Comprehensive cardiovascular community control programmes in Europe

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One of the most important tasks facing the medical profession in Europe today is the control of cardiovascular diseases, which are very prevalent in most countries. In spite of the tremendous development of curative services for cardiovascular diseases, mortality and morbidity have not been reduced in many countries.

The knowledge accumulated by research in epidemiology and prevention shows the multifactorial origin of cardiovascular diseases. As the major risk factors for these diseases have been identified, it has become apparent that the control and prevention of cardiovascular diseases need the community approach: the involvement of an entire community in an intervention programme.

The pioneer in this field was Finland, where the North Karelia project, conducted by Professor Pekka Puska and his many collaborators, was launched in 1972. Two years later it generated an international intervention programme — the comprehensive cardiovascular community control programme (CCCCP) — was initiated by WHO.

Now, after more than ten years' experience, we are able to say that the results of this programme prove that population risk factor levels can be affected and cardiovascular mortality can be decreased.

The sharing of experience gained in different countries was one of the most valuable assets of the CCCC, because it showed that control activities should be extended to other chronic diseases as well. In many countries participating in the CCCC, the pilot areas have now been transformed, as a logical development of comprehensive prevention, into areas conducting countrywide integrated noncommunicable diseases intervention (CINDI) programmes, with the aim of preventing and controlling major noncommunicable diseases and changing the lifestyles of the population.

On behalf of WHO, I should like to thank all the institutions involved in CINDI in participating countries and all the programme directors, especially Professor Pekka Puska, for their cooperation in this programme.

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PART I

REVIEW OF THE CCCCP
BACKGROUND

Over the last 100 years the industrialized countries have experienced a major change in public health: the impact of infectious diseases has been dramatically reduced owing to general social and hygienic or specific preventive and therapeutic measures. Chronic diseases, especially cardiovascular diseases (CVD), have emerged as the main new public health problem.

Cardiovascular diseases are a major cause of mortality in the developed world, although great variability exists in the death rates in different regions of the world. Towards the end of the 1960s and at the beginning of the 1970s, the magnitude of the problem in the industrialized countries became obvious, even among the general population. Cardiovascular diseases were found to be responsible for about half of the deaths, nearly one third of the permanent disability, and a high proportion of the use made of the health services (1). Analysis of data from several industrialized countries has shown that the control and prevention of CVD could be expected to have a great impact on the longevity of the adult population (1). Thus, it is obvious that new improvements in public health depend on achieving control of cardiovascular and other chronic noncommunicable diseases.

The high mortality and morbidity from CVD is not only a result of the aging of the population. In many developed countries, around 40% of all deaths in the middle-aged population are caused by CVD. About three quarters of these deaths are due to coronary heart disease (CHD), mainly acute myocardial infarction (AMI). There are considerable differences in CVD and CHD rates, even between the industrialized countries, as has been shown repeatedly by mortality statistics compiled by WHO (2,3). In 1975, Finnish men had the highest CHD mortality rates in the world, while Japanese men had the lowest in the industrialized countries.

The high occurrence of atherosclerotic circulatory diseases causes not only a high number of fatalities, but also an even larger burden of nonfatal cases. This, as well as the regional differences in the CVD rates, was shown by the seven countries study (4), which surveyed and followed middle-aged
male population samples in different parts of the world, and by the AMI registration study coordinated by WHO (5).

This kind of important information formed the background for the idea of launching well conceived comprehensive efforts to control CVD population wide. Such initiatives were to take place in a number of countries, which made it useful for WHO to coordinate them. The first WHO meeting on the new WHO comprehensive cardiovascular community control programme (CCCCP) was held in Geneva in 1974. The important task then facing the medical profession, scientists and health policymakers was to control CVD efficiently in countries where they were highly prevalent, and to influence health development in countries that were, at that time, undergoing industrialization.

The amount of knowledge accumulated by cardiovascular research during the last 25 years was voluminous. The application of these results in general practice was, however, greatly unsatisfactory. Cardiovascular diseases did not receive the attention they deserved, especially from the public health point of view.

Given this situation, the new WHO programme for CVD concentrated on the promotion of preventive and control measures so that the whole community, as well as each individual, could benefit from them.

Such activities had already begun before 1974. In 1972, the North Karelia project was launched in Finland as a major pilot programme to develop approaches and methods for the nationwide control of CVD. In the early 1970s activities of a similar kind were started in other countries too, e.g. Czechoslovakia and the German Democratic Republic. These programmes all later took part in the WHO CCCC, to a greater or lesser extent.

Apart from the realization of the great problem, results from research of a different kind had indicated several promising ways of reducing the burden of CVD. Epidemiological research, supported by other types of research, had identified a few factors that were related to the risk of CVD in a consistent, independent and strong way. These factors were likely to have a causal role, which was a challenge for primary prevention. At the same time the methods of diagnosing and treating patients already affected by these diseases had improved. Finally, obvious opportunities for rehabilitation and secondary prevention existed.

These developments provided the potential for the effective control of CVD. The new WHO programme was designed to enable communities and countries to make appropriate use of these opportunities in a well conceived way. Furthermore, the simultaneous application of these measures in the community could have extra advantages: because of natural links these measures could support each other.

The WHO meeting in Geneva in 1974 outlined the approach and contents of the CCCC activity that will be reviewed in this publication.
The main aim was for a number of WHO Member States to design and set up their own CCCCPs in pilot areas, in which comprehensive coordinated measures would be carried out and evaluated. These programmes would show the way for national activities. Comparison of the approaches and experiences in different countries would also give information about the general options and methods for effectively controlling the epidemic of CVD. The countries that took part in the CCCCP included Finland, the German Democratic Republic, the Federal Republic of Germany, Hungary, Italy, Norway, Switzerland, the USSR and Yugoslavia. A description of how each pilot area set up its own CCCCP begins on p. 31.

The aim of this report is to review this international activity as it was formulated and coordinated by WHO in the European Region. The chronological development of the programme is presented, the major principles and methods are outlined, the different approaches adopted in different countries are presented and, finally, general conclusions are drawn. It should be pointed out that the CCCCP was never meant to apply one standardized protocol in all the participating countries nor to undertake any central pooling of the results. Only the concept and main principles were agreed upon; the actual programmes in each pilot area were supposed to be tailored to the local situation. The WHO coordination was intended to help the participating countries to learn from each other's experiences and by pooling their experience to draw wider conclusions.

**CHRONOLOGICAL DEVELOPMENT**

In 1974, when the CCCCP was outlined, many earlier or current WHO activities were used to help formulate the approach, in addition to the general background mentioned above.

Several earlier WHO meetings (in Rome in 1970, Innsbruck in 1972 and Brussels in 1973) had reviewed the existing evidence for the medical basis of the prevention and control of CVD and had made recommendations for the choice of targets in future trials, intervention programmes and national health service measures.

Studies on the establishment of myocardial infarction registers in 23 well defined population areas in 19 countries had gathered information on the incidence and natural history of AMI in different parts of the world (5). Hypertension control programmes, on a pilot basis, had

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been organized in 15 areas in 13 countries and stroke control programmes in 12 areas in 7 countries. Projects dealing with the prevention of rheumatic fever and rheumatic heart disease had been started in six experimental population areas. Standardized procedures were adopted in all these projects by all the collaborating centres and data were pooled and centrally analysed by WHO: Besides studying specific problems related to the prevention and control of each of the CVD at the community level, these projects had also provided methodological and organizational know-how, necessary for the future establishment of CCCCPs.

Other research activities were also directed towards this overall aim. WHO had established collaboration with more than 130 laboratories around the world. The selected fields were, for example, basic mechanisms of lipid metabolism, physical inactivity, trace elements in their relation to the development of atherosclerosis, atherosclerosis risk factors in childhood, pulmonary hypertension and cardiomyopathies. In various WHO programmes great attention had been devoted to manpower development by directly organizing courses and seminars, assisting individual fellows and analysing the trends in postgraduate training in this field. The existence of such possibilities also greatly contributed to the establishment of CCCCP-related activities in different countries.

**CCCCP meetings 1974–1984**

WHO held yearly meetings over a ten-year period to develop the CCCCPs, monitor their progress and evaluate their effects. The first meeting in Geneva in 1974 reviewed the CCCCPs that had already begun in the early 1970s in Czechoslovakia, Finland and the German Democratic Republic, and discussed the need for CCCCPs and why they had failed in the past. The meeting drew up a list of the key elements that the CCCCPs in pilot areas should include:

- prevention
- early diagnosis and detection
- rehabilitation
- the education of health personnel and the public
- data collection
- research.

The meeting went into some detail about what sort of research would be needed: on the long-term effects of intervention; on methods of evaluating the effects of teaching programmes on the community; on health personnel and on the health services; on the epidemiology of health as opposed to disease; on the techniques that ensure community acceptance.
of health promotion; and on the factors that determine the attitudes of patients to treatment, particularly when they are not very ill.

A meeting in Geneva, the next year, drew up guidelines for CCCCPs covering planning, organization, health education, information, evaluation and research. At this and the next meeting in 1976 in Koli, discussions touched on the problem of how to balance the need for international comparison with the obvious diversity of the countries running the model CCCCPs. While WHO could play a coordinating role in this international project and assist in developing general principles, it was agreed that the details would have to be left to each programme to work out on its own.

Progress reports were presented at the yearly WHO meetings, and specific issues of concern were discussed. At Koli, recommendations were made about screening, information systems, community analysis, the standardization of diagnostic categories and methods of examination, evaluation, and education and training. In Geneva in 1977, most participants agreed that the programmes should take a comprehensive approach to the control of CVD, and drew up recommendations on community analysis, changes in health behaviour, the strategy and tactics to be used in building up a programme, the involvement of the community, data collection and the evaluation of the programmes. Many of these issues are discussed in greater detail later in this report. Emphasis was placed on the importance of influencing lifestyles from the earliest age.

By 1978 it was clear that the programmes were having problems of comparison, partly because they were at different stages of implementation, partly because of their diversity, and partly because of difficulties with methodology, standardization and intervention measures. Discussions at the meeting in Tromsø in 1978 centred on data processing and information systems, and the participants recommended using some existing systems as well as establishing some new ones. In 1979 at a meeting in Novi Sad, the programmes were showing signs of changing the risk factor levels in their populations, and quality control and the standardization of measurement methods were discussed. The participants agreed that health personnel could gain experience in the operation of CCCCPs on a small scale, but that the pilot areas could not be used as training centres in any systematic way. They also decided to pool their experience in influencing health behaviour in children. For the first time the idea of extending the programmes to include all chronic diseases was raised and supported.

By 1980, the discussions were beginning to concentrate on the problem of evaluation. The meeting in Prague in 1980 reviewed the main principles for evaluating lifestyles, risk factors, morbidity and mortality changes, and the use of reference areas.

The penultimate meeting in Heidelberg in 1982 began to review the results of the CCCCPs. They had succeeded in reorienting the medical
services towards primary and secondary prevention, and had substantially reduced hypertension levels in the community. They had had less success in reducing smoking, and had had no effect on diet or cholesterol levels, except in Norway. Since it is hard to conduct a pilot programme without also affecting the reference area, new techniques of evaluation may be required that do not rely on reference groups.

Towards the end of the trial period in 1982, most of the pilot programmes had decided to expand and intensify their activities, by including more types of CVD, strengthening the intervention measures and becoming more comprehensive (by including all the components of the comprehensive approach: primary prevention, secondary prevention, health care, research, information systems, etc.). They also offered to put their accumulated skill and experience at the service of countrywide programmes on chronic diseases, an issue that had been raised at a number of meetings and which was now becoming of growing interest to WHO.

This offer was formally acknowledged at the final CCCCP meeting in Udine in 1984, when WHO invited the participating countries to incorporate their CCCCPs into the new WHO countrywide integrated non-communicable diseases intervention (CINDI) programme, which was to replace and expand the WHO CCCCP. While some did that, others continued to develop their CCCCPs and yet others did both. The final reports on the CCCCPs that were presented at this meeting by the participating countries are reviewed and discussed in Part II of this report.

Associated developments

Towards the end of the period reviewed here, i.e. in the early 1980s, several developments took place associated with the CCCCP in the European Region.

CCCCP work in the non-European countries and especially the developing countries took place separately from the European programme. The different stage of development and public health situation in these countries demanded different approaches and a realistic balance in the control of communicable and noncommunicable diseases. None the less, although communicable diseases are the major public health problem in these countries, WHO realized and emphasized that the rates of CVD and other noncommunicable diseases were rapidly increasing in many developing countries. The concept of primordial prevention was developed and advocated, to describe the approach to preventing the predicted rise in CVD rates and to preserving the cardiovascular health of these populations. As to the practical work, heavy reliance on primary health care was adopted as the main working strategy by meetings in Nairobi in 1981, Manila in 1983 and Geneva in 1985.
In 1981, the National Public Health Institute of Finland in Helsinki, the coordinating centre of the North Karelia project, was appointed a WHO collaborating centre for community control programmes in CVD. The next year, the WHO Regional Office for Europe launched a special programme to decentralize the cardiovascular programme. This gave the centre in Helsinki the special tasks and responsibilities of promoting and assisting CCCCP-related activity in Europe.

After a series of planning meetings since 1979, WHO launched a major international project on monitoring trends in cardiovascular diseases (MONICA) in 1982. The protocol of the project was approved by the meeting of principal investigators in Geneva in 1981, although it was somewhat revised at later meetings in 1982 and 1983. The aim of the MONICA project is to measure trends in cardiovascular mortality and the incidence of CHD and cerebrovascular disease, and to assess the extent to which these trends are related to changes in known risk factors measured at the same time in defined communities in different countries.

A great number of countries and centres joined the MONICA project including many of the CCCCP centres. The Heidelberg meeting in 1982 discussed the links between the CCCCP and the MONICA project. The participants concluded that the CCCCP pilot areas (whether or not they were part of the MONICA project) should include the MONICA criteria and procedures as a tool for evaluation of several items, although intervention still remained the key aim of the CCCCP. They realized that the MONICA methodology could be a valuable tool for the standardized measurement of disease and risk factor changes in the CCCCP intervention communities.

A further link between the CCCCPs and the MONICA project was formed when the international data centre of the MONICA project was established at the National Public Health Institute of Finland in Helsinki, already the WHO collaborating centre for community control programmes in CVD.

Finally, WHO’s plan to formulate and launch integrated noncommunicable disease control programmes was of great relevance. This concept was developed at a series of WHO meetings, both global and regional: in Kaunas in 1981, Geneva in 1982, and Copenhagen in 1983. During the 1983 meeting the basis for the European collaboration was formulated. The principles of the CINDI programme were further developed at meetings in Brioni in 1984 and Moscow in 1985. The relationship between the CCCCP and the CINDI programme was discussed and agreed upon at the CCCCP meetings in Heidelberg and Udine, as already described. Many of the CCCCP centres joined the CINDI programme, which was seen as a natural continuation and extension of the work carried out in the framework of the CCCCP.
The central aim of the CCCCPs was to apply available scientific knowledge in a well conceived way to attain maximum control of CVD in the entire community and to evaluate the experience for wider use. The five words symbolized by the letters CCCCP describe the general principles.

**Comprehensive**

In view of the close interrelationship of major individual cardiovascular disorders, it is important to tackle the problem of control in an integrated way.

Since the origins of the problem of CVD lie deeply in people’s lifestyles, environmental factors and service structures, no simple solution or simple measure can solve the problem; instead, the coordinated use of a whole range of actions and measures that support each other is needed simultaneously.

**Cardiovascular**

The scope of the programme is the category of CVD, which forms the greatest public health problem in most of the industrialized world, and certainly in the European Region. Within this category, different diseases vary in importance from country to country and the emphasis of the programme may thus vary accordingly. However, coronary heart disease and cerebrovascular stroke are usually the most important severe forms of CVD.

**Community**

The word is used here to mean a defined body of people, their interactions and environment, living in a geographically defined area. A community-based approach is seen as essential for the programme for two reasons.

1. Cardiovascular diseases, their precursors and risk factors, are so common that they concern most of the people in the community.

2. The origins of these health problems are deeply embedded in the community, and thus the disease rates can be influenced only by influencing the whole community, i.e. through the natural channels of influence and existing service structure of the community.

**Control**

This word is used to cover all the possible elements aimed at reducing the burden of the disease, i.e. primary prevention, early detection, treatment,
rehabilitation and secondary prevention as well as research and other supportive activities. A further connotation of the earlier term *comprehensive* is that the programme combines the different elements of disease control in an optimal way, appropriate to the given situation.

**Programme**

This word emphasizes that practical programmes with given aims are being dealt with. Thus it is primarily a community programme, not a scientific experiment. Research is needed to formulate a scientific basis and to assess the results. But the main aim is intervention, i.e. the sound application of existing knowledge in an attempt to help real people. The programme concept also includes the conventional principles and elements of a programme framework (e.g. planning, implementation, evaluation) as described later.

The active nature of the programme is emphasized by the magnitude of the problem on the one hand, and by the great amount of accumulated medical knowledge, related to prevention and treatment, on the other hand. A community programme aims to apply existing scientific knowledge to serve the population (or to help the community by having better access to the existing knowledge).

Although continuous efforts to ensure medical and technological advances are still needed, it is obvious that control of major CVD and related diseases is possible with existing knowledge, if it can be applied effectively in the population. Although unanimity on the causal links between health habits and disease is lacking — as it may always be — we have to act on the best currently available knowledge. This point is further reinforced by the magnitude of the problem and the realization that doing nothing is also a decision. A decision to await final proof cannot help the great number of people in society who suffer premature death or major disability. The community should be offered the best available advice, just as practising doctors make their best clinical judgement as to the treatment of their patients' health problems.

A feature of a community programme is that it forms the bridge between biomedical, clinical and epidemiological research on one side and national health policy and health care on the other side. Several of the CCCCCP meetings emphasized the pilot nature of the programmes. This means that the CCCCCP approach should be tested and carefully evaluated in a restricted defined community before it is applied on a large scale nationwide. Thus the individual programmes serve not only their target area, but also act as a pilot, demonstration, or model for testing the approach for wider application.

The field nature of a community programme prevents the experimental control of many variables. It is therefore impossible to test specific
epidemiological or behavioural hypotheses rigorously. Rather, a com-
munity project tests a complex yet practical programme that is based on a
theory and is of such a nature that it could be applied elsewhere, if the
results show success. Thus the limited internal validity of the project is
compensated for by the greater external validity of the results, i.e. validity
for use in real-life circumstances.

From the scientific point of view, the design and evaluation of the
community programme obviously faces many challenges and problems. A
community programme or community study is in these respects sometimes
compared with a classical intervention trial that is based on the random
allocation of individuals into experimental and control groups. Such a
classical trial also has its limitations: clinical intervention to reduce risk
factors is expensive, deals with people outside their natural living con-
ditions, and cannot realistically be applied nationwide. It is often also
impossible to restrict the changes in the intervention group to the risk
factors alone. Concurrent changes in other factors will often occur because
of a more general impact of the intervention that cannot easily be
controlled.

The community-based approach overcomes these problems to a great
extent. The strategy is to intervene in the community as a social organi-
zation, rather than to apply measures to individual people. It also tests the
effects of a comprehensive package applied in a community setting. The
intervention takes advantage of existing community channels of influence,
community organization, and natural interactions in the community. This
strategy may reduce costs significantly and may also obviate the ethical
problems that can exist if one clinically labels and treats risk factors rather
than giving general advice on healthy lifestyles.

Compared with clinical trials, however, the epidemiological inference
from a community programme about the association between risk factors
and disease is limited. Because of the advantages given above, community
programmes may, however, contribute considerably to reducing the
uncertainty surrounding the causal link between CVD and risk factors. At
the same time, the community-based study gives valuable information
about how intervention in real life can be organized, whether the risk
factors in the population can be changed, what are the overall conse-
quences in the community, etc.

A key feature of the demonstration or pilot programme is that the
intervention is well conceived and implemented as a planned, systematic
programme. The content of the programme is determined by existing
medical, epidemiological, behavioural and social knowledge applied intel-
ligently and adopted to the local community setting.

A community programme applies medical and epidemiological
knowledge to identify the health problems and to give priorities to health
objectives, as well as behavioural and social knowledge to design the actual
programme content and activities. This implies an interdisciplinary approach in planning, implementation and evaluation.

The medical/epidemiological model

From the medical and epidemiological point of view, the content of a community control programme is guided by knowledge of the disease rates in that particular community and of the known risk factors and usual treatment for those diseases. As stated earlier, the main medical goal, control of the CVD epidemic, implies that all possible action will be taken to reduce the burden of the disease. It can be argued, however, that major success in controlling a chronic disease can be based only on primary prevention, since intervention after the clinical stage has been reached will have only a limited impact. The greatest potential in the control of CVD thus lies in primary prevention: the mass epidemic should be tackled by mass prevention.

A great deal was already known about the precursors and risk factors of CVD when the CCCCP was launched. Research had proceeded from descriptive epidemiological studies on populations at high and low risk and retrospective studies among patients to prospective follow-up studies, the first major one being the Framingham study in the United States (6). A summary of the results of several other prospective studies initiated in the United States in the 1950s and 1960s was published as the final report of the pooling project (7), and results from a major international prospective study, the seven countries study, were also available (4).

All these studies indicated that a few factors — notably smoking, elevated serum cholesterol levels, and elevated blood pressure — predict a major part of subsequent CHD risk, independent of any other factors studied. Results from basic biochemical studies, as well as results from a few experimental and quasi-experimental studies on the different risk factors, have also long been available and used for smoking cessation, cholesterol-lowering diets and blood pressure treatment.

By the beginning of the 1970s, these studies had already led to a number of reviews and expert group recommendations for further studies or the national application of preventive activities. In 1970, a WHO expert group that met in Rome proposed that preventive trials should concentrate on combined intervention to reduce smoking, hypertension, raised serum cholesterol levels, and physical inactivity. In the same year the report of the Inter-Society Commission for Heart Disease Resources (8) in the United States recommended that primary prevention should be aimed at the elimination of smoking, a change of diet to reduce serum cholesterol levels, and treatment to lower high blood pressure, with special emphasis on the combination of these risk factors.
These major risk factors were the obvious choices for most CCCCPs. However, their role obviously had to be balanced in somewhat different ways in different countries. Several other possible risk factors were also naturally considered and often included: physical inactivity, overweight, psychosocial stress, diabetes, excess alcohol intake, etc.

Once the risk factors have been agreed on in a programme, choices still need to be made about the intervention strategy. The high-risk (or clinical or focused) approach attempts to identify those people with high risk factor levels and to act on these. Although such an approach has its merits and will always be needed as part of the community approach, CCCCPs apply a different principle. The community (or total population or public health) approach attempts to modify the general risk factor profile of the whole population.

Although an individual's risk of suffering from CHD increases with increasing risk factor levels (a fact of obvious relevance for clinical practice), it is critical to realize that high-risk individuals in most countries with high CVD rates produce only a small proportion of the disease cases that occur in the community. Many cases arise among people with only moderately raised risk factor levels, but usually in several risk factors at once. Because the people at moderate risk outnumber the few really high-risk individuals, and because the simultaneous occurrence of several risk factors has a synergistic impact, a major reduction in the number of disease cases in the community can occur only if the general risk factor levels can be modified in this great majority: in practice, in the whole population.

The clearly greater potential of the community approach compared with the high-risk approach in reducing CHD rates in a community has been demonstrated by making a model of the impact of different risk factor reduction strategies using data from prospective follow-up studies (9,10). The North Karelia project results also show that the initial level of people's risk factors is not a very good predictor of the changes they are likely to make to their lifestyles, hence further reducing the usefulness of the high-risk approach (11). Thus, from the epidemiological point of view, major reductions in disease rates in a community can be achieved only by a widespread reduction in the levels of many risk factors. This implies community-wide action.

Obviously, the population strategy and the high-risk strategy are not mutually exclusive. On the contrary, any practical community programme usually combines these strategies for maximum impact.

It should also be remembered that although primary prevention is emphasized, a comprehensive programme attempts to improve early detection, treatment, rehabilitation and secondary prevention among people already affected by CVD. When the CCCCP was launched, several WHO working groups had already reviewed medical progress and identified obvious opportunities to improve the situation in most communities.
These opportunities consisted of improved screening and diagnostic methods, early detection and ambulatory care, rehabilitation and secondary prevention. A large coordinated WHO study on secondary prevention had pointed out the ways to prevent recurrent myocardial infarctions — a major issue for any community programme, since a great proportion of fatal heart attacks in the community affect people who have already experienced a myocardial infarction (12).

The behavioural/social model

The CCCCP also attempted to understand better the behavioural and social framework of community-based intervention. Once the central aim of the programme has been defined as being to influence lifestyles and risk factors in the whole community, the task enters the realm of the behavioural and social sciences. Medical practice has long been based on the assumption that once the behavioural agents leading to diseases have been identified, merely to inform the subjects is enough to change their behaviour and thus the incidence of the disease. Numerous studies and everyday practice show that this is seldom the case. Behaviour is embedded in a complex way in the social and physical environment.

Much of the work on the prevention of chronic diseases has concentrated on the link between the agents (risk factors) and the host (people). But actually, many if not most of the great achievements in public health have involved major emphasis on the environment. This link to the environment applies to the control of CVD and is a major rationale behind the community approach. The agents (behaviour/risk factors) of heart disease are largely determined by social forces and other environmental factors. Any major progress in influencing the disease rates has to depend on the environmental forces and structures being dealt with. The natural, most effective way of changing a population’s risk factor levels is to work through the community: the community should be the major target rather than its individuals.

The task of influencing people’s behaviour and lifestyles is in the domain of social and behavioural sciences. Still, a major problem has been the lack of a unifying theory to serve as a guide. Programme- and action-oriented people often feel frustrated by the inability of behavioural and social scientists to tell them what they should do. Despite this, sound behavioural and social science principles do exist to guide the way in planning, implementing and evaluating community-based health programmes.

Especially within the North Karelia project, but also within some other European CCCCPs, work was done along these lines (13). Several overlapping models have usually been developed. A behaviour-change model is used in many community programmes and is based on classical psychological and sociological theories. It emphasizes the steps that programme
planning and evaluation should include to help individuals to modify their behaviour. These steps can be listed as follows (13):

(a) improve the preventive services to help people identify their risk factors and to provide appropriate attention and services;

(b) provide information to teach people about the relationship between their behaviour and their health;

(c) persuade people to become motivated and promote their intention to adopt healthy activities;

(d) train people to increase their skills in self-management, environmental control, and healthy activities;

(e) give social support to help people continue with their healthy activities;

(f) change the environment to create the opportunities for healthy activities and improve unfavourable conditions; and

(g) organize the community to mobilize it for broad changes (through increased social support and environmental modification) that will support its adoption of new lifestyles.

In addition to this behaviour-change framework, several others have been used, such as the innovation/diffusion approach, the communication/behaviour-change approach, the social marketing approach and the community organization approach. A more general model, as used in the North Karelia project, is shown in Fig. 1.

MAIN PROGRAMME COMPONENTS

The practical framework of a community programme for the control of CVD has three components: planning, implementation, and evaluation. Although this is usually the sequence in which they happen, in many cases these elements take place at the same time as the project proceeds.

Planning

The major parts of the planning phase are (a) the definition of the objectives, (b) community analysis, and (c) the establishment of the organizational framework and other preparatory steps for launching the programme.
Definition of objectives

The definition of the objectives, based on a careful epidemiological assessment of the situation, is a key feature of the CVD community control programme. The objectives can also be outlined in a hierarchical way (see Fig. 2). The general goal is to improve the health of the population. To do this the CVD programme aims specifically to reduce the rates of defined CVD. The choice of these main objectives (outcomes) will depend on local occurrence rates and the perceived desirability and possibility of influencing them. In the European Region, AMI and cerebrovascular stroke are usually the main targets for CVD control programmes.

Once the main objectives have been defined as the reduction of specific CVD, the intermediate objectives can be formulated. They are based on the one hand on general knowledge about the likely causal risk factors of the chosen target diseases, and on the other hand on knowledge about the prevalence rates of these factors in the target population. The available knowledge on the CVD risk factors was already substantial when the various CCCCPs were launched in Europe, and WHO had already made several recommendations on the subject. Other aspects could also modify the choice of risk factors and other intermediate objectives: the perceived likelihood of achieving change, the expectation that broader benefits beyond CVD could be derived from the change, and the safety and cultural acceptability of the proposed action.
As already discussed, most programmes emphasized as their objectives the primary prevention of AMI and/or stroke by trying to influence the following risk factors in particular: hypertension, smoking and elevated serum cholesterol levels in the population.

The next level in the hierarchy of objectives includes the practical objectives and actual intervention measures. These are based on carefully analysing the various community features behind the risk factors and on understanding the strategic determinants that influence them. This also relates to community analysis.

**Community analysis**

Community analysis, in this context, is defined as determining those features in the community likely to be important in the development of a CCCP.

Community analysis should provide as comprehensive an understanding as possible of the situation at the start of the programme. It should provide the basis for selecting priorities and appropriate methods of intervention. It should also indicate how continuous follow-up in these matters can be carried on throughout the programme and thereby help to guide the activities. Since health education is one of the most important intervention methods, community analysis is of special relevance to health education activities.

The necessary data may be secondary (i.e. they already exist) or primary (i.e. they may have to be collected). Secondary data comprise statistics,
health records, reports of previous studies, expert recommendations, etc. The necessary primary data can be collected by surveys, mainly based on questionnaires, of individuals or population groups. Case information may be obtained, e.g. from specific disease registers or by interviews with informed people.

The basic information on the community may be divided into the following types:

— demographic data  
— the epidemiological situation  
— information related to lifestyles and health education  
— resources.

The demographic data include the age and sex structure and other general features of the population, mortality rates and trends. Cultural and socioeconomic indices relevant to the disease are also included.

A description of the epidemiological situation requires, in addition to the general disease information, data on the prevalence and incidence of CVD, preferably within different groups of the population. In addition, information is needed on the prevalence of factors that may influence the onset and natural course of the diseases (e.g. smoking, dietary habits, physical activity, consumption of alcohol) and related biological risk factors (such as serum cholesterol and blood pressure levels, and overweight).

It is particularly important to collect information on behaviour, and especially on behaviour patterns, that is relevant to the implementation of health education activities and can provide a basis for action. Such information would include:

— the natural history of the behaviour patterns concerned, their meaning to the target group, and their possible susceptibility to change (this "diagnosis" will include beliefs and attitudes related to such behaviour patterns);  
— the identification of systems of communication and influence and of the opinion leaders within those systems;  
— an understanding of the more formal power structure of the community, on the basis of which individuals or groups may be enlisted for the purposes of planning and implementation;  
— the opinions of local health personnel on the various problems and possible methods of solving them, as their willingness to cooperate is essential.

Before the programme is implemented, an appraisal is necessary of the resources and the type of service structure existing in the community:
health manpower, facilities for cardiovascular care and their structure and capacity, health education resources, data processing resources and financial resources. The pattern of health service use must be analysed.

Building up the programme

The establishment of a comprehensive cardiovascular community control programme goes beyond the usual activities of health care bodies, involves authorities other than health and has to be based on a major health policy decision. Since such a programme also contains many societal and political components, its strategy and its tactics have to vary according to the local epidemiological, health care and sociopolitical situation.

It may therefore be difficult to outline a general strategy valid for any place or country; on the contrary, specific strategic and tactical approaches have to be identified in any given situation. It seems unlikely, however, that any such programme would be viable in any place without the support and endorsement of nonmedical bodies or authorities. It seems to be desirable to make the establishment of a comprehensive community control programme an integral part of the overall health policies of an area (be it province, county, city or country). If such general health policies have not yet been defined, it is desirable to use the occasion of establishing a programme to elaborate an overall health policy, making the programme an integral part of further developments planned in the field of health care.

The following steps and elements are an essential part of the plan, and the best or alternative solutions most feasible for each community should be elaborated in detail:

- making decisions
- choosing the community
- establishing societal bases
- funding
- establishing the project team
- establishing a steering committee
- having access to the medical community
- having access to the general population.

A CCCCP has a wide societal base resulting from the concerted efforts of health and lay organizations, with the particular involvement of citizens' associations. The initial effort needed to establish such a broad base for a community project seems to have paid off in terms of the output of the various CCCCPs.
Implementation

No detailed description will be given here of the implementation of the CCCPs in different countries (but see the descriptions of the country programmes, pp. 31-77). The guiding principle of the activity was that the implementation in each country and area would be tailored to the local situation, based on the general principles described above. As an example, a brief description of the implementation of the intervention in the North Karelia project is given here (13).

An example of programme implementation

The goal was systematically to implement the programme in the area of North Karelia according to its defined aims and principles. Within the overall framework of the programme, its actual implementation was sufficiently flexible to be adjusted in response to opportunities in the community. After the necessary measures were defined, formal support was ensured and community resources were identified to accomplish the tasks.

Integrating the programme into the social organization of the community was necessary, because in so doing the participation of the community and the availability of community resources were ensured. Thus the project set the objectives and developed the general framework, while the activities were carried out mainly by the community. The project catalysed this work by providing materials, training, the necessary official support, mass media support, and follow-up.

The programme activities were simple and practical in order to facilitate their enactment in the larger community. Instead of highly sophisticated services for a few people, simple basic services were provided to the largest possible proportion of the population. This was supported by information dissemination and personnel training. Integration of these comprehensive measures with existing services not only saved project resources, but avoided the duplication and overlapping of activities as well, and thus meant better use was made of the community resources.

To identify and mobilize community resources, the project worked closely with official agencies and voluntary organizations in the area. As an official pilot programme, the new health service activities initiated by the project became part of formal public health activities in the area. Thus participation in these activities formed part of the regular work of the health professionals, not simply an extra job or hobby. In this way the project activities were based on authority decisions, and were backed up by training and motivation. Close personal contacts between the project team and the local health personnel were emphasized to help motivation and compliance.

The use of the large network of other organizations and opinion leaders encouraged participation by the population. For the most part these
organizations appreciated being able to contribute to the success of an important project. Many personal contacts were made, local problems were discussed, and opportunities for practical contributions were reviewed. The population’s interest and support generated by the activities and spread by the mass media made it easier to establish further intervention activities.

Since the motivation and support of the general population formed a cornerstone for the project intervention, much of the practical project work was carried out by lay people and voluntary organizations. Well trained and motivated public health nurses maintained the systematic basic health centre activities and the necessary administrative framework (e.g. hypertension dispensaries, smoking cessation courses, rehabilitation groups, disease registers). Physicians acted as medical experts within this framework.

The programme activities of the North Karelia project can be divided into the following groups:

- media-related and general educational activities;
- training of local personnel and other active groups;
- reorganization of health services (primary health care, other);
- other community organization activities;
- monitoring of project activities to gain feedback and thus improve their management.

The media activities involved cooperation with the local newspapers and radio, production of much health education material, and support for various community meetings and campaigns. Training extended to doctors, nurses, social workers, teachers, representatives of voluntary organizations, etc. Later on in the project, informal opinion leaders were identified and trained in a systematic way. Most of the training was organized in cooperation with the county administration and/or with other organizations.

The necessary reorganization of the health services was carried out through formal decisions, training, demonstrations, and the provision of guidelines and materials. Major activities were the reorganization of hypertension control in the area (hypertension clinics and a hypertension register) and the organization of the follow-up and secondary preventive activities for myocardial infarction patients.

Other community organization activities concerned a large number of voluntary organizations (heart association, housewives’ association, sports clubs, etc.), the food industry (dairies, sausage factories, bakeries, etc.) and grocery stores. Using and developing various information systems (surveys, registers, statistics, etc.), the project monitored the progress and using this feedback improved the management of the project.
**Children**

Although most of the CCCCP activity concerned adults, many programmes involved children too. In view of the acknowledged difficulty of bringing about changes in the harmful living habits of adults, such habits have to be prevented from becoming established — a process that starts in childhood. Truly comprehensive and optimal community control must comprise the period of growth. Collaboration with child psychologists on the subject of health behaviour during the phase of growth is essential, together with simultaneous attention to physiological requirements.

At the age of 20 years, CVD risk factors tend to take an undesirable upward turn influenced mostly by the environment. It would not be sensible therefore either to start or to stop community programmes at this critical point. The problems of health education are different in adults and in children: whereas in adults the problem is the motivation to maintain or change to sensible habits and the behaviour is largely subject to personal responsibility, children tend to live in an environment that is provided for them and where personal choice is more limited.

Obviously, it is important that grown-ups set a good example in terms of their own thoughts and actions. The parent is the most important influence, but there are many other agents and agencies that have the potential to influence the child beneficially.

To change community behaviour, schools should develop integrated approaches to encourage proper eating habits, healthy daily rhythms and exercise, and to eliminate smoking, drinking and drugs. Finally, considering how deeply habits are rooted in culture and tradition, the limitations of a purely technical approach to health education should be realized but should not impede action.

Following these lines, activities among children and young people were launched by several programmes. In North Karelia, a special youth project was started (14).

**Training, education and a CCCCP**

Training and education for and within a CCCCP are seen as key elements from several points of view. The educational process within a CCCCP has three distinct and related elements:

- the definition of the educational objectives
- the design of the learning experiences to achieve the objectives
- the evaluation of the process and the outcome.

No educational programme can be considered adequate unless these three components are included. The objectives of an educational programme
for a CCCCP include not only the acquisition of knowledge but also, and
more importantly, the acquisition and refinement of all the skills needed to
accomplish the aims of the CCCCP. Furthermore, it is always necessary to
include the affective component of education, i.e. the identification and
modification of the attitudes of the personnel involved in the CCCCP.
Division of the educational objectives into these three categories (knowledge,
skills and attitudes) is useful because each calls for quite different methods
of learning and evaluation.

CCCPs, as such, have no formal educational responsibilities like those
of medical schools, for example, but they have a clear responsibility to
ensure that all those associated with the programme are adequately trained
for their duties. Thus, an important educational function is to identify
those who need to be trained, and specify clearly their training needs, at
any particular time.

The health personnel who are to be involved in a CCCCP should be
trained in community control methods. This is usually a responsibility of
the normal educational system for health personnel. Once the programme
is in operation, the centres where the activities take place must take on the
responsibility of identifying the educational needs of the health personnel
engaged in the programme, by monitoring its progress. This function
could be called educational diagnosis, because its purpose is to detect the
educational deficiencies of the staff. Thus the monitoring of typical com­
ponents of a CCCCP might indicate that certain essential tasks are being
badly performed and that highly specific educational action is indicated to
improve performance.

It is quite possible, however, that the inadequate fulfilment of tasks
may be due to other factors that cannot be corrected by educational means.
The leader at each centre should therefore be able to determine whether
educational or other measures, such as policy changes or administrative
procedures, are needed. Thus, there may be no provision for the employ­
ment of nurses or equivalent health workers in the CCCCP. In such a
situation, manpower policy changes followed by appropriate training are
needed.

Educational diagnosis leads to the definition of the educational prob­
lems to be solved in terms of the skills required and the target groups to be
educated. Target groups may be particular professional categories, such as
general practitioners or public health nurses, or the various combinations
of personnel of different categories that make up the health care team.
Individuals may need training or retraining.

From a detailed description of the tasks to be performed, it is possible
to identify the skills needed to perform them. The tasks are allocated to the
appropriate categories of personnel who are then observed or otherwise
tested for their capacity to perform them. The CCCCP should then organ­
ize training for those who lack the necessary skills. Such training may be
carried out within the CCCCP, in the course of the ordinary duties of the worker or group of workers concerned.

The relationship between training/education and the CCCCPs had at least three different levels.

1. **Training for the CCCCPs.** During the planning phase, key people in many centres were trained for their coming task. For many of these people, WHO provided fellowships so that they could visit other pilot areas that already had experience with a CCCCP. For instance, because the North Karelia project had started in 1972, representatives of most of the other programmes visited North Karelia to become acquainted with the methods and experiences there.

2. **Training within the CCCCPs.** Training was one of the main methods used within most CCCCPs to implement the community-wide intensified activity to control CVD. This training followed the principles given above.

3. **Training for wider purposes,** based on the CCCCP experience. As indicated earlier, the CCCCPs were seen as pilot or demonstration programmes to serve national struggles against CVD. Thus the CCCCPs in most, if not all, the participating countries have been used in a variety of ways as training models for national efforts to control cardiovascular and other chronic diseases.

**Evaluation**

**General principles**

Evaluation, like implementation and planning, is a natural part of any CVD control programme. The tools for evaluation are the information services. By using them the development of the programme can be followed and the indicators of the objectives can be measured. The evaluation of the programme, and accordingly its information services, can in principle be divided into two parts: internal and external.

Every practical subprogramme should include the collection of information that will help to organize the activities of the programme and enable the individual worker to follow the impact of his or her work. Generally this internal evaluation is based on files, patient cards, etc. Even if this type of information cannot usually be used in the scientific external evaluation of the programme, owing to poor standardization and often inadequate coverage, nevertheless this kind of internal evaluation often has a central role in the success or failure of a programme. An overlapping concept is formative evaluation, which provides information during the programme on the experience with the various programme components and thus helps further to develop or formulate the programme.
In the external evaluation, experts who are not involved in the practical implementation assess the results of the programme. This kind of evaluation and evaluative research is especially important for programmes carried out in a limited area as a pilot or demonstration for wider use. An overlapping concept is the summative evaluation that assesses the overall effects and other results over a given time period. This evaluation is usually carried out by an expert group, in some way external to the daily community work.

The aim of this evaluation is usually to assess (a) the feasibility of the programme, (b) its effects and, as much as possible, (c) the process, (d) the costs, and (e) other consequences.

The feasibility of the programme reveals to what extent it has been possible to implement the practical activities that were planned. The necessary information is usually obtained from the description of and various statistics about the activities.

In the assessment of the effects of the programme, the achievement of the main and intermediate objectives is followed during the programme period. Because the observed changes may be due to developments other than those caused by the programme, it is necessary to follow the indicators of the objectives in the same way in another reference community that is as similar as possible to the programme community. In such a quasi-experimental study design, there can obviously be more than one intervention and/or reference community. The information on the achievement of objectives is usually obtained either by examining random samples that are representative of the population, or from disease registers. In the use of random population samples, independent cross-sectional samples should be used in order to assess the development among the whole population. Acute myocardial infarction and stroke registers have a particularly central position in cardiovascular programmes. The use of the diagnostic criteria developed by WHO is recommended, and the registers should also include other items, according to the special features of the programme.

By detailed and comprehensive information, it is possible to get a good picture of what kind of process in the target community really led to the achievement or non-achievement of the objectives. This relates to change over time and to changes in various process-related (intervening) variables such as knowledge, attitudes, exposure to intervention, social support, etc.

The assessment of the total costs of the programme enables one to get a picture of the ratio between costs and effects in the programme or its efficiency. Careful assessment of the costs involved in the programme also gives information not only about the overall costs of the programme but also about the relative costs of various subprogrammes.

It is especially important in a large pilot programme to reveal by careful evaluative research not only the intended effects but also other possible
consequences such as unintended effects, both positive and negative. Examples of negative, unintended effects could be side effects caused by increased medication, a decrease in income in some population groups (e.g. producers) and an increase in stress due to intensive health education. Examples of positive consequences could be a reduction in the rates of other chronic diseases, an improvement in subjective health and an improvement in the quality of life.

**Standardization**

The aims and extent of standardization were much discussed at the CCCCP meetings. It was generally agreed that owing to the nature of the programmes, only the principles of the programmes and certain factors in the evaluation can be standardized from one programme to another. The aim of standardization is to assess the extent to which the various programmes attach the same meaning to the same terms. In this context, standardization is applied to:

- defining diagnostic categories
- establishing comparable methods of examination
- developing generally applicable methods of evaluation.

There are obviously many difficulties in the way of achieving overall, strict standardization. A CCCCP covers an entire community and deals with real-life situations of considerable complexity. Not only standardization but also flexibility is needed in order to steer a path between lack of adequate guidance in carrying out the project and instructions that are too rigid, impractical, and therefore inhibitory in a project of such a scale.

**Diagnostic categories.** Most diagnostic categories in the field of the major CVD have already been defined by WHO expert committees and scientific groups, either for general application or for the special purposes of specific WHO studies. These WHO definitions were used in the CCCCP as much as possible. They had been used in many earlier reports and scientific papers, and the investigators felt that the programmes would be more acceptable to the international scientific community if the same (or very similar) definitions were used; however, diagnoses established in local hospitals should always be taken into account in the analysis. The programmes had to review periodically the diagnostic procedures and criteria that were actually being used in their areas, and compare them with those recommended by WHO. The outcome of such analyses was useful when evaluating the effects produced by a given programme and essential for comparisons between programmes.
Methods of examination. The techniques of blood pressure measurement are defined in several WHO documents. It must be remembered, however, that, in a true community programme, based on real-life activities, it will be difficult to ensure that these techniques are used by all the health workers responsible for measuring blood pressure. In contrast to epidemiological surveys, where a limited number of doctors or auxiliaries are given strict instructions, the large number of general practitioners and nurses involved in a CCCCP may not be under continuous and direct supervision. It is important, therefore, to run training courses where the standard methods of blood pressure measurement, and the importance of using them, are emphasized.

Ideally, every activity within a programme should use a single, central laboratory for serum cholesterol determinations. This laboratory should participate in the WHO lipid standardization programme, carried out in Europe by the WHO collaborating centre for blood lipid research in atherosclerosis and ischaemic heart diseases in Prague, which acts as a quality control centre for the standardization of blood lipid measurements under the MONICA project. Usually, however, a large CCCCP makes use of several laboratories, and it is then important to know how reliable they are. In this connection, a distinction should be made between routine cholesterol determinations for clinical purposes and those performed in the baseline and follow-up surveys for the evaluation. The latter must be carried out under strictly standardized conditions, preferably in a central project laboratory participating in the WHO lipid standardization programme.

ECG techniques are well described in a WHO publication (15). A collaborating centre for research and training in cardiovascular diseases was established as an ECG reference centre in Budapest by the Regional Office at the request of many European institutes involved in epidemiological and preventive studies. Its aims are achieved by the regular distribution of standard ECG sets for coding. The codings returned are analysed and the experience fed back to the participants with suggestions as to how the quality of performance can be improved.

Methods of evaluation. Every activity in a pilot CCCCP must be evaluated, if ultimate expansion from a pilot programme to an overall public health policy is to be justified.

To assess the changes in lifestyles resulting from a community-based CVD control programme, separate representative population samples should be drawn and examined. These samples should be drawn both before, after and, if possible, at intervals during the programme periods. The samples ought to represent both the programme area or areas and, if applicable, the reference area or areas. Samples can be stratified by sex and by age groups (e.g. ten-year categories). They should be large enough to
allow for the estimation of differences and trends (if data collected between the baseline and final survey are included) in the population means and the proportion of some high-risk categories.

The subjects in the samples should be issued with a standardized questionnaire and measurements of biological risk factors should be carried out. The items measured by the questionnaire should relate to personal and socioeconomic background, medical history, use of the health services, lifestyles, health-related attitudes and knowledge, and psychosocial conditions. The items connected with lifestyles should include at least smoking, diet and physical exercise. The data collected by the questionnaire should be validated, as far as possible, by physical and biochemical measurements (e.g. self-reported smoking data may be compared with serum thiocyanate data).

Data related to the community ought also to be collected. These data concern the resources of the community, its social organization, service structure, living standards and other environmental determinants of people's behaviour. These kinds of data can also be sought from administrative statistics.

It is assumed that biological risk factors are measured at the baseline, at final examination and, when possible, at an intermediate stage. The biological risk factors should concern at least serum cholesterol, blood pressure, height and weight, although other measurements should be made, if possible. All these measurements should be standardized following the international recommendations and using careful training.

As emphasized earlier, independent samples should be drawn each time. To satisfy specific aims, cohorts might also be followed up, as this provides valuable complementary information. For each examination it is advisable to compute means and standard deviations and quintile cuts in five-year age and sex groups. This will make it possible later on to determine age- and sex-adjusted means.

When a reference area is available, comparisons can be made within areas and between areas. If an intervention area alone has been enrolled, obviously only a within-area comparison becomes possible. The multiple logistic risk function approach may be useful for evaluating the overall changes in the estimated risk.

Many sources can provide integrated information on morbidity. The most common sources are the abstracts of discharge records from local short-stay hospitals. In fact, morbidity is most likely to be treated in hospital. Data from hospitals, as well as from outpatient clinics, should be collected periodically and systematically. Moreover, they should be stored and analysed for single individuals and not only as an overall rate. Subsamples of the general population under the special responsibility of selected general practitioners can be monitored by means of some notification system linked with the pilot programmes.
If a cohort has been established and followed up both in the intervention and in the reference areas, periodic questionnaires by mail and additional ad hoc examinations, plus a final examination of the survivors, will provide the necessary incidence data. Similar questionnaires can be sent out periodically to the general population. In any case, the diagnosis of myocardial infarction and stroke should be validated. The registration system for cardiovascular attacks may be a useful tool for the monitoring of specific illnesses. If the registers are used to determine the effects of the programme on the outcomes, they should be introduced in both reference and intervention areas. If a register is in operation only in the intervention areas, the results can be used only for monitoring and for process evaluation and not for outcome evaluation.

In the evaluation of CCCCPs, changes in mortality are one of the most important hard results. The use of a matched reference area helps to clarify these results, because rates and trends for the whole country or for different areas within a country do not account for regional variations or social class gradients. Even if a single country can provide information from only one intervention and one reference area, its inclusion in the overall international data adds to the general experience. Existing general mortality rates and cause-specific mortality rates are the minimum requirements. The specificity of the rates applies to both the numerator and the denominator used in their calculation. Age-specific and age-adjusted rates should be calculated.

Measures of the validity of the data on causes of death are difficult to apply. One measure sometimes used is the frequency with which autopsies are undertaken. Another measure is the proportion of people who die in hospital. It is possible to carry out a sample survey based on death certificates and then to interview the certifying physician to evaluate the validity of his or her diagnoses. Quality control of the performance of death certification should be undertaken regularly. It can be achieved by checking a sample of death certificates for assurance of their stability over time.

The general study design, and especially the use of reference areas, has a role in the evaluation of CCCCPs. The degree of effectiveness of a programme can be assessed by comparing the epidemiological findings in a representative sample of the study population before intervention was started, with the findings in another representative sample of the same community after, say, five years. This method is known as using the population as its own control. It goes without saying that the same survey methods must be used on both occasions. Each programme activity is also evaluated by monitoring the trends in community morbidity and mortality. For this purpose, a suitable information system must be developed.

Spontaneous (or secular) changes cannot be excluded as an explanation for any differences observed. The critical question, "Are the changes
in the health status of the community causally related to the intervention programme introduced in the community?”, can only be answered with reasonable assurance if a reference area, similar to the intervention area, serves for comparison with the intervention community. Limited inferences can be drawn without the use of a reference community but these become even more tenuous if concomitant dynamic, secular changes are taking place in disease incidence and associated factors. Such dynamic situations tend to be the rule, while a static state, even if present for the country as a whole, may not hold for the intervention community.

Without the aid of data from a reference area, it will not usually be possible to determine whether an otherwise managerially satisfactory programme is effective and efficient. Nevertheless, gaining experience with the managerial aspects of a community programme may be worthwhile in itself. On the other hand, inclusion of one or more reference areas in the programme design, while highly desirable, does not necessarily ensure an unequivocal answer as to whether, or to what extent, the programme has been causally responsible for any changes observed in the course of the intervention.

As an example, the North Karelia project (16) used a quasi-experimental study design. One or more communities were chosen where the experimental intervention was to be carried out. In other words, the best possible knowledge, both from the epidemiological and socio-behavioural points of view, about risk and CVD control, was applied to the whole community. One or more other communities were chosen as reference areas. These communities represented natural development: apart from the experimental project activities, the reference community was in no way deprived of any development that might occur there.

The observation unit was the community. Several communities could have been used to increase the population, but it is not realistic to have enough communities to use the community as a unit in the statistical analysis. Using two or more communities could cause problems in interpretation, if one showed a positive result and another a negative result. This situation could arise because of possible community preferences or unequal efforts among the intervention team. On the other hand, the use of several reference communities, if feasible, can reduce the likelihood of detecting a spurious result as a consequence of random variation over time, especially in disease rates.

In all quasi-experimental designs, where the assignment into experimental and control units is not random, both biased sampling (selection of study units) and biased selection of experimental and reference units are possible. In the case of the North Karelia project, the intervention area was defined by the original popular petition that called on the Finnish Government to take action to reduce the high level of CVD morbidity and
mortality in the county of North Karelia. The only choice was then the selection of the reference unit. Another county was chosen as the reference community.

The main design for evaluating the effect of the programme on risk factor levels is usually the "separate sample, pretest-posttest control group" design as presented by Campbell & Stanley (17). In this design, separate cross-sectional samples are drawn from the same populations, one in the intervention and another in the reference area, before and after the programme.

Assessment of the effect of the North Karelia project was based on large cross-sectional sample surveys in the population of the intervention area and the reference area at the outset in 1972, and after five-year periods (in 1977 and 1982). The effect of the programme was defined as the net reduction in disease and risk factor levels in North Karelia (i.e. the reduction in North Karelia minus the reduction in the reference area).
PART II

COUNTRY PROGRAMMES
FINLAND: THE NORTH KARELIA PROJECT

General background and aims

The North Karelia project was launched in 1972, and it has since formed an example and model for other community programmes in different countries. The start of the North Karelia project in Finland was undoubtedly related to the extremely high CVD rates in that county. The project was also a natural continuation of the epidemiological research in the field of CVD that began in Finland in the 1950s. With increasing awareness of the problem and with emerging results on the existence and nature of the possible risk factors, the idea of attempting prevention on a large scale became a reality.

The North Karelia project was designed in response to a petition from representatives of the county of North Karelia, signed in 1971. The petition urged the Finnish Government to take action to reduce the extremely high heart disease rates in the area. It was based on alarming information on the high CVD morbidity and mortality rates, not only in the Finnish population as a whole, but in the population of North Karelia in particular. From the very beginning the project was seen as a national pilot programme for developing and testing methods for the nationwide control of CVD. The project was formulated and launched in close cooperation with Finnish experts and WHO.

Owing to this particular historical background, the project provided a unique opportunity to design and carry out the first major community-based study that would incorporate the theoretical considerations already discussed on the prevention of CVD. Thus the aim of the project was to carry out a systematic and comprehensive intervention, using epidemiological knowledge about both the risk factors and the relevant behavioural and social science principles.

The target risk factors in the project were chosen from previous epidemiological knowledge and information on their occurrence in the local population. The conventional hard risk factors — elevated serum cholesterol levels, smoking and elevated blood pressure — were chosen as targets. Serum cholesterol levels were to be influenced mainly through
general cholesterol-lowering dietary changes. The practical intervention activities were integrated with the existing services structure and social organization of the area. The project sought to define the objectives, to provide instruction, to coordinate and promote activities, as well as to assess the results, while most of the actual work was done by the community itself.

The major objective of the programme in North Karelia was to reduce mortality and morbidity rates from CHD and related major CVD in the whole population, but with special reference to middle-aged men. The main emphasis was on primary prevention through a general reduction in the levels of the mentioned risk factors, especially through general changes in lifestyle in the community.

The comprehensive educational and services-oriented programme to modify the risk factor profile of the population was based on local community action and the local services structure, with the aim of encouraging lifestyles that reduce risk factor levels and promote health. Practical skills were taught, social support for the change was provided and environmental modifications were implemented as part of the comprehensive community organization for change.

Evaluation

The evaluation of the North Karelia project was designed to assess the feasibility of the programme, its effect on health behaviour, risk factors and disease rates, and programme costs. In addition, interdisciplinary research was conducted to study both the process and other consequences of the intervention. The project was initially coordinated by the University of Kuopio, and later by the National Public Health Institute in Helsinki. The Institute is the central site for evaluation of and research into the project. Field activities are run mainly from the local project office at the county health department in North Karelia.

Changes in risk factors and health behaviour in the population were assessed by examining cross-sectional random samples of the middle-aged population. Changes in North Karelia were adjusted for corresponding changes in a matched reference area to assess the effect of the programme (the net change in North Karelia). The neighbouring county of Kuopio, most similar to North Karelia, was chosen as the reference area. North Karelia has some 180 000 inhabitants and the reference area about 250 000.

Major population surveys in North Karelia and the reference area were carried out at the outset in 1972, and five and ten years later in 1977 and 1982. In each survey, almost 10 000 subjects were examined with participation rates of between 80% and 94%. Disease rates in North Karelia were monitored using special myocardial infarction and stroke registers that operate throughout the county according to WHO criteria. Developments
in mortality rates and uptake of disability pensions in the two areas, as well as in the whole country, were assessed using national register data.

The results of the first five-year period of the project (1972–1977) have been reported in a number of publications and in a monograph published by WHO (18). They were so encouraging that it was decided to continue with the programme and with the follow-up of the risk factor and disease changes in the area. This was considered vital for learning about the long-term consequences of this type of activity. At the same time, the project has increasingly been associated with national applications of the results. Although in accordance with the original aims, this reduces the availability of reference areas for evaluation.

Ten-year results and experiences

In spring 1982, a large follow-up survey was carried out in North Karelia and the reference area to assess the ten-year changes. At the same time the most recent mortality data were collected and analysed to determine the trend in the CHD and CVD mortality rates in North Karelia and other counties of Finland (including the reference county). The following is a summary of the results, published elsewhere in greater detail for risk factors (19), mortality rates (20,21) and other experiences (13).

Health behaviour and risk factor changes among men and women are summarized in Table 1. Smoking and serum cholesterol levels in the North Karelia population began to decline during the first five years and continued to do so during the second five-year period. Table 1 also shows the net reductions (i.e. those adjusted for changes in the reference area) in the risk factor levels during the ten-year period of 1972–1982. For men, significant net reductions took place for all the risk factors. For women significant net reductions were found for blood pressure and dietary fat consumption. For smoking the net reduction among men was substantial and became even more pronounced during the second five-year period. The smoking results in 1982 were validated by serum thiocyanate determinations.

In the analysis of the mortality data, the years 1969 to 1971 were included to give three preprogramme years for the trend estimate (the eighth revision of the International Classification of Diseases was adopted in 1969 and has been used since). Table 2 shows that during the period 1969–1982, CHD mortality among the middle-aged male population in North Karelia decreased annually by 2.9% (it decreased by 2.3% in the reference area and by 2.0% nationally). Most of this decrease in North Karelia occurred after 1973. During this period (1974–1979), when the initial net change in risk factors could be expected to have an impact, the reduction in CHD mortality was 22% in North Karelia, 12% in the reference area and 11% in the rest of the country. Coronary heart disease mortality in women declined more in North Karelia than in the rest of the
Table 1. Changes in the main target health behaviour and risk factors among men and women in North Karelia (NK) and the reference area Kuopio (KUO), according to cross-sectional population surveys in 1972, 1977 and 1982

A. Men, 30-59 years of age

<table>
<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Percentage of smokers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NK</td>
<td>52</td>
<td>44</td>
<td>38</td>
<td>-14 (P&lt;0.0001)</td>
<td>-17 (P&lt;0.0001)</td>
</tr>
<tr>
<td>KUO</td>
<td>50</td>
<td>45</td>
<td>45</td>
<td>-5 (P&lt;0.001)</td>
<td></td>
</tr>
<tr>
<td>Amount of smoking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NK</td>
<td>10.0</td>
<td>8.6</td>
<td>6.6</td>
<td>-3.4 (P&lt;0.0001)</td>
<td>-28 (P&lt;0.0001)</td>
</tr>
<tr>
<td>KUO</td>
<td>8.6</td>
<td>8.5</td>
<td>7.9</td>
<td>-0.7 (NS)</td>
<td></td>
</tr>
<tr>
<td>Fat consumed in milk and on bread (g per day)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NK</td>
<td>83</td>
<td>59</td>
<td>54</td>
<td>-29 (P&lt;0.0001)</td>
<td>-22 (P&lt;0.0001)</td>
</tr>
<tr>
<td>KUO</td>
<td>72</td>
<td>62</td>
<td>61</td>
<td>-11 (P&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>Serum cholesterol (mmol/l)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NK</td>
<td>7.1</td>
<td>6.7</td>
<td>6.3</td>
<td>-0.8 (P&lt;0.0001)</td>
<td>-3 (P&lt;0.0001)</td>
</tr>
<tr>
<td>KUO</td>
<td>6.8</td>
<td>6.7</td>
<td>6.3</td>
<td>-0.5 (P&lt;0.0001)</td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NK</td>
<td>149</td>
<td>143</td>
<td>145</td>
<td>-4 (P&lt;0.0001)</td>
<td>-4 (P&lt;0.0001)</td>
</tr>
<tr>
<td>KUO</td>
<td>146</td>
<td>146</td>
<td>147</td>
<td>+1 (NS)</td>
<td></td>
</tr>
</tbody>
</table>

a Number of cigarettes, cigars and pipes smoked per day per subject (smokers and non-smokers taken together).

Note. NS = not significant.

country, but because of the much lower absolute numbers there is considerably more uncertainty about the significance of the results for women. A similar pattern was also observed for all cardiovascular mortality. Fig. 3 shows the regression-based trends in CHD mortality in North Karelia and the whole of Finland.

The comprehensive evaluation provided other evidence to support the conclusion that the intervention had a positive effect on CVD and health in general. A net reduction in the self-reported prevalence of angina pectoris, diagnosed and/or treated by a doctor, was observed in both men and
B. Women, 30-59 years of age

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of smokers</td>
<td>NK</td>
<td>10</td>
<td>10</td>
<td>17</td>
<td>+ 7 (P&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>KUO</td>
<td>11</td>
<td>12</td>
<td>18</td>
<td>+ 7 (P&lt;0.0001)</td>
</tr>
<tr>
<td>Amount of smoking a</td>
<td>NK</td>
<td>1.1</td>
<td>1.2</td>
<td>1.7</td>
<td>+ 0.6 (P&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>KUO</td>
<td>1.2</td>
<td>1.4</td>
<td>1.9</td>
<td>+ 0.7 (P&lt;0.0001)</td>
</tr>
<tr>
<td>Fat consumed in milk and on bread (g per day)</td>
<td>NK</td>
<td>45</td>
<td>31</td>
<td>28</td>
<td>- 17 (P&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>KUO</td>
<td>39</td>
<td>33</td>
<td>29</td>
<td>- 10 (P&lt;0.0001)</td>
</tr>
<tr>
<td>Serum cholesterol (mmol/l)</td>
<td>NK</td>
<td>7.0</td>
<td>6.6</td>
<td>6.2</td>
<td>- 0.8 (P&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>KUO</td>
<td>6.8</td>
<td>6.5</td>
<td>6.0</td>
<td>- 0.8 (P&lt;0.0001)</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>NK</td>
<td>153</td>
<td>142</td>
<td>141</td>
<td>- 12 (P&lt;0.0001)</td>
</tr>
<tr>
<td></td>
<td>KUO</td>
<td>147</td>
<td>144</td>
<td>143</td>
<td>- 4 (P&lt;0.0001)</td>
</tr>
</tbody>
</table>

a Number of cigarettes, cigars and pipes smoked per day per subject (smokers and non-smokers taken together).

Note. NS = not significant.

Women. The earlier findings showed positive effects (net change) on pension rates for cardiovascular disability. These were based both on pension statistics and on survey data. Analysis of the national cancer register data also indicated more favourable cancer incidence trends in North Karelia than in the whole of Finland towards the end of the project period. Fig. 4 shows the overall mortality trend for middle-aged men in North Karelia.

Table 2. Average annual regression-based decline in age-adjusted CHD mortality in North Karelia, in the reference area, and in Finland (excluding North Karelia)

<table>
<thead>
<tr>
<th>Area</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Karelia</td>
<td>2.9</td>
<td>3.7</td>
</tr>
<tr>
<td>Reference area</td>
<td>2.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Finland, excluding North</td>
<td>2.0&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.7&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Karelia</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Difference from North Karelia in relation to random variation, P<0.001.

<sup>b</sup> Difference from North Karelia in relation to random variation, P<0.05.

Source: Puska, P. et al. (13).

As a whole, the evaluation detected no negative psychosocial consequences of the intervention, either in the total population or in the high-risk groups. Rather, the programme caused a reduction in self-reported psychosocial health complaints and in the perceived risk of heart disease, and an increase in subjective health in the North Karelia population. A significant difference in favour of North Karelia was observed in these changes when compared with the reference area (22).

The feasibility of the programme was good throughout the ten-year period in spite of the fact that — at least in the early years — health services were scarce and the society tended to be traditional and resistant to change and widespread lifestyle innovations. Local health services and local health personnel cooperated well and thus supported the activities. The local population participated with enthusiasm, and community organizations contributed in various ways to the success of the project. Because the aims of the project were integrated with the existing health services, and broad community participation was a key feature, the overall costs of the programme were modest. What is more, savings were made in a reduction in disability payments.
Fig. 3. Regression-based change in age-adjusted CHD mortality in the population aged 30–64 years in North Karelia and in the rest of Finland in 1969–1982

Fig. 4. Regression-based change in age-adjusted mortality in North Karelia among men aged 30–64 years in 1969–1982
Conclusions, continuation and national applications

The Finnish experience and results so far support the idea that a well conceived comprehensive community-based programme can have a positive impact on lifestyles and cardiovascular risk factors in a whole population and that this is associated with reduced cardiovascular mortality rates. They also demonstrate the potential of a community-based approach for changing the risk factors, as well as providing practical experience in organizing such activities within health services and other community settings.

The programme in North Karelia continues to promote further the favourable development in lifestyles and risk factors. This is considered important for national and international demonstration and training purposes. It is also important to continue to monitor the risk factor and disease trends to assess fully the long-term impact of the project activities. This is taking place through the methodology used in the MONICA project (Finnish participation in this project is known as FINMONICA). Furthermore, the scope of the programme has been enlarged to include related major noncommunicable diseases in an integrated way (Finland is now participating in the WHO CINDI programme) and to emphasize the promotion of positive health. Since 1978, the project has also launched systematic and carefully evaluated programmes to influence health behaviour and risk factors among children and adolescents (the North Karelia youth project).

Before 1977 it was the policy of the North Karelia project team not to promote risk factor changes in the reference area or nationally. Nevertheless, during this period the project had a great deal of positive national publicity. After 1977 the project team did become involved in national applications. Government committees on health education and hypertension recommended the national use of many project experiences and recommended that a new office for health education be established in the National Board of Health. The project’s health education materials have been distributed nationwide in great numbers. A major national activity has been a series of national health education programmes shown on Finnish television by the project since 1978 (23). Antismoking legislation was introduced in 1977.

Associated with these developments were findings that CVD-related lifestyles were beginning to change in Finland as a whole, and a favourable change in cardiovascular mortality rates has been observed throughout Finland, as shown in Table 2 and Fig. 3. The CHD mortality rate of Finnish men, which used to be the highest in the world, has decreased nationwide. The decline has been one of the most rapid in the world during the last few years, and Finland has already lost its position as the country with the highest CHD mortality rates.
German Democratic Republic: The Schleiz Project

General background

As in many other countries, CVD have become a major public health problem in the German Democratic Republic since the Second World War. In the 1960s intensive research was started at various levels to explore the problem. From 1973 to 1975, a community-based programme to reduce cardiovascular and noncommunicable diseases in the whole population of the Schleiz district was planned and prepared and it was launched in 1976 (24). There was no previous experience in the German Democratic Republic of implementing such a programme and no knowledge of the extent to which it could be expected to have any effect on the existing health care system. For the evaluation of the results another district, Dippoldiswalde, was chosen as the reference area.

Both areas are rural districts, at the stage of industrial growth, in addition to agriculture; the intervention district has about 33,000 inhabitants and the reference district 46,000. The districts are comparable concerning a number of relevant characteristics including the medical health care system. In both districts, the district capital is the only large town.

In the intervention district of Schleiz, methods had to be found that were applicable in the existing health care system, to intervene in the community. They had to be accepted by the population as individual, mass or administrative measures and to be seen to reduce the risk factor level in the whole population. Additionally, all other aspects of the comprehensive health care system had to be improved, and the use made of the existing health care resources in the district had to be optimized.

Individual consultations were set up for high-risk people, i.e. those with markedly increased serum cholesterol levels, blood pressure, weight and other characteristics not primarily connected with the programme, but belonging to the tasks of health care. These consultations were arranged in outpatient clinics. Every year, a large amount of health education material was distributed directly to high-risk people, and indirectly through public offices to the rest of the population.

During the first five-year project period (1976–1981) 80–100 lectures on prevention were delivered annually throughout the 64 small municipalities of the district. Altogether 56 gymnastic groups (organized by the women’s organization) and 22 sports clubs (organized by voluntary trainers) were working during the project period. Special emphasis was put on the role model influence of the community leaders: it was decided that no health personnel should smoke at work; the proportion of smoking teachers dropped from 34% to 18% and of civil servants and other administrators from 36% to 20%.
Since 1978, additional simple cardiovascular risk factor screenings have been carried out in the Schleiz district in connection with the obligatory mass X-ray screening of the adult population. The subjects and their doctors are informed of the results, and this has markedly increased the population's awareness of these activities. This task has been supported by newspaper articles in the local press. Many other activities have taken place in the district to inform the population about the seriousness of CVD and about the risk factors and available preventive measures.

**Evaluation**

In order to evaluate the effects of the preventive programme, 673 people were randomly recruited and examined in both districts in 1976 and 1981. In different age- and sex-specific categories, the response rate ranged from 63% to about 90% in both districts. The independent random samples were drawn from the population register of the dispensary for lung diseases. To assess the changes in morbidity from CVD, AMI and stroke registers were set up without age restriction. In the reference district, these registers operated only in 1973 and 1975. After the five-year follow-up in 1981, they operated continuously in both areas. In the Schleiz district, a continuous register for AMI and stroke has existed since 1977. In both districts, registers for diabetes and malignant neoplasms have also existed for years.

Additionally, an extra analysis of all death certificates since 1970 was carried out in both districts, to review and partly to recode them. Age-adjusted mortality rates for both districts were calculated in a way that is not directly comparable to the national statistics. The net change was calculated for all morbidity, mortality and risk factor rates or mean values, i.e. the difference between the baseline and the terminal (five-year) results in the intervention district, adjusted for the change in the reference area.

**Results**

The surveys showed that the cardiovascular risk factors fell more between 1976 and 1981 in the population of the intervention district than in the reference district (Table 3). Although the number of cigarettes consumed per day by smokers increased by 10.7%, the number of smokers declined by 7%.

No significant net changes were seen in the dietary studies. The lifestyle changes in both areas compared favourably with national changes as shown by official statistics.

The number of undetected hypertensives was markedly reduced. The proportion of treated hypertensives increased by 22% compared with the reference area, while that of the number of effectively treated increased by 67%.
Table 3. Risk factor changes in the Schleiz project between 1976 and 1981

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
<td></td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>136.5</td>
<td>137.2</td>
<td>-5</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>84.5</td>
<td>84.9</td>
<td>-5.5</td>
</tr>
<tr>
<td>Serum cholesterol (mmol/l)</td>
<td>5.9</td>
<td>5.7</td>
<td>-10.1</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>25.4</td>
<td>25.0</td>
<td>-1.2</td>
</tr>
<tr>
<td>No. of cigarettes smoked per day</td>
<td>8.9</td>
<td>7.7</td>
<td>+0.8</td>
</tr>
</tbody>
</table>

Note. NS = not significant.

The incidence of AMI and stroke showed a net change in Schleiz of -3.8% and -5.9% respectively. The incidence of fatal AMI also showed a net reduction. In contrast to this, there was a net increase in nonfatal attacks (Table 4). The cancer register showed a net reduction, while the diabetes register showed a net increase in both fatal and nonfatal rates.

Linear regression analysis for the age-adjusted mortality rates for Schleiz, the reference area and the whole of the country for the two periods 1970–1978 and 1979–1982, showed that in 1979–1982 mortality from all CVD as well as from CHD and cerebrovascular disease fell more in Schleiz than in the reference area of Dippoldiswalde (Table 5). But it must be taken into account that, owing to the small populations, no statistically significant differences were found and no firm conclusions can be drawn.

Other aspects and national developments

The evaluation of the Schleiz project also collected information on other experiences related to the project. A preliminary cost-effect assessment showed a favourable estimate that coincided with the findings of the North Karelia project. Work absenteeism was also assessed: a net reduction of 6% was found in the intervention area of Schleiz, which would have considerable financial implications if it were really related to the intervention.
Table 4. Incidence of CVD in 1982 and net changes from 1976/1977 to 1981/1982 in Schleiz, according to the AMI and stroke registers

<table>
<thead>
<tr>
<th>Type of attack</th>
<th>AMI and stroke</th>
<th>AMI</th>
<th>Stroke</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>63.9</td>
<td>-2.7</td>
<td>-6.7</td>
</tr>
<tr>
<td>Fatal</td>
<td>38.3</td>
<td>-9.7</td>
<td>-33.1</td>
</tr>
<tr>
<td>Nonfatal</td>
<td>25.5</td>
<td>+7.1</td>
<td>+52.6</td>
</tr>
</tbody>
</table>
Table 5. Regression-based changes in CVD mortality in Schleiz, the reference area and the whole country in 1970-1978 and in 1979-1982

<table>
<thead>
<tr>
<th>Type of disease</th>
<th>Changes in Schleiz (%)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Changes in the reference area (%)&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Changes in the whole country (%)&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>All CVD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>-1.4</td>
<td>+ 2.0</td>
<td>+3.4</td>
</tr>
<tr>
<td>Women</td>
<td>-0.5</td>
<td>- 3.5</td>
<td>-2.1</td>
</tr>
<tr>
<td>CHD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>-0.9</td>
<td>- 7.0</td>
<td>+5.1</td>
</tr>
<tr>
<td>Women</td>
<td>-3.3</td>
<td>-14.9</td>
<td>-0.8</td>
</tr>
<tr>
<td>Cerebrovascular disease</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>-0.9</td>
<td>- 0.9</td>
<td>+6.7</td>
</tr>
<tr>
<td>Women</td>
<td>-2.7</td>
<td>-10.1</td>
<td>+5.3</td>
</tr>
</tbody>
</table>

<sup>a</sup> Recoded; all causes of death considered.

<sup>b</sup> National statistics (not recoded); underlying cause of death only.
During and after the implementation of the Schleiz project, a number of other national activities were launched (25). A major effort, and a natural extension of the Schleiz project, is the integrated control programme of cardiovascular and other noncommunicable diseases (CANON). The main long-term objective, as in the Schleiz project, is the reduction of morbidity and/or mortality from CVD and other noncommunicable chronic diseases among the young and the middle-aged. The main intermediate objective is the reduction of the risk factors in the population.

The CANON programme comprises 11 administratively defined districts, with a total population of 831 000, who decided to implement this programme in 1982. The territory is divided into six preventive and five reference districts which are comparable for important population characteristics. In these territories, random sample surveys have been carried out to define the risk status of the population aged 13–69 years. The first investigation was in 1982/1983, the next in 1986/1987 and another is scheduled for 1991/1992. For the evaluation, incidence registers (for AMI, stroke, cancer, diabetes mellitus) are used in addition to population surveys and mortality data. Through these and other data sources the aim is to obtain a comprehensive picture of the impact of the intervention.

FEDERAL REPUBLIC OF GERMANY: THE EBERBACH-WIESLOCH PROJECT

General background

The Federal Republic of Germany used to occupy a middle position in the rank order of mortality from CVD among the countries of Europe. Trends in the 1960s began to rise, however, and rapid changes in the lifestyle of the population due to the economic boom urged the timely introduction of measures likely to stop and reverse these trends.

The Eberbach-Wiesloch project was started in 1976, to develop and test methods to control CVD in the Federal Republic of Germany. From the very beginning the project, designed and implemented by a centre in Heidelberg, was actively involved in the WHO CCCCP. A particular feature of the CCCCP in the Federal Republic of Germany is that the health care system is based on free-practising physicians and obligatory health insurance with private companies. Through the Eberbach-Wiesloch project, the CCCCP had three overall aims:

— to stop and reverse the increasing trend in morbidity and mortality from CVD in the Federal Republic of Germany;
— to achieve this by using the existing resources and structures of the health system; and
— to develop models for the promotion of community health by the community itself.

Fig. 5 shows the design of the project. The first studies and the intervention on a pilot basis began in Eberbach in 1976. Effective intervention began in Eberbach in 1980. At that time, Wiesloch served as the reference community. Four years later, when sufficient experience had been collected in Eberbach, these models were gradually transferred to Wiesloch. Another community, Neckargemünd, then became the reference area. A further four years had to pass before the intervention in Wiesloch could be considered to have become effective compared with the intensity of the intervention in Eberbach. The whole project should run for eight years before attempts to evaluate its effects on disease outcomes are made, though process evaluation is continuous.

All three small towns are situated around Heidelberg, and they are quite typical of the state of Baden-Württemberg. Eberbach has a population of 16,000, Wiesloch (about 30 km away) 21,000, and Neckargemünd (about equal distance from both) 15,000.

The project was initiated and is coordinated by the Institute of Clinical and Social Medicine of the University Medical Clinic of Heidelberg, in close collaboration with the organization of the local medical profession.

Intervention

The general principle of the intervention was to improve medical curative services and primary prevention in the sense of control of CVD risk factors, mainly through appropriate behavioural changes and with the existing service structure and community participation.

The intervention began with the initial screening of the population of Eberbach and Wiesloch in 1976. Men and women in the 30–59-year age group were invited by the mayors of their towns for a health check-up with their own personal doctors. Of the 9,900 invited 9,700 appeared, a response rate of 98%.

The organization of the screening in the surgeries of the local doctors laid the foundations of the intervention. Doctors were the initiators and counsellors of each new activity, either acting individually in their doctor–patient relationship or acting as specialist advisers to the project. Through the involvement of the doctors, their nurses, laboratory technicians and secretaries were also part of the project.

Within their own general practice, local physicians started to rely increasingly on group therapy. Such groups were first established for post-infarction or hypertensive patients, and later also for high-risk subjects who
were overweight or smokers. The Institute of Clinical and Social Medicine assisted in these endeavours by organizing training courses in group therapy and dynamics for doctors and by providing expert help for the overweight groups. Local schools were also centrally involved in the intervention from the beginning.

**Evaluation and its results**

The evaluation of the Eberbach-Wiesloch project was based on the overall nature and objectives of the project. According to the general principles of the CCCCP the design of the interim evaluation set by the project team called for:

- process evaluation (the developed models)
- feasibility evaluation (transfer and self-sustainment)
- product evaluation (effects on risk factors and disease indices).
The process evaluation demonstrated how around 50 different activities, or models as they were called, gradually evolved through the active and creative participation of the community. The project in Eberbach evolved with practically no public financial assistance.

The transfer to Wiesloch of the models developed in Eberbach was generally feasible, although some differences in the experience were found. The intensive press and mass media coverage of the project raised wide interest in many other parts of the country. Projects with the same objectives, though not necessarily the same approaches, and derived from the Eberbach-Wiesloch project have been initiated in more than 20 smaller or larger towns of the country. In Baden-Württemberg itself further development has taken place. In the beginning of 1986 the state joined the CINDI programme of the Regional Office. Finally, the self-sustainment of the project in Eberbach is highly convincing, demonstrating its feasibility.

As for the effect evaluation, owing to its very nature the project cannot produce any rapid results. The goal was to develop gradual, self-sustained models for risk factor and disease control.

The observed changes in risk factors (smoking and high serum cholesterol and systolic and diastolic blood pressure) are presented in Table 6. The table indicates — though inconclusively — that the risk factor changes were slow to set in, but in general they tended to take place in a favourable direction.

Summary and conclusions
The project in Eberbach-Wiesloch, though part of the CCCP from the beginning, had its own emphasis in objectives and approach, like the other country programmes. Its main aim has been to test whether communities, under the guidance of the medical profession, are able to take care of their own health problems without additional state support. In a stricter sense, the aim was to learn how and by which models communities can deal with the problem of CVD and their risk factors when properly prepared.

The arousal and maintenance of the population's interest in the problems of CVD were successfully achieved. This was shown by the high participation rate at the initial screening and by the large number and high quality of models developed spontaneously in the first four years of the project. Interest and participation showed a tendency to peak, but no decline has yet been observed.

The project was also self-sustaining: the withdrawal of advisory activities and direct assistance by the Institute of Clinical and Social Medicine did not notably affect the project development in Eberbach. The transferability of the evolved models seemed satisfactory. This was proved by the absence of major obstacles in transplanting the models to Wiesloch and by the quick spread of the project to other towns in the country.
Table 6. Levels of certain risk factors in Eberbach (E), Wiesloch (W) and Neckargemünd (N) in 1976, 1980 and 1984

<table>
<thead>
<tr>
<th>Year and sex</th>
<th>Systolic blood pressure (mmHg)</th>
<th>Diastolic blood pressure (mmHg)</th>
<th>Serum cholesterol (mmol/l)</th>
<th>Smokers (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E</td>
<td>W</td>
<td>N</td>
<td>E</td>
</tr>
<tr>
<td>Men</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>131</td>
<td>131</td>
<td>a</td>
<td>82</td>
</tr>
<tr>
<td>1980</td>
<td>134</td>
<td>138</td>
<td>126</td>
<td>87</td>
</tr>
<tr>
<td>1984</td>
<td>123</td>
<td>a</td>
<td>125</td>
<td>85</td>
</tr>
<tr>
<td>Women</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>130</td>
<td>128</td>
<td>a</td>
<td>82</td>
</tr>
<tr>
<td>1980</td>
<td>128</td>
<td>127</td>
<td>124</td>
<td>81</td>
</tr>
<tr>
<td>1984</td>
<td>124</td>
<td>a</td>
<td>127</td>
<td>83</td>
</tr>
</tbody>
</table>

*No survey made.*

By necessity the towns involved in the project were small. Thus the interim evaluation did not try to assess changes in disease outcome indicators. A pooled analysis could give meaningful answers after about ten years of existence of the project. Risk factor changes on the other hand are monitored every fourth year: (a) to promote the impact of the project, (b) to show progress to those involved, and (c) to ascertain that the changes are not adverse.

The general experiences of the project are favourable. Overall the project team is convinced that, through the developed models, communities will be able to deal with their own health problems under proper guidance from their doctors. Obviously the overall results as to disease outcomes and the impact on national trends remain to be seen.

**HUNGARY**

**General background**

Hungary has high CVD rates and experienced an alarming increase during the 1960s and 1970s. In the beginning of the 1970s, a number of studies and
activities were started, many of them in collaboration with WHO. A special pilot area covered a large district of the capital, Budapest. Infarction registration was started in 1970; a programme on rehabilitation and the secondary prevention of AMI was started in 1972; an intensive coronary care programme was started in 1973 and a study on the precursors of atherosclerosis in children in 1975.

The CCCCP in Hungary started in Budapest in 1976 (26). In 1982 the programme was extended to new areas and new subprogrammes were introduced in the southern town of Pécs and a rural area in the same county (Siklós). Table 7 shows the population sizes in the communities (both intervention and reference) of the Hungarian CCCCP. The Budapest programme includes three districts: one district as the intervention area (population: 56,279) and two districts as reference areas (population: 194,751). Pécs (town) and Siklós (rural) act as intervention areas and their respective reference areas have the same urban/rural ratio as they do.

Table 7. The CCCCP areas and populations in Hungary

<table>
<thead>
<tr>
<th>Population</th>
<th>Intervention and reference areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Budapest</td>
</tr>
<tr>
<td>Total</td>
<td>251,030</td>
</tr>
<tr>
<td>25–74-year-olds</td>
<td>158,390</td>
</tr>
</tbody>
</table>

Intervention

The intervention included special education courses for health workers, mass health education for the general population and for populations at special risk, and active and passive screening not only for cardiovascular but also for other chronic conditions.

A special intervention group was established: medical doctors, programme organizers, psychologists and sociologists were responsible for the different levels of prevention. The main aim of the intervention was to influence the entire community.

The intervention operated mainly at the macro level. The intervention strategies took into consideration different community, social and ecological
units to reach all the people of the community. In this way the different levels of the intervention constitute a vertical system that includes:

- the whole community
- dwelling units
- smaller social units and voluntary organizations
- the family
- individual people.

Among other things, the following elements of intervention were used:

- the population was informed about the problems of CVD, about the aims and objectives of the programme in different groups of inhabitants living in the intervention area;
- all relevant local programmes and events were listed and supported;
- special health education materials were prepared on smoking, nutrition and physical activity for teachers, schools (students) and patients;
- support was given to the food industry to develop new healthy food products;
- the local antismoking measures were supported, and the introduction of local antismoking campaigns was assisted;
- local campaigns were promoted for the open use of sports grounds and gymnasiums in schools;
- the establishment of a health promotion centre in the intervention area was supported.

The programme has been described in greater detail elsewhere (27,28).

**Results and experiences in Budapest**

The CCCCP in Hungary started only gradually and formal measurements in the reference areas were started only later (baseline measurements in the reference areas were carried out in 1982–1983). Thus no major evaluation results are available and one must be careful with any early conclusions.

Three-year (1978–1981) changes in some risk factors, as estimated by the examination of samples of the general population, showed satisfactory control of hypertensive patients. The improvement of hypertension control is shown in Table 8. The proportion of treated and adequately treated subjects among the hypertensive population increased significantly. The cross-sectional comparison of a proportion of hypertensives suggests that
the improvements were due to the programme, since in the reference area the control of hypertensives was on a lower level. The net difference in change between the intervention and reference areas cannot yet be calculated because at the onset of the study there were no data available from the reference area.

By 1981, an increase had been observed in the mean serum cholesterol level and in the prevalence of obese people and of smokers. The early conclusion was that traditional health education through general practitioners and health workers has little effect on risk factor levels.

A comparison with the reference area showed that a slight increase in the crude mortality rates for AMI had taken place in the intervention area, but a definite increase took place in the reference area. An increase in the age-adjusted incidence of AMI took place in the intervention area and there was a decrease in the reference area. It should be noted, however, that in 1971 the two areas started from very different levels (the incidence of AMI was higher in the reference area).

The programme in Hungary continues and has expanded. In 1982, the MONICA project was introduced and it serves as a further tool for monitoring the changes. The programmes among children have been continued. Finally, based on the CCCCP experience, Hungary has joined the CINDI programme in attempts to develop effective integrated measures to control CVD and other noncommunicable diseases.

<table>
<thead>
<tr>
<th>Year</th>
<th>Treatment</th>
<th>Intervention area</th>
<th>Reference area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>1978</td>
<td>T</td>
<td>23</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>AT</td>
<td>6.7</td>
<td>27</td>
</tr>
<tr>
<td>1981</td>
<td>T</td>
<td>49</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>AT</td>
<td>27</td>
<td>40</td>
</tr>
<tr>
<td>1983</td>
<td>T</td>
<td>52</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>AT</td>
<td>27</td>
<td>55</td>
</tr>
</tbody>
</table>
General background

Italy as a Mediterranean country has had traditionally low coronary mortality, but during the 1970s the rates began to increase. A north–south difference was obvious; the rates were higher in the north. The Martignacco community cardiovascular control project was established in 1977 as a pilot study in northern Italy to ascertain the feasibility, safety and efficacy of a comprehensive programme aimed at the entire population and based on the actual health and social service organization of the community. The project was designed according to the WHO CCCCP principles, which were already well established by 1977. The project was planned to last for a minimum of five years and, if there were consistently positive results, to be continued and eventually extended to other districts of the region (29,30).a

Three surveys of the middle-aged population (40–59-year-olds) were planned: a baseline survey in late 1977/early 1978, a second one three years later in 1981 and a third one after five years in 1983. Two comparable communities were selected: Martignacco (population: 5259), located in the centre of the Friuli region, was chosen as the intervention area, while San Giorgio di Nogaro (population: 7651) situated in the southern part of the province, was designated as the reference area. The institution responsible for the Martignacco project was the Centre for Cardiovascular Diseases of the Regional Hospital of Udine.

Intervention

The comprehensive intervention was implemented according to three main strategies:

(a) a population strategy, based mainly on educational activities aimed at teaching the community about the risk factors for cardiovascular disease and how these risks may be reduced;

(b) a high-risk strategy, addressed to single individuals or specific groups at special risk;

(c) a strategy for secondary prevention, to prevent progression and recurrences of the disease once established.

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Information for the public, emphasizing the practical action that could be taken to combat the risk factors, was provided through public campaigns, health education, mass events and meetings for small groups, conferences and film showings on specific topics in schools, clubs, etc., and newspapers, leaflets, posters and stickers. Continuous feedback to the community on the progress of the project was organized. Special educational programmes were undertaken on specific topics: for the prevention and control of hypertension, for example, the programme consisted of free admission to the dispensary for quick check-ups of blood pressure, individual and collective information and training to encourage people to measure their own blood pressure, and the distribution of educational materials, etc.

The high-risk strategy involved subjects with high levels of one or more risk factors. They were given individual face-to-face counselling by the team physicians two or more times a year. The subjects' family doctors received regular information about the risk factors of each individual and took an important part in the intervention plan.

Concerning secondary prevention, measures to influence the course of established CVD were tailored to each individual. Following AMI all patients went through a full rehabilitation programme including comprehensive health education. Special emphasis was also placed on reducing the delays of patients with AMI in reaching medical care. The service of mobile coronary care was popularized.

**Evaluation and five-year results**

The evaluation aimed to assess the feasibility of the Martignacco project, and its effects on the prevalence of risk factors, on CVD incidence and on the probability of suffering a cardiovascular attack or death. Several results of the evaluation have been published (29-32).

For the incidence rates, people aged 40-59 years were followed from 1977 in the two areas and new attacks were carefully evaluated according to well established criteria. Because of the small size of the sample population it was also decided to assess mortality and morbidity changes by calculating survival tables. Participation in the three surveys, both at Martignacco and at San Giorgio, was on average over 90%.

The Martignacco project proved feasible at least as judged by the high participation rates and its limited costs. There were no particular problems with collaborating services, the mass media, schools, support associations and lay opinion leaders. The main risk factor results are given in Table 9. The average systolic blood pressure at the outset was somewhat higher in Martignacco compared with the reference area, but this difference was reversed during the follow-up period, so that the net change in Martignacco was significant, both for men (-9%) and for women (-11%). The same
Table 9. Risk factor levels among men and women aged 40-59 years in Martignacco (M) and San Giorgio (SG) and the net change in Martignacco from 1977 to 1983

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>147</td>
<td>145</td>
<td>147</td>
<td>159</td>
<td>-9</td>
<td>(P&lt;0.0001)</td>
<td>144</td>
<td>136</td>
<td>146</td>
<td>152</td>
<td>-11</td>
<td>(P&lt;0.0001)</td>
<td>144</td>
<td>136</td>
<td>146</td>
<td></td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>93</td>
<td>92</td>
<td>90</td>
<td>96</td>
<td>-7</td>
<td>(P&lt;0.0001)</td>
<td>90</td>
<td>88</td>
<td>89</td>
<td>90</td>
<td>-4</td>
<td>(P&lt;0.05)</td>
<td>90</td>
<td>88</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Serum cholesterol (mmol/l)</td>
<td>5.8</td>
<td>5.5</td>
<td>5.9</td>
<td>6.0</td>
<td>-8</td>
<td>(P&lt;0.05)</td>
<td>5.8</td>
<td>5.5</td>
<td>6.1</td>
<td>5.9</td>
<td>-3</td>
<td>(NS)</td>
<td>5.8</td>
<td>5.5</td>
<td>6.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>26.0</td>
<td>26.7</td>
<td>26.2</td>
<td>26.8</td>
<td>0</td>
<td>(NS)</td>
<td>26.4</td>
<td>26.5</td>
<td>26.6</td>
<td>26.6</td>
<td>0</td>
<td>(NS)</td>
<td>26.4</td>
<td>26.5</td>
<td>26.6</td>
<td>26.6</td>
</tr>
<tr>
<td>No. of cigarettes smoked per day per head of population</td>
<td>10.0</td>
<td>10.0</td>
<td>6.4</td>
<td>6.0</td>
<td>+4</td>
<td>(NS)</td>
<td>2.5</td>
<td>4.3</td>
<td>1.7</td>
<td>3.2</td>
<td>-7</td>
<td>(NS)</td>
<td>2.5</td>
<td>4.3</td>
<td>1.7</td>
<td>3.2</td>
</tr>
<tr>
<td>CHD risk estimate (age-standardized)</td>
<td>22.2</td>
<td>19.7</td>
<td>22.0</td>
<td>29.3</td>
<td>-50</td>
<td>(P&lt;0.0001)</td>
<td>5.7</td>
<td>4.1</td>
<td>7.0</td>
<td>6.5</td>
<td>-33</td>
<td>(P&lt;0.0001)</td>
<td>5.7</td>
<td>4.1</td>
<td>7.0</td>
<td></td>
</tr>
</tbody>
</table>

Note. NS = not significant.
pattern was shown by the mean diastolic blood pressure. A highly significant net reduction in the prevalence of hypertension was thus seen for both sexes (-32% for men and -22.3% for women).

In 1977 the mean serum cholesterol level was higher in Martignacco compared with the reference area for both sexes. This difference was reversed in 1983 with a significant net reduction in Martignacco for men (-8%) and a non-significant net decrease for women (-3%). The lack of significance among the women may have been masked by the remarkable increase in the serum cholesterol levels with age, demonstrated at entry.

The mean serum triglyceride level (not shown in the table) increased in a similar way in both areas during the follow-up period. For mean fasting glucose, a significant net reduction took place in Martignacco (-10.3% for men, -12.7% for women). The mean body mass index increased slightly in the two populations without significant differences. The mean skinfold thickness (not shown in the table) did not change in men but there was a slight increase for women with a -1.1% net reduction (not significant) in Martignacco.

The mean number of cigarettes smoked per day in the entire population decreased both in Martignacco and in San Giorgio, without significant net differences in the two areas (+4% for men, -7% for women). The percentage of smokers (people smoking at least 1 cigarette a day) decreased for both sexes in the two areas. The prevalence of male smokers in Martignacco fell from 59.3% to 42.4% (-16.9%), while in the reference area the decrease was from 50.8% to 40.4%. The percentage of female smokers decreased by about 7% both in Martignacco and in San Giorgio, without any net change. The discrepancies between the number of cigarettes and the percentage of smokers may be explained by some findings based on thiocyanate determinations, which suggest that reference area subjects might have underreported their daily smoking in the terminal survey. In conclusion smoking decreased in both areas without significant differences, even though there was a greater reduction in the prevalence of male smokers in Martignacco.

To summarize the effect of the intervention on risk factors, a CHD risk estimate was calculated using a multiple logistic risk function with five factors: age, systolic blood pressure, serum cholesterol level, cigarette smoking and body mass index. The analyses showed a significant net reduction of the risk of CHD in Martignacco: the estimated risk decreased by an average of 41% in Martignacco over five years.

The crude mean annual incidence of CHD and stroke over five years (1977-1983) is presented in Table 10, showing a favourable difference for the population of Martignacco, with the exception of CHD for women and nonfatal stroke for men. To minimize the effect of small denominators, survival tables were calculated from which event cumulative probabilities were drawn. The event cumulative probabilities for certain conditions and
Table 10. Crude mean annual incidence of CHD and stroke per thousand population in 1978-1983 in the Martignacco project among men and women aged 40-59 years

<table>
<thead>
<tr>
<th>Type of attack</th>
<th>Martignacco</th>
<th>San Giorgio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men</td>
<td>Women</td>
</tr>
<tr>
<td>CHD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatal</td>
<td>0.5</td>
<td>0.7</td>
</tr>
<tr>
<td>Nonfatal</td>
<td>1.3</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>1.8</td>
<td>1.5</td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatal</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Nonfatal</td>
<td>1.6</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>2.3</td>
<td>0.2</td>
</tr>
</tbody>
</table>

the percentage change in the intervention area are given in Table 11. Considering only the statistically significant results, in Martignacco there was a net reduction in total mortality minus violent death for men (-34%) and for both sexes (-31%). The probability of having a heart attack was reduced in Martignacco by about 60% in men, while the probability of suffering a stroke decreased even more markedly in women. Finally, the probability of having a heart attack or a stroke decreased by an average of 40% in the whole cohort of Martignacco.

Continuation, applications and conclusions

The general acceptance of the project by the population of Martignacco was particularly stressed towards the end of the initial intervention period. Many people expressed their fear that the project would cease and the whole community felt that continuation was important. A formal petition was presented to the district administrators and local health authorities late in 1983. The Council of Martignacco formally decided to continue the project and an agreement for a further five years was signed in 1984.

The continuation programme includes the implementation of the already established activities and several intensified intervention measures. It was also decided to enlarge the permanent project office in Martignacco,
Table 11. Cumulative event probabilities (X 10 000) for certain conditions in Martignacco (M) and San Giorgio (SG) with statistically significant differences in 1978-1983 and percentage reduction in the intervention area

<table>
<thead>
<tr>
<th>Type of condition</th>
<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M SG</td>
<td>Change</td>
<td>M SG</td>
<td>Change</td>
<td>M SG</td>
<td>Change</td>
</tr>
<tr>
<td>Total mortality minus violent death</td>
<td>514 783</td>
<td>-34.3a</td>
<td>-</td>
<td>-</td>
<td>361 524</td>
<td>-31.1a</td>
</tr>
<tr>
<td>Fatal and nonfatal CHD (WHO criteria)</td>
<td>109 282</td>
<td>-61.3a</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fatal and nonfatal CHD (Hard criteria)</td>
<td>78 204</td>
<td>-61.7a</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Fatal and nonfatal stroke</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>177 298</td>
<td>-40.6a</td>
</tr>
<tr>
<td>Fatal and nonfatal stroke</td>
<td>-</td>
<td>-</td>
<td>15 124</td>
<td>-87.9a</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*a P<0.05.

to provide it with a computer terminal linked to the main frame computer in Udine. As the programme continues the possibilities will be examined of developing an integrated prevention programme of noncommunicable diseases in the area. The evaluation of the further development will take place in the framework of the MONICA project.

During the first project period, the Centre for Cardiovascular Diseases in Udine received many invitations to develop similar activities in other administrative areas, especially in those neighbouring Martignacco. After the official presentation of the Martignacco project results during the WHO CCCCP meeting in Udine, to which local and national newspapers gave a lot of space, the requests from administrators and communities rose suddenly. This social demand was supported by the Regional Health Authority which charged the Centre for Cardiovascular Diseases to design
and coordinate a regional programme for cardiovascular disease prevention. Concerning evaluation, the whole area is actively involved in the MONICA project, so the Region has standardized registers for coronary and cerebrovascular attacks and carries out standardized population surveys for coronary risk factors.

In conclusion, after five years of activities the Martignacco project was successful in reaching its main objectives. Comparing the characteristics of the middle-aged population of Friuli with those from other Italian regions (33), it appears that the population of Friuli is not much different from those of other northern Italian communities. Thus the results should well be applicable in other parts of northern Italy, as well.

Although one must still be cautious about the conclusions on the long-term effects of the Martignacco project on disease, the interim results look promising and match well with those in the Roman multifactorial prevention of CHD project on one side and the North Karelia project on the other. The good feasibility and role of the project as a tool for wider national developments seem to be obvious.

NORWAY: FINNMARK STUDY AND TROMSØ STUDY

General background

The mortality ascribed to CHD increased rapidly in Norway between 1951 and 1970. When the age- and cause-specific mortality at the county level was analysed for the first time in the period 1959–1962, considerable regional differences were observed and Finnmark, the northernmost county, showed the highest CHD mortality rates. The mortality rate was at least as high in the thinly populated areas as in the small urban areas in the region. For the period between 1959–1962 and 1964–1967, the increase in the CHD mortality rates in the three northernmost counties was clearly above the national average for both sexes.

Although in the 1970s relatively little national action was taken to reduce the CHD rates, with the exceptions of a parliamentary bill on nutrition policy and active antismoking work, several major studies were launched. The Oslo City health department completed a large cardiovascular survey of males in Oslo in 1972 in cooperation with the Oslo Municipal Hospital. This was followed by several epidemiological studies and trials that have given important information on the options for CVD prevention. The state Mass Radiography Service carried out screening studies in Finnmark, Sogn og Fjordane and Oppland counties during the years 1974–1985.
Two projects in particular began in 1974 in the northern part of Norway and became involved in the WHO CCCCP. One project consisted of special community-based activities in the county of Finnmark, and the other was a heart study initiated in the municipality of Tromsø by the University of Tromsø. This was a well planned epidemiological study, associated with intervention measures in the city of Tromsø. Both projects had their own particular backgrounds. They did not comply with the CCCCP protocol in a strict sense: both projects involved community-based interventions on CVD risk factors and the assessment of changes, but they lacked formal reference areas.

The Finnmark study

Finnmark is the country's northernmost county and has a population of 80,000, who live in small villages or towns scattered over a wide area (1.7 inhabitants per km$^2$). In the early 1970s, the county health authorities took the initiative in organizing a comprehensive, systematic CVD programme as a part of their ordinary preventive activities. This programme was to include all the residents in the county, but was directed mainly at men and women aged 35-49 years. In order to obtain information about CVD risk factors, for planning purposes, a random sample (10%) of residents aged 20-34 years was examined for these factors. The intervention strategy was as follows:

- treatment and counselling were given to high-risk individuals detected through screening of the eligible population;
- intensified health education was arranged for the population as a whole.

The Finnmark study was initiated mainly as a health programme and not as a trial. The intention was to test the possibility of mobilizing a county's primary health care in a systematic CVD prevention programme. Evaluation of the programme raised problems, because the use of a reference area was, for several reasons, excluded. The aim was to learn about the effect of the intervention on risk factor levels in the population by using data from two screening examinations: one carried out immediately before the intervention began, and one three years afterwards. Risk factor changes in the screened cohorts (i.e. men and women aged 35-49 years and a 10% sample of those aged 20-34 years) were analysed, concentrating on contrasts between groups of people allocated to different programmes according to risk factor level (34).

For the baseline survey in 1974-1975 (Finnmark I) 9353 men and 8049 women in the county were invited to take part. These people comprised all the residents aged 35-49 years and a 10% random sample of all
residents aged 20–34 years (100% in four of the municipalities). An ident­
ical screening (Finnmark II) was carried out exactly three years after the
first screening, in each locality. Altogether 15 558 people were invited to
take part in Finnmark II. Of these, 79.1% (12 329) attended both
screenings.

The results of the study based on the data from the two surveys have
been published elsewhere (35). During these three years, the serum choles­
terol level decreased (cross-sectional comparison) on average by about
0.3 mmol/litre owing to: first, a decrease among the people referred for a
follow-up examination and second, a decrease among household members
of people who had been followed up. The effect of a referral to attend a
follow-up examination because of high blood pressure was doubtful.
Cigarette consumption decreased (cross-sectionally) 12% for men and 4%
for women. The overall decrease in risk factors indicates a possible health
benefit of about 20%, calculated in terms of myocardial infarction risk
over 10 years.

Although, owing to the lack of a formal reference area, it is difficult to
assess the extent to which the changes were due to the intervention, the
study team was satisfied with the experience. The intervention was feasible
and changes among high-risk people were likely to be, at least partially, a
consequence of the intervention. Because CVD mortality and morbidity in
Finnmark is being monitored, the study team hopes in the future to
demonstrate that changes in disease rates reflect the observed risk factor
changes.

The Tromsø heart study

The municipality of Tromsø is located 400 km north of the Arctic Circle
and covers 2432 km². The total number of inhabitants is about 45 000. The
municipality is part of the county of Troms with a total population of
about 130 000. The municipality comprises both a number of islands and a
part of the mainland.

The primary objective of the Tromsø heart study was to try to explain
the relatively high mortality figures for CHD in this sparsely populated
area (36). Along with this scientific objective, steps were taken on different
levels to try to reduce the CHD risk that had been recognized as a major
health problem in the region.

The study was run in the municipality of Tromsø, which comprised the
city and four nearby areas. No reference area was established. The first
subjects who had been identified at the screening were sent for follow-up
and treatment at the outpatient clinic. The methods used in the first
Tromsø survey were to some extent adopted from the Oslo study, as in
the Finnmark study. A general educational campaign was arranged in
conjunction with the screenings, in addition to advice and action aimed at high-risk individuals.

The second screening was arranged in 1979/1980. Comparison of the risk factor prevalence rates in 1979/1980 with those measured at the initial screening, revealed the extent to which the risk factor levels had changed in the programme area. About 5000 men aged from 20 to 54 years took part in both examinations.

The results showed a substantial reduction in the prevalence of smokers, from 57% to 48%, (but this reduction was also observed in the whole country), a slight and unexplained increase in blood pressure (from 127 to 130 mmHg) and a marked reduction in serum cholesterol, from 6.6 mmol/litre to 5.9 mmol/litre. The changes were strongly related to the educational level at entry in 1974. About 35% of people reported changes in their diet, and the proportion of those who reported taking regular exercise increased from 24% to 35% in five years.

Some preliminary observations have been made on mortality data. They are difficult to interpret, but during the period 1976–1980 a clear decrease in stroke death rates was shown, together with a levelling off of the increasing trend in mortality from CHD.

The study team felt that the programme was feasible, but the effects were difficult to assess, partly because of the national activities in Norway. This was no doubt substantially influenced by the various studies carried out in the country.

SWITZERLAND: THE NATIONAL RESEARCH PROGRAMME 1A, PRIMARY PREVENTION OF CARDIOVASCULAR DISEASES

General background

It seemed particularly appropriate to make a concerted effort to prevent CVD in Switzerland in the 1970s: ischaemic heart disease mortality was still on the increase up to 1979. Nearly 50% of all deaths were due to CVD. Against this background, the Swiss National Science Foundation decided in 1976 to fund the national research programme 1A on the primary prevention of cardiovascular diseases, based on a decision by the Federal Minister of the Interior.

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The main objectives of the national research programme were twofold: (a) to evaluate possible ways of reducing known cardiovascular risk factors in the local populations of two intervention communities and compare the effects with two communities receiving routine care, and (b) to provide tested cost-effective methods for nationwide use in the future control of CVD. To achieve this aim, comparable communities with between 10 000 and 20 000 inhabitants were selected (one pair in the French-speaking part, one pair in the German-speaking part of the country). For the purpose of epidemiological comparison, a fifth community in the Italian-speaking part of the country was also included (37).

**Project design and intervention**

The programme began in 1977 after the planning phase, with a baseline assessment in stratified random samples covering all four communities and additional volunteers in the two intervention communities. The baseline assessment was followed by 2 1/2 years of intervention in two of the four communities. At the end of 1980, there was a final assessment, including all those screened at the first examination and a further random sample of those not screened at the beginning of the programme.

Three main principles of community-oriented health education guided all the intervention methods:

- the active participation of the population
- the mobilization of personal and community resources
- the integration of the new programme into existing local health and social services.

The local citizen health action committee, with its coordinator, assumed responsibility for these three functions. The main tasks included the conceptualization, planning and implementation of the various components of the intervention programme in the community as a whole, as well as in specified high-risk groups.

Work with high-risk groups was supplemented by interventions designed to reach the whole community. For this purpose, all the media were included as an integral part of the prevention strategy. In addition, environmental changes were promoted in all sensitive risk areas (e.g. by trying to reach distributors and producers of food products, advertisers, and cafeteria and restaurant chefs). Finally, rather than stigmatizing those individuals with risk factors, attempts were made to motivate the whole population towards a healthier lifestyle.
Evaluation, results and experiences

The evaluation was based on the results of the baseline and follow-up surveys of the random population samples. The results presented in Table 12 refer to the members of the original random samples who could be examined at the end of the programme. Re-examination rates averaged roughly 70%. The evaluation was based on a questionnaire covering various topics and a number of standardized biological measurements. The general conclusions of the evaluation were as follows (38,39).

1. Large segments of the population participated. It proved possible to motivate the populations of the intervention communities (Aarau and Nyon) to participate actively in the community health programmes. Over half the population took part in one or more activities. This interest included, furthermore, the willingness to pay for some of the preventive services offered.

   Most importantly, in both areas, the health programmes continued even after the outside financing had ceased. This decision to continue was supported by a popular vote in Aarau and by a (publicly subsidized) private health league in Nyon.

2. The preventive programme was effective for smoking control. The evaluation showed a reduction in risk factor levels in all four communities over the period 1977–1980, but the reduction in smoking was significantly more marked in the intervention communities than in the reference communities. For instance, 26% of regular smokers in the intervention communities, compared with 18% of regular smokers in the control communities, broke the habit. In addition, significant changes were found in hypertension control, although this was not reflected in the mean blood pressure levels. In the German-speaking part of Switzerland, the rising trend of serum cholesterol with age was reduced in the intervention community, and for women of all ages there was a significant reduction.

   As would be expected, the changes were greater among those who participated in preventive activities than among the others. A summary of the risk factor changes is given in Table 12.

3. Calculations based on a cost–benefit model showed that the health benefits of risk factor reduction well outweighed the programme costs.

The experience and results obtained in the Swiss project suggest that such cardiovascular community control programmes are both feasible and effective under Swiss conditions. The project team considers that the final report gives Swiss decision-makers the opportunity to determine whether future countrywide prevention is warranted. The project team is, indeed,
Table 12. Risk factor changes in the random population sample aged 16-69 years (standardized by age and sex) in the national research programme 1A.

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Intervention towns (N = 848)</th>
<th>Reference towns (N = 1358)</th>
<th>Net percentage change 1977/78-1980/81</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular smokers (%)</td>
<td>33</td>
<td>27</td>
<td>37</td>
</tr>
<tr>
<td>Amount of tobacco consumed (g/day)</td>
<td>5.0</td>
<td>4.2</td>
<td>6.7</td>
</tr>
<tr>
<td>Serum cholesterol (mmol/l)</td>
<td>5.6</td>
<td>5.4</td>
<td>5.6</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>123</td>
<td>126</td>
<td>125</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>23.4</td>
<td>23.8</td>
<td>24.1</td>
</tr>
</tbody>
</table>

Note. NS = not significant.

Source: Gutzwiller, F. et al. (37).

involved in a number of national activities in the field of CVD control, including the Swiss MONICA project, that take advantage of the experience gained with the present pilot project.

USSR: POPULATION STUDY ON MULTIFACTORIAL CVD PREVENTION

General background
Cardiovascular disease is a major public health problem in the USSR, although the situation varies greatly throughout the country. The fight
against CVD has proceeded along several lines, and a number of studies of
different kinds were launched in the 1970s.

In 1977, a population study on multifactorial CVD prevention was
started in six different centres. This study has its own features and does not
completely comply with the CCCCP. In connection with this study,
community-based activities to control CVD were launched in several
centres — notably in Moscow and in Kaunas (in the Lithuanian SSR) —
where the activity ultimately led to the launching of integrated pro­
grammes to prevent major noncommunicable diseases, as part of the WHO
CINDI programme. The approaches used and results obtained in the
prevention of CVD in the USSR have been discussed in greater detail
elsewhere (40).

The population study
The study is being conducted among men aged 40–59 years according to a
standard protocol, in six cities: Moscow, Kaunas (Lithuanian SSR), Minsk
(Byelorussian SSR), Tashkent (Uzbek SSR), Frunze (Kirghiz SSR), and
Kharkov (Ukrainian SSR). In each city the study population was divided
into three groups: one group in which intensive prevention was carried out
by specially trained personnel and two comparison groups. In the compari­
on groups, the preventive measures were carried out by the physicians of
the existing network of health services. The prevention group and the first
comparison group were examined in their entirety. In the second com­
parison group, only 10% random samples were examined at the beginning
and end of the study. Death rates from and incidence of CHD were
constantly registered within the study population, which totals 71 000 men
in the six centres.

After the baseline studies, preventive measures were carried out for at
least a five-year period. Because the centres joined the study at different
times, the final evaluation will be made only in 1988. The total number of
men examined at the outset was 30 047. The average response rate was
63%. The final five-year follow-up examination has been completed in
Moscow and Kaunas and several results are already available (41–43). In
the other centres, the follow-up examinations are still being carried out.

In Moscow and Kaunas, preventive measures were applied to the entire
intensive prevention group. They included intervention in five major CHD
risk factors, and the detection and treatment of patients with CHD.

The five-year results of the study in Moscow and Kaunas demonstrated
a stable 20–25% decrease in the prevalence of arterial hypertension (dias­
tolic blood pressure \( \geq 95 \text{ mmHg} \)) and a 22% decrease in the prevalence of
smoking in the intensive prevention group as compared with the situation
at entry. These changes were accompanied by a decrease in mean levels of
systolic blood pressure, diastolic blood pressure and the number of

65
cigarettes smoked per day. Over the same time, the first comparison group did not demonstrate much change in blood pressure level, and the proportion of smokers decreased insignificantly (by 11%). The decrease in the prevalence of hypertension is accounted for by the improvement in treatment and a reduction in incidence. The number of treated hypertensives doubled, while the number of effectively treated hypertensives increased from 16% to 35%. A 13.6% decrease in the risk of dying from CHD was estimated in the intensive prevention group, and put down to the relative decrease in systolic blood pressure and smoking.

The five-year mortality results obtained in Moscow showed that total mortality was 21% lower in the prevention group (7.4 and 9.4 deaths per 1000 subject-years in the prevention and first comparison groups, respectively); CVD mortality was 41% lower (2.5 and 4.3 deaths per 1000 subject-years, respectively), including myocardial infarction mortality that was 38% lower (1.9 and 3.1 deaths per 1000 subject-years, respectively). Coronary heart disease patients demonstrated the greatest decrease in the five-year incidence of AMI and in CVD mortality. Thus, the incidence of AMI (fatal and nonfatal) was 12.0 and 22.7 cases per 1000 subject-years in CHD patients in the prevention and first comparison groups, respectively; CVD mortality rate was 6.7 and 11.7 deaths per 1000 subject-years, respectively; and AMI mortality rate was 5.8 and 11.7 deaths per 1000 subject-years, respectively. A drop in CVD mortality among CHD patients was obtained only two years after the study began. Though no significant differences were obtained in mortality rates among subjects with risk factors but without CHD in the course of the study, nevertheless mortality rates fell by 16.4%, primarily owing to a decrease in CVD mortality in the prevention group when compared with the first comparison group. Follow-up and further analyses are being undertaken.

YUGOSLAVIA: THE NOVI SAD PROGRAMME

General background

The CCCCP of the Novi Sad population, in the Province of Voivodina, was launched in 1975 and planned for a five-year period, i.e. until 1980. It was intended to be carried out as a regular part of the health care system and of community action in general. The Clinic for Internal Medicine of the Faculty of Medicine of Novi Sad was in charge of the programme during its first phase, and the Novi Sad health centre took over in 1980. During its first phase, the programme was carried out in the urban part of the city only (140 000 inhabitants). In 1981, it spread throughout the whole city of Novi Sad including its suburbs (230 000 inhabitants).
The programme had an interdisciplinary character, and many institutions and experts from different backgrounds took part. Apart from the Faculty of Medicine, primary health care was also centrally involved. The Scientific Council of the programme, which headed the whole programme, consisted of representatives of all the services and institutions involved. Fig. 6 shows the organization of the programme. The resources for the programme implementation came from several regular sources. Special resources for scientific work and the education of professionals were secured.

The CCCCP of Novi Sad was a wide intervention study based on the existing health care services and community resources. The programme was implemented in collaboration with WHO as regards coordination, the exchange of experiences with other centres and discussions of methodology. The major objective of the programme was to stop the increasing trend of CVD mortality and eventually to decrease CVD mortality, morbidity and invalidity rates.

Before the programme was implemented, preparations were made within the health service system, the community and the whole population of Novi Sad. During the first phase, the extent of CVD and other data relevant to the health of the population in the city were assessed. The prevalence rates of the risk factors were also assessed and preparations were launched for wider community initiation and involvement in the programme. The available data were collected and analysed on the demographic and health statistics of the Novi Sad population. A population sample of adults was chosen and examined.

This epidemiological information helped to determine the target risk factors and to guide further action on elevated blood pressure, obesity, smoking habits, high serum cholesterol levels, nutrition and the promotion of physical activity. Plans for the role of primary health care in the programme were made and launched. Diagnostic criteria for the three main CVD (hypertension, ischaemic heart disease, stroke) were adopted, as was the method of the first medical check-up. Myocardial infarction and stroke registers were designed and established.

The population and all community organizations were encouraged to take part in the programme and intersectoral collaboration was established. The problem was seen as a common one, and not belonging to the health services alone.

The programme developed in four main directions.

1. Promotion of CVD diagnosis and therapy. This was achieved through primary health care (emergency care, general practice and occupational health). Clinics for CVD prevention and control were established to provide primary clinical cardiovascular care in the Province of Voivodina, and a CVD institute was set up in Sremska Kamenica with the latest equipment, to provide a higher level of specialized therapy for CVD patients.
2. Early detection and treatment of CVD and its risk factors. This was achieved through the active participation of the whole health service, and of primary health care in particular. The early detection and control of hypertension, myocardial infarction and stroke were emphasized, but so also were the early detection and treatment of other CVD-related conditions (hypercholesterolaemia, diabetes mellitus) and the major risk factors (smoking, unhealthy diet and low physical activity).

3. Continuous education of medical professionals. Courses in cardiology were arranged and supported by the CVD institute in Sremska Kamenica. Mainly health workers in primary health care took part.

4. Long-term measures to influence health-related habits. Community action took place through the establishment of a coordinating committee for CVD health care promotion in Novi Sad, with the mayor of the city as the chairman. The committee consisted of the representatives of educational institutions, labour organizations, humanitarian organizations, other relevant local community organizations and the mass
media. The committee aimed to provide social support for the actions of the programme and for intersectoral cooperation in modifying community lifestyles. Such measures were aimed at young people (preschool children and schoolchildren) in the first place, but also at adults.

The implementation and evaluation of the programme took place simultaneously. Health status changes in the population of Novi Sad were assessed. Changes in the way the health services provided CVD prevention were observed. The detection and treatment of hypertension and diabetes mellitus have become more efficient and the treatment of myocardial infarction and stroke has been improved.

Changes in dietary habits (a move from animal fats to vegetable oils), in tobacco consumption, and in physical activity were assessed. The impact of all these behaviour changes on the population risk factor levels was also assessed. Further follow-up of indices of these changes was made possible when the Novi Sad programme joined the WHO MONICA project.

Results

Major population surveys were carried out in 1976 and 1984. The first involved a 5% sample of the adult population (≥20 years) of urban Novi Sad; that in 1984 was a MONICA sample (1600 people) of those aged 25–64 years and included the neighbouring villages. No reference area was used; only changes from 1976 to 1984 were assessed, comparing only those aged 25–64 years.

Between 1976 and 1984, the proportion of newly detected hypertensives decreased significantly from 32% to 5%. The proportion of treated hypertensives (Fig. 7) and of successfully treated hypertensives also increased (Fig. 8). These changes were associated with a significant decrease ($P<0.05$) in the mean values of systolic and diastolic blood pressure (Table 13).

In 1976, 39% of the population aged 25–64 years had cholesterol values above 5.7 mmol/litre: this percentage decreased to 35% in 1984 ($P<0.05$). The percentage of male smokers decreased from 55% in 1976 to 52% in 1984. The mean number of cigarettes smoked also decreased, whereas the proportion of female smokers increased. A comparison of the 1976 and 1984 data on physical activity is not possible because different criteria were used. Other data have indicated an increase in the total number of people active in sports: in 1984, 44% of the population took up these activities in their leisure time. Overweight decreased in the younger age groups, but increased in the older age groups. A myocardial infarction and stroke register was established in 1983. According to the register, the incidence rate of AMI decreased by 21% between 1983 and 1985, and AMI mortality decreased by 24% in the same period. The registered incidence rate of stroke
Fig. 7. Percentage of treated hypertensives in the hypertensive population of Novi Sad, aged 25–64 years

decreased by 10%, and that of stroke mortality by 21%. The rates per 1000 inhabitants for AMI incidence were 2.56 in 1983 and 2.00 in 1985; for stroke incidence, 2.68 in 1983 and 2.38 in 1985.

Conclusions and further development
The programme proved the feasibility of a well planned project combining research and practical intervention. The local health service has, due to this
programme, become an initiator and a coordinator; in fact, a reorientation has taken place in its work, as a whole. It now emphasizes the promotion of CVD diagnosis and therapy, of early detection and treatment of the diseased and those at risk, as well as of long-term preventive measures aimed at improving lifestyles. Increasing the education of health workers was essential, especially for those workers in primary health care, and took place continuously during the programme. Close collaboration with both higher administrative levels, as well as with the local primary health care, has been vital. Besides the involvement of the health service, the active involvement of the whole community and its individuals was crucial for the success of the programme. To develop further, the programme stressed the need for more accurate follow-up of the changes in CVD morbidity and mortality, and in their risk factors. Novi Sad therefore joined the MONICA
Table 13. The mean values of systolic and diastolic blood pressure in the population of Novi Sad, aged 25–64 years

<table>
<thead>
<tr>
<th>Blood pressure</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Average</td>
<td>Standard deviation</td>
</tr>
<tr>
<td>Systolic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>135.3</td>
<td>20.7</td>
</tr>
<tr>
<td>1984</td>
<td>133.2</td>
<td>17.3</td>
</tr>
<tr>
<td>Diastolic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1976</td>
<td>86.9</td>
<td>10.7</td>
</tr>
<tr>
<td>1984</td>
<td>84.2</td>
<td>10.8</td>
</tr>
</tbody>
</table>

project in 1982. At present there is a strong intention to use the CCCCP experience as a basis for a more integrated, countrywide programme for the prevention of noncommunicable diseases. Thus Yugoslavia has joined the WHO CINDI project. The CCCCP and CINDI principles are likely to be integrated in the future, and the experience gained in the pilot area of Novi Sad is likely to be applied to wider areas and ultimately countrywide.

CONCLUSIONS

The CCCCPs have been successful overall despite their diversity. No two single programmes were the same, but they all shared the community approach based on a fairly loose framework. Although the CCCCPs were not trials, because several of them did not include reference areas, scientific evaluation of their effects was possible under certain conditions, as was done in North Karelia. The programmes showed that risk factor levels in the general population or in samples could be changed in a satisfactory way in many areas, with different degrees of success; the CVD incidence and mortality also showed different trends; in some places their rates fell. Difficulties in some areas were a reflection of the limited government
support for the programmes. A certain dichotomy has been noted between primary prevention and treatment, the latter having received less attention; difficulties were encountered in some areas in raising general practitioners' interest in prevention, although younger doctors seem to be more positively oriented towards general health promotion than single disease care. No investigation was promoted on the reasons for success or failure, yet it is strongly needed in order to identify the reasons for motivation or non-motivation; the real problem of all the programmes has been to build a bridge between research and trials on the one hand and practice and the community on the other, trying to apply the best knowledge, exploit existing resources and facilities in the best way and monitor the reaction of the community.

OTHER SIMILAR PROGRAMMES IN THE EUROPEAN REGION

Several other countries/centres were also involved in the CCCCP cooperation. These countries, however, had programmes that were on a smaller scale, which started later or complied less with the CCCCP protocol than those already reported. The following countries have presented their programmes at one or more WHO CCCCP meetings, but they represent by no means all the possible activity in this field in Europe.

Austria

Two programmes related to CCCCP have taken place in Austria recently, both based on repeated screenings for cardiovascular risk factors in people aged 20 years or above. One involves the province of Vorarlberg and the other the Tyrolean village of Zirl (about 1000 inhabitants). Follow-up data in the early 1980s suggested spontaneous improvements in some risk factors in Vorarlberg. In Zirl, a dietary counselling programme resulted in a 10% decrease of serum cholesterol in males and 8% in females. The programme in Vorarlberg was subsequently enlarged and became part of the CINDI programme.

Bulgaria

In Bulgaria, a community project was carried out in the town of Gabrovo as part of the country's CVD control programme. Nonmedical activities included large-scale health education, the improvement of facilities for physical activity, nutritional interventions, antismoking campaigns, etc.
Medical activities consisted of mass screening for risk factors and diseases, clinical investigations and dispensary control (treatment, rehabilitation, social/professional readaptation). Training courses for physicians were conducted. Attention was given to the task of developing an appropriate system for evaluating health changes in the community. The activity expanded in the 1980s, and in 1985 the country joined the CINDI programme.

Czechoslovakia

The CCCCP-related activities in Czechoslovakia have been numerous. They have included a number of epidemiological studies on CVD risk factors and prevention. A major national hypertension control programme was started in 1976. Screening for other chronic disorders was also included. Several studies and programmes among children were launched. The CCCCP activities in the country were always considered as an integral part of the existing health care system, with special focus on hypertension and ischaemic heart disease. In 1984, the MONICA project was started in Czechoslovakia and the following year the country became associated with the CINDI programme.

Greece

As a first step in the field of CVD epidemiology, the Athens University Medical School carried out an examination in 1978 of a representative occupational sample of 8000 factory workers in the area of Athens. An examination of the population of the island of Salamis, which also belongs to the wider area of Athens, was undertaken next. In 1979, an examination of all three-generation families took place. These studies have given much information on the occurrence of CVD risk factors in the Greek population and have led to a number of further activities.

Ireland

Ireland became involved in the CCCCP at a relatively late date, although a large amount of research and activities on CVD has been carried out over the past decades. This was mainly due to the fact that Ireland was observed to have one of the highest mortality rates from CHD in the world. These earlier programmes, based mainly on large-scale risk factor screenings, have been disappointing because of the absence of resulting risk factor changes, except in the treatment of hypertension. After they rejected the MONICA project as an observational enterprise, the Government and the Irish Heart Foundation decided in 1985 to launch an intervention project in the county of Kilkenny (with a population of 70,000 inhabitants). The
overall protocol followed the CCCCP design closely and was similar to that of the North Karelia project. A formal reference area was chosen and a baseline survey was carried out among representative population samples in the two areas. Thereafter a community-based intervention was started in the intervention county.

Malta
Malta was a late joiner of the CCCCP activity. In 1984, after an exploratory study, Malta started a register of CVD following the MONICA procedures and as part of the MONICA project. The local situation is favourable for comprehensive disease and risk factor surveillance since the population is limited (about 300,000 inhabitants) and there is only one major hospital. Obviously no reference areas are available for comparison. Screening for cardiovascular risk factors was started in random population samples. Several intervention measures were also introduced, not only for CVD, but also for some other chronic diseases, and the country joined the CINDI programme.

Portugal
Typical of the situation in Portugal is the high rate of cerebrovascular stroke (obviously due to high blood pressure levels) but relatively low rate of CHD. With this background, and given the scarcity of resources, the activity in Portugal has concentrated on hypertension control. Already in the mid-1970s, a community programme to control hypertension was started, the Musgueira study. This study involved an intervention and a reference area, and the establishment of a hypertension clinic and register. In the 1980s, a group on CVD prevention gradually expanded these activities and a number of national health education campaigns were launched, and ultimately in 1986 an institute for preventive cardiology was established.

Romania
Many CCCCP activities were tested and gradually implemented in Bucharest in the 1970s, under the guidance of the Centre for Cardiovascular Diseases. These consisted of an AMI register, secondary prevention and rehabilitation, the evaluation of coronary care units, a health education programme, a primary prevention trial, a stroke register, and a control programme for diabetes, obesity and nutritional disorders. A mass screening for several chronic diseases was carried out in 1972–1973 in two areas, one urban and one rural. Finally, the CVD programme was intended to be integrated into the existing primary health care programme. These CCCCP activities taking place in Bucharest followed the principles laid down at various WHO meetings.
Sweden

The Gothenburg intervention trial was started in the early 1970s and ended in the early 1980s. It was a randomized trial and not a community programme in the strict sense of the term. Nevertheless, a number of CVD-related studies and activities in Gothenburg made the city a special centre for CVD control: a community control programme for hypertension has been carried out, for example. In 1977, a similar programme was also initiated in Skaraborg county, near Gothenburg, an area with a population of 240 000. No formal community-based evaluation of the development in Gothenburg has taken place. There are several indications, however, of favourable risk factor development in the city and also indications of more favourable CVD mortality trends there than elsewhere in Sweden.

OTHER SIMILAR PROGRAMMES OUTSIDE THE EUROPEAN REGION

Preventive CVD community programmes have also been developing outside the European Region. At about the same time as the Finnish North Karelia project, the Stanford three community study was planned and launched in the United States (44). This Stanford study was limited in scope compared with the North Karelia project. It concerned a much smaller population, used mainly mass media intervention over three years to affect only risk factors and behaviour, and it did not assess possible changes in disease rate. Nevertheless, the effect of the intervention on CVD-related behaviour and risk factors was positive.

At the same time as the North Karelia project and the Stanford three community study, a third even more restricted community-based intervention study on CHD risk factors started in Jerusalem (45). This study, the so-called CHAD programme, was instituted in a family practice area covering some 2500 people in western Jerusalem in the early 1970s. Its effectiveness was evaluated by comparing the changes among about 500 cases detected by surveys conducted around 1970 and 1975 (all residents aged 25 years and older were invited to take part) with those changes observed among about 1500 people examined in an adjacent control neighbourhood. Hypertension decreased in prevalence by 33%, hypercholesterolaemia by 31%, cigarette smoking by 23% (among men), and overweight by 13%. Allowing for the reductions observed in the control population, the net reductions in prevalence were 20% for hypertension, 15% for hypercholesterolaemia, 11% for cigarette smoking (among men) and 13% for overweight. The results suggested that intervention centred on
primary health care and under the given conditions had an appreciable effect on cardiovascular risk factors in the population. The programme has been continued, an interim 10-year evaluation of the intervention population has been done, and a 15-year evaluation of both populations is being carried out.

The results obtained in the Stanford study encouraged the investigators to initiate a larger study, known as the five city project (46). In this investigation, begun in 1978, two large cities were selected for educational intervention, and three others were assigned for reference. Since the total population of the five cities was about 350 000 people, it was anticipated that a significant reduction in morbidity and mortality could also be obtained, if the study were to last nine years. Because a self-sustaining programme in the community was required and because of the success of the North Karelia project in using community organization, the aim was to enhance and systematize the community organization programme in the five city project. Preliminary mid-course results on risk factor reduction are encouraging (47).

A number of additional community programmes or studies are being planned or are already under way in other continents. Many of them are in principle comparable to the European CCCP format and to the North Karelia project. As in Europe, some communities are too small for disease rate changes to be measured and the programmes are concerned with behaviour and risk factor changes only. Some do not have reference communities and some assess the changes only among those subjects initially examined (cohort analysis), as in the Stanford three community study or the CHAD programme in Israel. The actual community settings and intervention approaches vary considerably in the different studies. Such programmes have been launched for instance in Cuba, China, on the north coast of New South Wales in Australia, and near Capetown in South Africa, as well as in Minnesota, Pennsylvania and Rhode Island in the United States. The studies in Minnesota and Rhode Island are large, comprehensive and long-term like the five city project of Stanford. These three American studies are linked through their common US federal funding resources and their shared methodology for evaluating the outcome.

As mentioned earlier, the development of CVD-related community programmes in the developing countries has been more limited, for several reasons. Those programmes implemented in developing countries have emphasized the role of primary health care, and been influenced by general government decisions about primordial prevention aimed at avoiding the rise in CVD experienced in the industrialized countries.
PART III

DISCUSSION AND CONCLUSIONS
PROGRAMME IMPLEMENTATION

The CCCCPs were implemented in a number of European countries within the framework of the WHO collaborative programme. The programmes have followed the same general principles in the different countries, but the nature of the programme as well as the type of community have greatly varied from country to country.

In some countries the intervention communities have been large enough (as in North Karelia) to be able to assess disease changes as well; in some countries (as in Switzerland) the communities have been smaller, so that only risk factor changes were assessed. Some countries (Norway and Yugoslavia) have found it difficult to have a reference area. The emphasis in the scope and contents has varied a great deal. Some programmes (e.g. in the German Democratic Republic) have emphasized more the role of the health services, while others have concentrated more on the role of other community organizations (e.g. in the Federal Republic of Germany).

Table 14 gives a summary of the nine main programmes described earlier. The summary is necessarily simplified and the earlier text should be consulted for further information.

FEASIBILITY OF THE PROGRAMMES

Overall, the experience gained in the programmes described in Europe, as well as the rapid growth in the number of such new programmes in Europe and elsewhere, has clearly demonstrated the feasibility of comprehensive community-based cardiovascular programmes. In no case did the programmes fail to be implemented. It is difficult to discuss in detail the actual implementation of the programmes, as the way in which the interventions were carried out was not assessed. This would have been difficult, but interesting.
Table 14. Summary of the CCCCPs reviewed in this publication

| Interventio
<p>| Type of | Reference | Evaluation | Starting | Evaluation | Type of |</p>
<table>
<thead>
<tr>
<th>area(s)</th>
<th>community</th>
<th>community(ies)</th>
<th>criteria</th>
<th>year</th>
<th>year(s)</th>
<th>intervention</th>
</tr>
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<tbody>
<tr>
<td>Finland</td>
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<tr>
<td>North Karelia</td>
<td>Whole county (N = 180,000)</td>
<td>County of Kuopio (N = 250,000)</td>
<td>Morbidity: AMI, stroke, cancer Mortality: all and cause-specific Disability: all and cause-specific Risk factors Lifestyles</td>
<td>1972</td>
<td>1977, 1982</td>
<td>Comprehensive community-based, emphasizing community organization, health centres, mass media</td>
</tr>
<tr>
<td>German Democratic Republic</td>
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<td></td>
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<tr>
<td>Schleiz</td>
<td>Whole district (N = 33,000)</td>
<td>District of Dippoldiswalde (N = 46,000)</td>
<td>Morbidity Mortality Risk factors</td>
<td>1976</td>
<td>1976, 1981</td>
<td>Comprehensive community-based, emphasizing health services</td>
</tr>
<tr>
<td>Country</td>
<td>Location</td>
<td>Mortality</td>
<td>Morbidity:</td>
<td>Year(s)</td>
<td>Other Information</td>
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<tr>
<td></td>
<td>Towns of Eberbach (N = 16 000)</td>
<td></td>
<td>only infarction</td>
<td></td>
<td>Screening, health education, community participation</td>
<td></td>
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<tr>
<td></td>
<td>and Wiesloch (N = 21 000)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Risk factors, Lifestyles</td>
<td></td>
<td>Screening, health education, etc.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mortality, Morbidity, Risk factors Lifestyles</td>
<td></td>
<td>Health education, other community activities, etc.</td>
<td></td>
</tr>
<tr>
<td>Intervention area(s)</td>
<td>Reference community(ies)</td>
<td>Evaluation criteria</td>
<td>Starting year</td>
<td>Evaluation year(s)</td>
<td>Type of intervention</td>
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<tr>
<td>Norway</td>
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<tr>
<td>Finmark and Tromsø</td>
<td>County of Finmark (N = 80 000) and Tromsø municipality (N = 45 000)</td>
<td>None</td>
<td>Risk factors</td>
<td>1974</td>
<td>1974/75, 1977/78 (Finnmark) 1977, 1979/80 (Tromsø)</td>
<td>Screening, health education and counselling</td>
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<td></td>
<td></td>
<td>Lifestyles</td>
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<td>Switzerland</td>
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<tr>
<td>Aarau and Nyon</td>
<td>Vevey (N = 12 000) and Solothurn (N = 16 000)</td>
<td>Risk factors Lifestyles</td>
<td>1977</td>
<td>1977, 1980</td>
<td>Health education, other community activities</td>
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**Union of Soviet Socialist Republics**

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<tbody>
<tr>
<td>Moscow, Kaunas, Minsk, Kharkov, Tashkent, Frunze</td>
<td>Cities: all men aged 40-59 years from randomly selected areas (N = 71,000)</td>
<td></td>
<td></td>
<td></td>
<td>Primary and secondary prevention</td>
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<tr>
<td></td>
<td>Two comparable reference groups in each city, (N &gt; 3,000 in each group)</td>
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</table>

**Yugoslavia**

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<tbody>
<tr>
<td>Novi Sad</td>
<td>City (N = 230,000)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>Mortality</td>
<td>Morbidity</td>
<td>Risk factors</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Invalidity</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lifestyles</td>
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</tbody>
</table>
The central project teams represented government, university or local health service backgrounds. The aim was usually to involve local practitioners and other health personnel as well, with varied success. Only some programmes succeeded in involving non-medical community organizations or in making structural interventions.

The degree of success in implementation has varied, depending on a number of factors: the awareness and motivation of the population, the enthusiasm, skills and resources of the project team, and the general support of the local, regional and national health authorities. An obvious influence on the successful implementation of a programme was the support of the local decision-makers and the national and local health authorities. Whether the programmes enhanced such support and in what way, is again difficult to say.

As to programme feasibility, programmes following similar general principles have been successfully carried out in countries with contrasting cultural, political and health care systems, which demonstrates the validity of the general concept.

**EFFECTS OF THE PROGRAMMES**

The major questions in the evaluation of the programmes are naturally whether it is possible to influence the risk factor levels of the population and, if so, whether such changes lead to corresponding changes in CVD rates. The evaluation study design used to measure the effect can be described as quasi-experimental. Changes in the intervention area population are compared with corresponding changes in matched reference area(s). This estimate of effect is likely to be a conservative one, because the launching of major national pilot programmes is likely to influence the reference area as well. A quasi-experimental study design also has other limitations for scientific inference, as discussed earlier. Nevertheless, pooling the experience from a number of studies, as done in this report, adds to the strength of the conclusions.

Table 15 gives a summary of the risk factor changes in the main European programmes. This summary is necessarily simplified, and for the details, the earlier text as well as the publications of the respective projects should be consulted.

The table indicates that out of the nine programmes, about half reported having an effect on the main risk factors. It also suggests that generally none of the risk factors is universally easier than the others to affect in the community.
Table 15. Risk factor changes in the major European CCCCPs

<table>
<thead>
<tr>
<th>Change</th>
<th>Number of programmes reporting changes in:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>smoking</td>
</tr>
<tr>
<td>No net effect or a negative effect (if no reference: no change or a negative change)</td>
<td>1</td>
</tr>
<tr>
<td>A reduction, but no reference available</td>
<td>3</td>
</tr>
<tr>
<td>A nonsignificant net reduction</td>
<td>2</td>
</tr>
<tr>
<td>A significant net reduction</td>
<td>3</td>
</tr>
</tbody>
</table>

On several occasions the changes observed in the risk factors were substantial. For instance, the reductions observed in North Karelia among the male population during the ten years of the programme were 36% for smoking, 11% for mean serum cholesterol levels, and 5% for mean diastolic blood pressure. The changes in biological variables (serum cholesterol levels and blood pressure) in the different programmes were usually much smaller than in behaviour such as smoking, which is to be expected. The magnitude of changes in the risk factors observed may be considered small for an individual, but as they represent mean changes for the whole population, they should be important for population disease rates.

The national spontaneous change, reflected in changes in the reference area, varied in the different countries. In several programmes the risk factor levels also declined somewhat in the reference area, indicating a favourable national change and/or the wider impact of the intervention programme. In the North Karelia project this was already observed during the first five-year period, but especially during the continued follow-up of the major national activities of the project.

In addition to several of the other European programmes, favourable risk factor changes were reported in the Stanford three community study and the CHAD project in Israel. Given the analogies in the theory underlying the programmes and in their application to entire communities, these experiences demonstrate that this kind of approach is feasible and indicate that it can be at least partially effective and generalizable.
The magnitude of effect observed in the North Karelia project and in some of the other successful programmes compares well with that observed in some recent multifactorial clinical trials, such as the American multiple risk factor intervention trial (48) and the European collaborative trial (49, 50). Only in smaller scale intensive clinical trials with very high-risk subjects, such as the study in Oslo, have greater effects been achieved (51). Especially considering the costs per subject involved, the community-based approach generally presents a much better cost-benefit ratio. Promoting general healthy lifestyles in the community may also prevent some of the possible psychological and emotional problems involved in intensive labelling of and intervention in high-risk subjects — not to mention the other advantages of the community-based approach, as already described.

In spite of the clearly successful community programmes, some of the programmes failed to have any positive effects on target risk factors, at least during the evaluation period. At this stage it is very difficult to know clearly which of many potential determinants, related either to baseline factors or to intervention methods, may have been responsible for the favourable or unfavourable risk factor changes obtained in the different programmes and what recommendations should be made for further replications. A community programme ultimately tests whether a specific programme as a whole (which should be designed so that it can be applied on a larger scale) is feasible and effective under given conditions. The impact of different community conditions and of the different components of a programme on the successes and failures of any given programme can be evaluated only to a limited extent, and from the present international experience only very limited conclusions can be drawn.

For the assessment of effect, at this stage, the main emphasis is clearly on risk factor changes. Many of the communities involved were clearly too small or the follow-up period was too short for any disease-related effects to be measured. Nevertheless, those programmes that reported clear risk factor changes over a long period generally also reported corresponding changes in CVD rates (North Karelia, Schleiz, Martignacco). The ten-year disease changes in North Karelia, in particular, strongly suggest that the cardiovascular trends in the community did respond to the risk factor changes in the community, initiated by the intervention. In spite of the small population sizes, the actual net changes in disease rate in the Schleiz and Martignacco projects were also positive.

**GENERAL DISCUSSION ON THE IMPACT OF THE CCCCP**

Thus the programmes have demonstrated not only that they are obviously feasible, but also that they had certain effects, at least in the form of risk
factor reductions. This conclusion has to be qualified, however. There is certainly a selection and reporting bias in that, first, active countries and centres joined the CCCCP and, second, countries and organizers that failed to implement their programmes may have dropped out. However, every country at any stage involved in the CCCCP collaboration is reviewed in this report. The reporting bias means that programmes may have emphasized the positive results in their reports and glossed over the aspects where they failed. Although this is certainly the case with associated findings, information on the main risk factors has been collected and reported on in all the main programmes.

Another reservation concerns the validity of the data. Rather little international validation and quality control were carried out, which may also cause biased results. On the other hand, the international criteria for risk factor measurements and other methods of evaluation, as well as quality control, were discussed and emphasized at most of the WHO meetings attended by programme participants.

It is important to keep in mind these reservations. Careful review of the available results from the programmes, however, certainly strongly suggests that many, if not all, the programmes have had at least a partial effect on risk factor reductions. Because the local CCCCPs were seen as national pilot and demonstration programmes, we should also consider their possible wider effects. Although no formal evaluation of this was attempted, the country reports make several references to national implications. Some programmes, such as the North Karelia project and the Schleiz project, made major contributions to national activities. The fact that these project teams had close links with national institutions obviously enhanced national applications. It is likely, however, that many if not most of the programmes contributed to the national prevention of CVD, and if not, they did at least provide both the public and professional circles with a visible demonstration of what can be done. This is supported by the fact that most of the programmes continue in some way and that many of them have even formally been extended and expanded, often within the framework of the WHO CINDI programme.

Finally, what has been the impact of the CCCCP for WHO? For a ten-year period a major part of WHO’s scarce resources was spent on this programme. The CCCCP provided WHO with a practical framework in the field of a major health problem and with aims that are central to WHO. In launching and coordinating the programme, WHO certainly helped not only the participating centres but also the countries concerned. Within WHO, the programme probably increased the emphasis on chronic disease control, an area of major concern in the European Region.

The timing of the programme was appropriate, since previous research had already paved the way, and the rapid increase in the number of community-based programmes during the period further corroborates the
demand for them. If anything, the WHO MONICA project could have been started earlier, so that soon after the cross-sectional differences between the countries in the early 1970s had been established, a monitoring system could have been launched to assess the trends in disease rates and their determinants, with or without active community intervention programmes. The importance of the CCCCP for WHO is also shown by the fact that it was obviously the major activity that paved the way to the more comprehensive, integrated control of major noncommunicable diseases — the CINDI programme. Many of the CCCCP countries have developed and expanded their programmes and joined CINDI. The experiences gained in the CCCCP have been most valuable for CINDI, both in the countries and in WHO.

REFERENCES


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