step by step in the entire country. The results of the assessment of the FIN-D2D will be published in 2008. The preliminary results show that there are nearly as many people with undiagnosed type 2 diabetes as there are people diagnosed with type 2 diabetes. The FINRISC test has already become an essential element in the primary health care, and the screening is running well. On the other hand, the intervention

activities need to be strengthened in order to achieve the goals set for the project.

Internationally, the DEHKO Programme is so far the only existing national diabetes programme including primary prevention of type 2 diabetes. Its FIN-D2D Project is based on the Finnish health care system and specifically designed for circumstances prevailing in Finland. However, since the rapidly increasing type 2 diabetes is a global burden, diabetes experts, health care decision makers, and health care providers all over the world are interested in the structure, methods, and results of the DPS Study, and especially now, in the FIN-D2D Project. The DEHKO Programme has been adopted as a model for creating and implementing national diabetes programmes in, for example, Cyprus, Slovenia and Portugal, and FIN-D2D draws attention and gathers observers from all over the world for getting ideas for their own countries.



ACTION PLAN FOR PROMOTING FINNISH HEART HEALTH

*Marjaana Lahti-Koski, Manager,
Health promotion and development
Finnish Heart Association*

In most cases, cardiovascular diseases (CVD) can be prevented, or at least delayed. There exists scientific knowledge of how, at least in theory, cardiovascular diseases could be eliminated as a public health problem among working-age adults. The challenge is to turn theory into practice in health-related behaviour and living surroundings.

The goal of the Finnish Heart Association is that, within 20 years' time, CVD will no longer be a significant health problem among working-age Finns and that people will have more healthy and active years in their lives. To reach this goal, more effective actions are needed at all stages of the development and treatment of CVD.

Action Plan for Promoting Finnish Heart Health for the years 2005–2011 was published in June 2005. It gives guidelines and strategies for actions to prevent cardiovascular diseases and, by this way, also to promote health on population level. It is part of the Finnish Heart Plan which covers actions related to CVD prevention together with care and rehabilitation of CVD patients.

Representatives from numerous stakeholders participated in preparing the Action Plan. The preparation in four working groups focused on health promotion in different stages of life cycle: childhood, youth, working-age, and ageing. The groups produced extensive background papers which were summarized into 50 action proposals representing different fields and target groups. Fourteen of the proposals focus on the whole population, and the rest of them on different stages of life cycle.

The key message for policy makers is that the prerequisites for health should be taken into account in all decision making in society. It should also be kept in mind that promoting health is not the province of healthcare professionals alone. Thus, the proposals are targeted to, e.g., health care,

educational and cultural sector, physical activity sector, society planning and building, food industry, food services, and mass media. In all, promoting heart health requires collaboration between many actors.

Non-governmental organizations have an important role in implementing the action plan in Finland. The Finnish Heart Association has already started the implementation as part of the Finnish Heart Plan. As an example, one of the proposals regarding children and their families is to develop a nation-wide model for child health clinics that focuses on systematic monitoring of heart health factors and strengthening the role of family-based lifestyle guidance. At the clinic, a child's growth and healthy weight gain is monitored and supported by promoting good dietary and physical activity habits at the level of the entire family. Models for family-based lifestyle guidance will be developed further.

More attention should be paid to the constantly growing obesity problem. Individuals cannot solve this problem on their own. The world as it is now is an environment that promotes obesity. Plenty of food with a high energy content is easily available. A society that depends on cars and automated devices provides fewer and fewer natural opportunities for physical activity. 'From overweight to balance' is a three-year project, which aims at developing patterns and activities that help to support the prevention of overweight and promote weight control among working-aged people. Included in the project, a nationwide information campaign is running with the theme 'A Small Decision a Day'. This media campaign focuses on rousing and supporting people to make small changes with the help of internet pages and by producing expert articles and TV commercials. Key words of the message are well-being and the possibility and freedom to choose a healthy and positive lifestyle.

Continued efforts to promote a healthy diet for the entire Finnish population are important. The 'Heart Symbol' system has been successfully launched, and is helping consumers make better choices from the viewpoint of nutrition. The continuity of this system should be ensured by allocating it sufficient financial resources.

About two million Finns take a meal outside their homes every day, which means that every action that makes such meals healthier will also promote the health of the population. The results of an investigation carried out by the Finnish Heart Association suggest that the nutritional quality of food provided by catering services does not meet the criteria of healthy food in every respect. Therefore, it is necessary to develop a system for monitoring the nutritional quality of food provided by catering services, and to promote the spread of information relating to heart-friendly meals. The goal is to continue developing a method for monitoring the nutritional quality of food provided by industrial kitchens, to ensure that the monitoring method is introduced, and to increase the knowhow of staff for improving the nutritional quality of the food they prepare.



LITERATURE

Aromaa A, Koskinen S (eds). *Health and functional capacity in Finland. Baseline results of the Health 2000 health examination survey. Publications of the National Public Health Institute B12/2004.* Helsinki 2004. Available also at <http://www.ktl.fi/health2000>.

European Consensus Group: *Concepts of Functional Foods in Europe: Consensus Document. British Journal of Nutrition, Volume 81, Supplement 1, 1999, pp.1–27.*

FINDIET Study Group (1998): *The 1997 Dietary Survey of Finnish Adults. B8/1998.* Helsinki: National Public Health Institute.

Health in Europe: Data 1998–2003. Luxembourg: Office for Official Publications of the European Communities, 2005. Available also at: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-71-05-182/EN/KS-71-05-182-EN.PDF

Helakorpi S, Patja K, Prättälä R, Uutela A. *Health Behaviour and Health among the Finnish Adult Population, Spring 2005. Publications of the National Public Health Institute B18/2005.* Helsinki 2005 (in Finnish, with English tables, figures and summaries). Available also at: http://www.ktl.fi/attachments/suomi/julkaisut/julkaisusarja_b/2005/2005b18.pdf.

Hirvonen T, Tapaninen H, valsta L, hannila ML, Aro A, Pietinen P. *Efficacy and safety of food fortification with calcium among adults in Finland. Public Health Nutr. 2006; 9 (6):792-7.*

Kautiainen S, Rimpelä A, Vikat A, Virtanen SM. *Secular trends in overweight and obesity among Finnish adolescents in 1977-1999. Int J Obes Relat Metab Disord 2002;26:544–52.*

Koskinen S, Aromaa A, Huttunen J, Teperi J (eds). *Health in Finland. National Public Health Institute, Stakes and Ministry of Social Affairs and Health, Helsinki 2006.*

Lahti-Koski M, Vartiainen E, Männistö S, Pietinen P. *Age, education and occupation as determinants of trends in body mass index in Finland from 1982 to 1997. Int J Obes Relat Metab Disord 2000;24:1669–76.*

Lahti-Koski M, Pietinen P, Männistö S, Vartiainen E. *Trends in waist-to-hip ratio and its determinants in adults in Finland from 1987 to 1997. Am J Clin Nutr 2000;72:1436–44.*

Laatikainen T, Pietinen P, Valsta L, Sundvall J, Reinivuo H, Tuomilehto JT. *Sodium in the Finnish diet: 20-year trends in urinary sodium excretion among the adult population. Eur Clin Nutr 2006; 60: 965-970.*

Martikainen P, Mäkelä P, Koskinen S, Valkonen T. *Income differences in mortality: a register-based follow-up study of three million men and women. Int J Epidemiol 2001;30: 1397–1405.*

Männistö S, Ovaskainen ML, Valsta L (eds.). *The National FINDIET 2002 study. National Public Health Institute: Helsinki, Report No: B3. 2003 (in Finnish, with English tables, figures and summaries). Available also at: http://www.ktl.fi/portal/suomi/osastot/eteo/yksikot/ravitsemusyksikko/julkaisut/finravinto_2002_tutkimuksen_raportti/.*

Ovaskainen ML, Reinivuo H, Tapanainen H, Hannila ML, Korhonen T, Pakkala H. *Snacks as a element of energy intake and food consumption. Eur J Clin Nutr 2006; 60 (4): 494–501.*

Pietinen P, Vartiainen E, Seppänen R, Aro A, Puska P. *Changes in Diet in Finland from 1972 to 1992: Impact on Coronary Heart Disease Risk. Prev Med 1996; 25:243-250.*

Raulio S, Roos E, Rahkonen O, Prättälä R. *Twenty-year trends of workplace lunches in Finland. Food Service Technology 2005;5(2–4):57–66.*

Reinivuo H, Valsta L, Laatikainen T, Tuomilehto J, Pietinen P. *Sodium in the Finnish diet: trends in sodium intake and comparison between intake and 24-hour excretion of sodium. Eur J Clin Nutr 2006, advance online publication, 26 April 2006; <http://dx.doi.org/10.1038/sj.ejcn.1602431>.*

Rissanen A, Heliövaara M, Aromaa A. *Overweight and antropometric changes in adulthood: a prospective study of 17,000 Finns. Int J Obes 1988;12(5):391–401.*

Similä M, Taskinen O, Männistö S, Lahti-Koski M, Karvonen M, Laatikainen T, Valsta L. *Maps on health promoting diet, obesity and serum cholesterol in Finland. Publications of the National Public Health Institute, B20/2005 (in Finnish, abstract and legends in English). Available also at: http://www.ktl.fi/attachments/suomi/julkaisut/julkaisusarja_b/2005/2005b20.pdf*

Tuomilehto J, Lindström J, Eriksson JG, Valle TT, Hämäläinen H, Ilanne-Parikka P, Keinänen-Kiukkaanniemi S, Laakso M, Louheranta A, Rastas M, Salminen V, Uusitupa M. *Finnish Diabetes Prevention Study Group. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance. N Engl J Med. 2001 May 3;344(18):1343–50.*

A.C. Nielsen. *Directory of catering kitchens 2005.* A.C. Nielsen Finland Oy, Espoo 2005.

Finnish Heart Association. *Action Plan for Promoting Finnish Heart Health for the years 2005–2011. Publication of Finnish Heart Association 1/2005.* Helsinki 2005. Available at: http://www.sydanliitto.fi/ajankohtaista/news/en_GB/press_release121205/_files/74342871450124414/default/Toby.pdf

Balance sheets for food commodities. Information centre of the Ministry of Agriculture and Forestry.



USEFUL WEBSITES

MTT Agrifood Research Finland,
<http://www.mtt.fi>

Consumer Research Center,
<http://www.kuluttajatutkimuskeskus.fi>

Finnish Centre for Health Promotion
<http://www.health.fi>

Finnish Diabetes Association,
<http://www.diabetesliitto.fi>

Finnish Heart Association,
<http://www.sydanliitto.fi>

Finnish Food Safety Authority Evira,
<http://www.evira.fi>

Folkhälsan Research Centre,
<http://www.folkhalsan.fi>

Functional Foods Forum,
<http://www.utu.fi/fff/>

Ministry of Agriculture and Forestry,
<http://www.mmm.fi>

Ministry of Social Affairs and Health,
<http://www.stm.fi>

National Public Health Institute
<http://www.ktl.fi>

Research Institute of Public Health,
<http://www.uku.fi/laitokset/kttl/>

Social Insurance Institution of Finland,
<http://www.kela.fi>

Statistics Finland, [www.http://tilastokeskus.fi](http://www.tilastokeskus.fi)

UKK Institute for Health Promotion Research,
<http://www.ukkinstituutti.fi>

Universities with food sciences:
Helsinki, <http://www.helsinki.fi>
Turku, <http://www.utu.fi>
Kuopio, <http://www.uku.fi>
Oulu, <http://www oulu.fi>

VTT Technical Research Centre of Finland,
<http://www.vtt.fi>



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