

# Fat and Heart Disease: Yes We Can Make a Change – The Case of North Karelia (Finland)

Pekka Puska

National Institute for Health and Welfare, Helsinki, Finland

## Key Words

Cardiovascular disease · Dietary interventions · Fat · Finland · Community-based intervention

## Abstract

**Background/Methods:** The exceptionally high mortality from cardiovascular disease (CVD) in the Finnish population in the 1970s ensued the initiation of preventive health interventions, which were first started in the Province of North Karelia and later on extended to all other regions of Finland. Their aim was to change population diets, especially with respect to the quality of fat: to reduce saturated and increase unsaturated fat intake. In addition, emphasis was placed on increased vegetable intake and salt reduction. The aim of this paper was to illustrate the effect of combined efforts of several stakeholders on CVD. This comprehensive action in Finland has involved health education programs, preventive measures in health services, actions at schools, broad collaboration with non-governmental and private sector organizations, government policies, population-based monitoring and evaluation, and international collaboration. **Results:** The combined efforts of all stakeholders have greatly helped people to reduce the intake of saturated fat and to replace this with unsaturated fat. This has been associated with an improved quality of the dietary fat (e.g. in 1972, over 90% of the population used butter on their bread compared to <5% at present) and a remarkable reduction in blood cholesterol

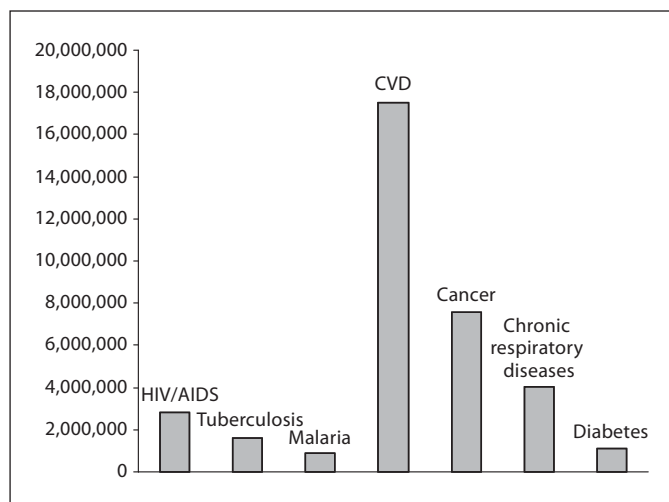
levels. It has led to a 80% reduction in annual CVD mortality rates among the working aged population, to a major increase in life expectancy and to major improvements in functional capacity and health. Studies have shown that the reduction in blood cholesterol levels, explained by the target dietary changes, have had the greatest impact on these very favorable health changes. **Conclusion:** The Finnish experience shows both the feasibility and great potential of CVD prevention and heart health promotion through general dietary changes in the population.

Copyright © 2009 S. Karger AG, Basel

## Introduction

Global public health is under rapid change: chronic noncommunicable diseases have become the leading cause of death in the world and are responsible for some 60% of the deaths in the world. About half of that is due to cardiovascular diseases (CVDs; fig. 1) [1]. CVD is thus the main cause of mortality in the world, being responsible for every 3rd death. The problem is rapidly growing in the low- and middle-income countries.

This global public health transition is very much a consequence of changes in lifestyles – i.e., in dietary habits, physical activity and smoking. The particular reasons for these changes are urbanization, changes in occupations, the aging of populations and many global influ-



**Fig. 1.** Estimated global deaths by cause, all ages, 2005 [1].

ences. The risks are increasingly accumulating in lower socioeconomic groups of the population – adding greatly to the inequalities of health.

The large international study published in the World Heart Report 2002 shows how a few risk factors are responsible for much of the global mortality [2] (fig. 2). Typical for these most important global risk factors is that they are closely linked with some lifestyles: seven of the nine top determinants of mortality in the world relate to how we eat, drink, move and smoke. Thus, diet and physical activity, together with tobacco and alcohol, are key determinants of contemporary public health.

Since CVD is a leading cause of mortality, the causes of CVD are of utmost concern. The main causal risk factors for atherosclerotic CVD have been convincingly revealed decades ago. They relate much to the above-mentioned lifestyles. The role of diet, particularly the quality of fat and salt affecting blood LDL cholesterol and blood pressure, has become more and more obvious [2].

Thus, there is a firm basis for the prevention of CVD and many other noncommunicable diseases through reducing these risk factors – i.e., changing the related lifestyles. Concerning the prevention strategy, it should be emphasized that although changing the diet and other risk-related lifestyle factors among high-risk persons can bring great benefit to those individuals, population-based prevention through influencing the population's diet and other lifestyle factors is by far the most cost-effective and sustainable way for a reduction in CVD rates and promotion of heart health in the population.

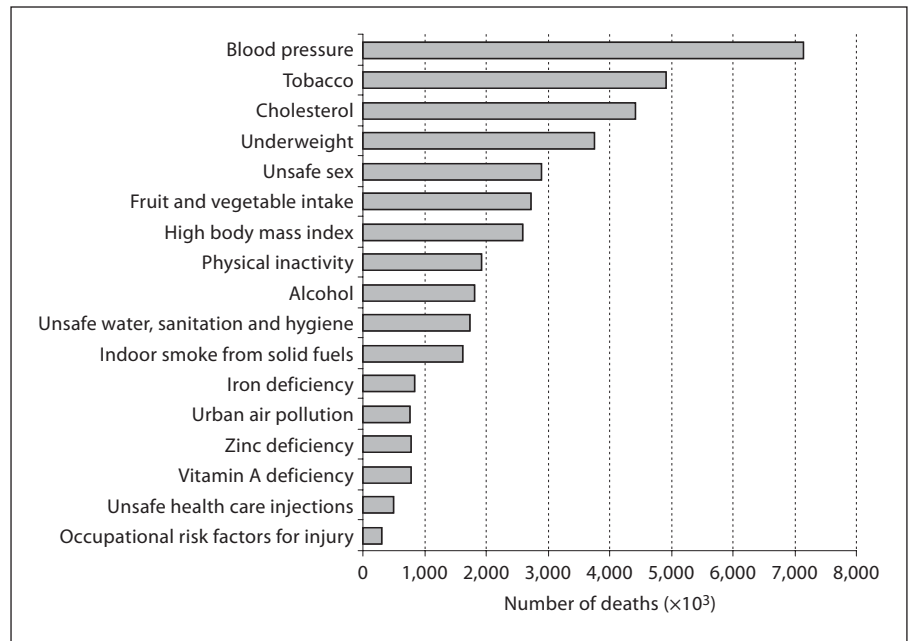
### North Karelia (Finland)

Finland was faced with exceptionally high mortality rates of CVD in the 1970s. Growing attention to this serious situation led to the initiation of preventive measures. The program, which was first launched in the Province of North Karelia and later was extended to all regions of Finland, concentrated heavily on changing the population's diet, especially with respect to the quality of the fat consumed: a reduction in saturated and an increase in unsaturated fat intake. In addition, emphasis was placed on an increased vegetable and a reduction in salt intake [3].

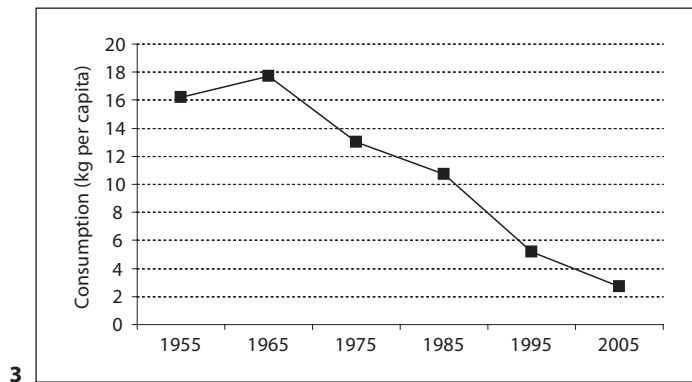
This comprehensive action in Finland has involved health education programs, preventive measures in health services, actions at schools, broad collaboration with non-governmental and private sector organizations, government policies, population-based monitoring and evaluation, and international collaboration. Collaboration with the food industry has greatly helped people to reduce the intake of saturated fat and to increase that of unsaturated fat (mainly from vegetable origin). A heart symbol is broadly used to label foods that are healthy choices in their category. The demonstration in North Karelia was heavily used in the national work.

The work in Finland has led to significant improvements in the quality of dietary fat (e.g. in 1972, over 90% of the population used butter on their bread compared to <5% at present), and to a reduction in blood pressure levels and smoking among men. The national butter consumption per capita has reduced from some 18 kg in 1965 to less than 3 kg in 2005 [4] (fig. 3). Use of vegetable oil (mainly rapeseed oil) for cooking has increased from close to 0% in 1970 to some 50%. Fruit and vegetable consumption has greatly increased and salt intake reduced. With these major dietary changes, the total fat consumption (as a percentage of energy) has reduced from close to 40% to a little over 30%, with major reductions in saturated fat and some increase in polyunsaturated fat intake [5–9] (fig. 4).

The dietary changes have also caused a remarkable reduction in blood cholesterol levels (fig. 5), with a subsequent reduction in blood pressure levels and smoking among men. A 80% reduction in the annual CVD mortality rates among the working aged population has been reported for all Finland (85% in North Karelia; fig. 6). Some 10-year increase in life expectancy and a major improvement in functional capacity and health have also been observed. Studies have shown that the reduction in blood cholesterol levels, explained by the target dietary changes, have had the greatest impact on these very favorable health changes (fig. 7).



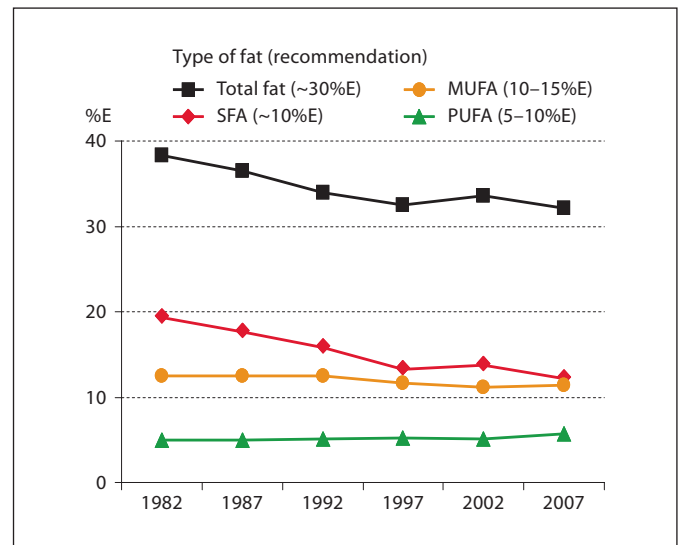
**Fig. 2.** Deaths in 2000 attributable to selected leading risk factors in the world [2].



3

**Fig. 3.** Butter consumption per capita in Finland [4].

**Fig. 4.** Total fat intake, and intake of saturated (SFA), monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids in Finland from 1982 to 2007 [5–9]. %E = % of energy.



Color version available online

4

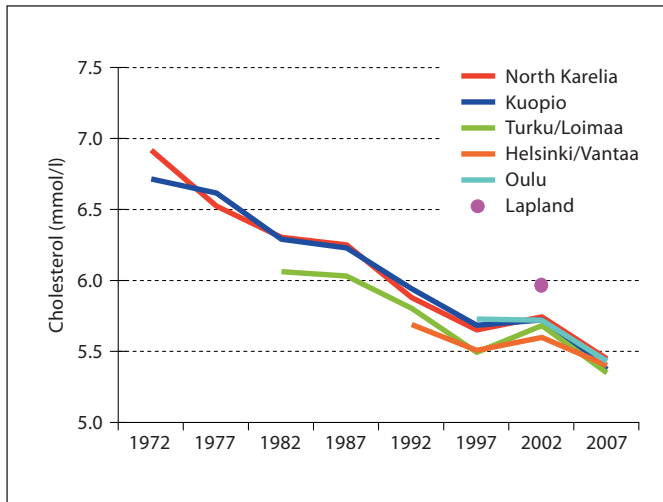
The theory and practice of the work in North Karelia and Finland as well as the results are presented in a recent summary report [10].

### Discussion

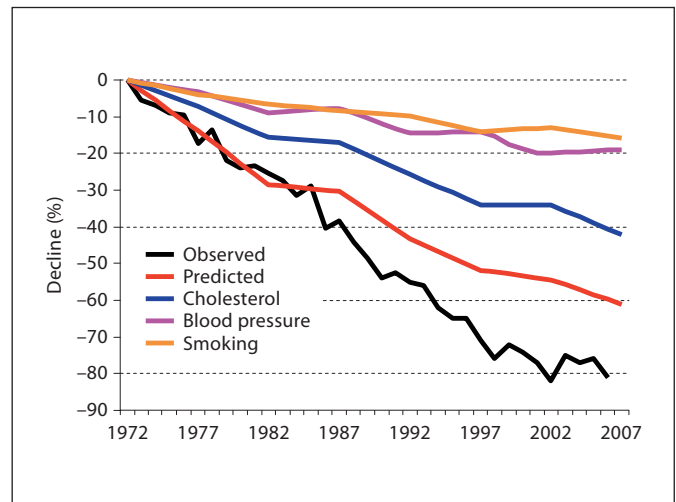
The experiences and results from the North Karelia Project and Finland strongly support the principles of the WHO Global Strategy on Diet, Physical Activity and Health and to its scientific background document – the

Expert Group Report on ‘Nutrition and Prevention of Chronic Diseases’ of the WHO/Food and Agriculture Organization of the United Nations [11, 12]. The comprehensive community-based intervention in North Karelia and the consequent national application of the principles and of its demonstration effect have led to a remarkable reduction in CVD mortality and therefore improved the public health of the nation.

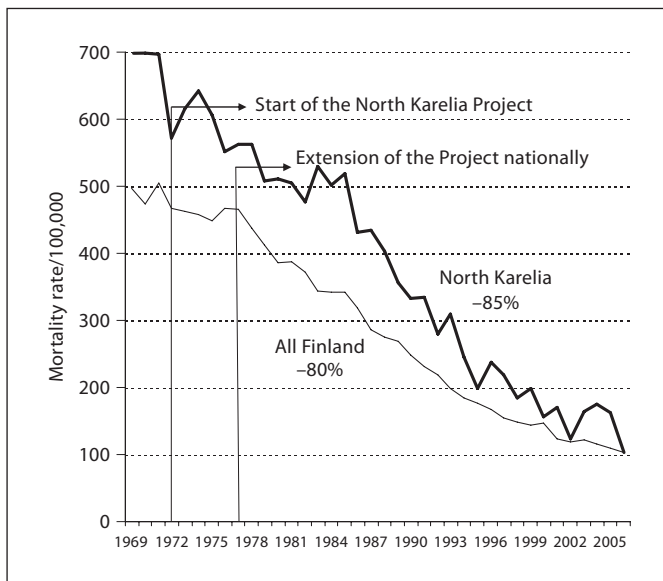
The intervention in the North Karelia Project was based on a population approach, i.e., on changing the dietary habits of the whole population through broad ac-



**Fig. 5.** Serum cholesterol in men aged 30–59 years.



**Fig. 7.** Observed and predicted declines in coronary mortality in males in Eastern Finland.



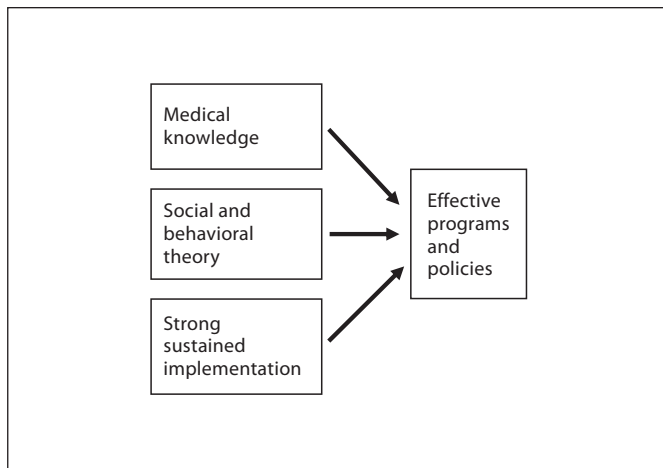
**Fig. 6.** Mortality rate per 100,000 population (age standardized to the European population).

tions in the community. Thus, the target was to change the community as a social and physical organization, since people’s dietary habits and other lifestyles are deeply enrooted in and determined by the environment. Obviously, within this work, the local health services also

assessed risk factors (like blood cholesterol) and identified persons at high risk to take steps to reduce their risk. The high-risk approach and the population approach support each other, but both theoretical considerations and practical experience show that the population approach applied in Finland is by far the most cost-effective way to influence CVD mortality rates and to promote public health.

The most important component of the successful action in Finland is often asked for. There is no ‘magic bullet’. Comprehensive action is needed, using a correct and relevant theoretical frame leading to a practical, flexible intervention. Regarding theory, both correct epidemiological/medical and behavioral/social frameworks are needed. The former means that we must target the strongest risk factors and risk-related behaviors (in North Karelia blood cholesterol and the quality of fat). The latter means that in changing behaviors/lifestyles, relevant frameworks must be observed (in North Karelia aspects of persuasion, teaching practical skills, and providing social and environmental support).

At the same time it is important to notice that a correct theory alone is not enough. There must be enough practical work for the implementation, i.e., the intervention must reach people in many ways in their everyday living conditions. One could argue that currently there are plenty of good strategies and program plans, but the implementation is weak. Thus the ‘implementation gap’ is one of the main challenges (fig. 8).



**Fig. 8.** Theory and action for effective programs and policies.

Briefly, the main elements of the Finnish action (from North Karelia to national actions) can be listed as follows:

- research (domestic and international collaboration)
- health services (especially primary health care)
- North Karelia Project and other demonstration programs
- health promotion programs (coalitions, non-governmental organizations, collaboration with the media)
- schools, educational institutions
- industry, private sector collaboration
- policy decisions, intersectoral collaboration, legislation
- monitoring systems: health behaviors, risk factors, nutrition, diseases, mortality
- international collaboration.

All these have contributed to the success in an inter-related way.

It has also often been asked, what the main factors behind the success in North Karelia are. The following list provides some suggestions of the project team:

- appropriate epidemiological and behavioral framework
- restricted, well-defined targets
- good monitoring of immediate targets (behaviors, processes)
- flexible intervention
- emphasis on changing environment and social norms
- working closely with the community
- positive feedback, work with media

- international collaboration, WHO support
- close interaction with the national health policy/integration with the National Public Health Institute
- long-term, dedicated leadership.

Based on the experiences and results of the work in Finland, presented here briefly and more broadly in the recent summary book [10], we can conclude that the Finnish experience has shown that:

- prevention of CVD is possible and profitable
- population-based prevention is the most cost-effective and sustainable public health approach to CVD control
- prevention calls for simple changes in some lifestyles (individual, family, community, national and global level action)
- influencing diet and especially quality of fat is a key issue
- many results of prevention occur surprisingly quickly (CVD/diabetes) and also at relatively late age
- comprehensive action, broad collaboration with dedicated leadership and strong government policy support.

### Conclusion

There is strong medical evidence that CVD (like many other chronic diseases) is preventable or could be delayed to a more advanced age. A population-based prevention programme is the most cost-effective way and in many cases the only affordable option for major public health improvements. To prevent CVD and to promote heart health, dietary changes are crucial, especially the change in the quality of fat. These changes can have a major impact in relatively short time and can lead to dramatic improvements in public health in the long run.

### Disclosure Statement

The authors have no conflicts of interest to declare.

## References

- 1 WHO: Preventing Chronic Diseases. A Vital Investment, Geneva, World Health Organization, 2005.
- 2 WHO: The World Health Report 2002. Reducing Risks, Promoting Healthy Life. Geneva, World Health Organization, 2002.
- 3 Puska P, Tuomilehto J, Nissinen A, Vartiainen E (eds): The North Karelia Project: 20-Year Results and Experiences. Helsinki, National Public Health Institute, 1995.
- 4 Balance Sheet for Food Commodities 2005 and 2006 (Preliminary). Helsinki, Information Center of the Ministry of Agriculture and Forestry, 2007.
- 5 Monitoring Trends and Determinants of Cardiovascular Diseases in Finland – The Monica Project. Helsinki, National Public Health Institute, 1986, No 3.
- 6 Kleemola P, Virtanen M, Pietinen P: The 1992 Dietary Survey of Finnish Adults. Helsinki, National Public Health Institute, 1994, No 2.
- 7 Lahti-Koski M (ed): Ravitsemuskertomus. The National FINDIET 1998 Study. Helsinki, National Public Health Institute, 1999, No 2.
- 8 Männistö S, Ovaskainen ML, Valsta L (eds): The National FINDIET 2002 Study. Helsinki, National Public Health Institute, 2003, No 3.
- 9 Paturi M, Tapanainen H, Reinivuo H, Pietinen P (eds): The National FINDIET 2007 Survey. Helsinki, National Public Health Institute, 2008, No 23.
- 10 Puska P, Vartiainen E, Laatikainen T, Jousilahti P, Paavola M (eds): The North Karelia Project: From North Karelia to National Action. Helsinki, Helsinki University Printing House, 2009.
- 11 WHO: The World Health Report: Reducing Risks, Promoting Healthy Life. Geneva, World Health Organization, 2002.
- 12 WHO: Global Strategy on Diet, Physical Activity, and Health. Geneva, World Health Organization, 2004.