

Community-based noncommunicable disease interventions: lessons from developed countries for developing ones

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Community-based programmes for prevention and control of cardiovascular diseases (CVD) started in Europe and the USA in the early 1970s. High mortality from CVD in Finland led to the start of the North Karelia Project. Since then, a vast amount of scientific literature has accumulated to present results and discuss experience. The results indicate that heart health programmes have a high degree of generalizability, are cost-effective and can influence health policy. In the 1980s the focus of programmes expanded from CVD to noncommunicable diseases (NCD), mainly because of the common risk factors. Attention has now turned to promoting this approach in developing countries, where the prevalence of NCD is growing. Theory and experience show that community-based NCD programmes should be planned, run and evaluated according to clear principles and rules, collaborate with all sectors of the community, and maintain close contact with the national authorities. In view of the burden of disease they represent and of globalization, there is a great need for international collaboration. Practical networks with common guidelines but adaptable to local cultures in a flexible way have proved to be very useful.

Keywords Cardiovascular diseases/prevention and control; Chronic disease; Risk factors; Community health services/organization and administration; Intersectoral cooperation; Health promotion; Health behavior; Cost of illness; Developed countries; Developing countries (*source: MeSH*).

Mots clés Cardiovasculaires, Maladies/prévention et contrôle; Maladie chronique; Facteur risque; Service public santé/organisation et administration; Coopération intersectorielle; Promotion santé; Hygiène de vie; Coût maladie; Pays développé; Pays en développement (*source: INSERM*).

Palabras clave Enfermedades cardiovasculares/prevenición y control; Enfermedad crónica; Factores de riesgo; Servicios de salud comunitaria/organización y administración; Cooperación intersectorial; Promoción de la salud; Conducta de salud; Costo de la enfermedad; Países desarrollados; Países en desarrollo (*fuentes: BIREME*).

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Introduction

Noncommunicable diseases (NCD) are the major health burden in the industrialized countries, and are increasing rapidly in the developing countries owing to demographic transitions and changing lifestyles among the people. In the global Burden of Disease Study for 1990 (1), which estimated the distribution of deaths by region, noncommunicable diseases ranked first as the cause of death in developed countries, as well as in many developing countries and the world as a whole. In the developed countries,

three out of every four deaths are due to cardiovascular disease (CVD), cancer, or accidents or other violent causes. In many developing countries also, NCDs are already a more common cause of death than infectious diseases (2, 3). Thus, we believe that addressing the problems and issues connected with noncommunicable diseases will lead to major health gains worldwide.

Research has clearly shown that noncommunicable diseases have their roots in unhealthy lifestyles or adverse physical and social environments. Risk factors like unhealthy nutrition over a prolonged period, smoking, physical inactivity, excessive use of alcohol, and psychosocial stress are among the major lifestyle issues. While there is firm knowledge on “What should be done?” for the prevention of these diseases, the key question at present is “How should it be done?”

How can our existing knowledge of noncommunicable diseases best be applied for effective prevention in real-life situations? Carefully planned community programmes are an important compo-

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ment of the strategy to help solve this problem. The huge gap between our knowledge about what needs to be done and the everyday situation of most of the people in the developing countries is due to several obstacles — cultural, political, psychological, economic, and others — that prevent making healthy changes. The aim of community programmes is therefore to build a bridge to help individuals and communities to overcome these obstacles. Since major NCD epidemics are due to unhealthy lifestyles, which often arise during periods of economic transition, a significant reduction in NCD rates should be possible by promoting general changes in the known NCD-related lifestyles.

We believe that the experiences gained over many years in the developed countries can be of great value in planning and implementing NCD prevention and control activities in the developing countries. In fact, about three decades ago, the first community-based programme for cardiovascular disease — the North Karelia Project (4) — was introduced in this least developed area of Finland where the socio-economic setting was, in some ways, similar to that in many developing countries today. The intervention strategy of this project was based on low-cost lifestyle modifications and community participation. Collaboration between countries with different socio-economic situations — e.g. through the framework of WHO's Countrywide Integrated Noncommunicable Diseases Intervention (CINDI) (6) and Interhealth (7) programmes — has demonstrated that the general principles for such community-based prevention programmes are the same regardless of the degree of development of the country.

The aim of this paper is to present and discuss some of the key aspects and experiences of community-based programmes to prevent noncommunicable diseases.

NCD programmes in developed countries

Historical development

Since the early 1970s, a number of community-based health intervention projects have aimed at promoting risk-reducing lifestyle changes in different populations. These projects were usually started in the field of cardiovascular disease prevention and emphasized the fact that merely providing risk-reduction measures for clinically high-risk people in health service settings would have only a limited impact in the whole country. On the other hand, if the population as a whole were to be targeted, even a modest risk-factor and heart-healthy lifestyle change would potentially have a huge public health impact. The first such community-based heart health intervention project was the North Karelia Project which was started in 1972 (4, 8). The very high CVD mortality in Finland in the early 1970s, together with the findings of earlier epidemiological research carried out in Eastern Finland in connection with the Seven Countries Study (9), was the background on which

this project was started. After the North Karelia Project, a number of similar projects were launched in the 1970s elsewhere in Europe (5).

Similar developments took place in countries in other continents as well. In the USA, Stanford University carried out the so-called Stanford Three-Community Study in the 1970s (10). Subsequently, the National Institutes of Health (NIH) financed three major community-based intervention projects: the Stanford Five-City Project (11), the Minnesota Heart Health Program (12), and the Pawtucket Heart Health Program (13). A few, usually smaller, projects were also carried out in other countries, including Israel (14) and South Africa (15). Later, projects with various study designs were launched, e.g. the German Cardiovascular Prevention Study (16) and the Norsjö Study in Sweden (17). A number of projects are also being carried out as demonstration projects of WHO-related programmes: CINDI (by the WHO Regional Office for Europe (EURO)), CARMEN (WHO Regional Office for the Americas (AMRO)), and Interhealth (WHO headquarters) (6, 7).

Results from developed countries

A number of publications have tried to summarize the results of the major community-based preventive projects. The methodological aspects have also been discussed from several perspectives (18–22). The task of summarizing the experience of these preventive community-based health interventions is not an easy one. If we exclude the “pure clinical risk-factor trials”, the remaining projects often differ in their settings, methods and intensity of the interventions, in the risk factor targets, and in the evaluation measurements, periods and designs. However, most of the major projects deal with the “classical” risk factors and emphasize both diet and smoking. They use a quasi-experimental design and a “comprehensive community-based approach”.

The scientific literature already contains some 50–100 projects or studies which, in one way or another, aimed at community-based prevention, usually focused on cardiovascular diseases. In most of these studies, however, the evaluations are not sufficient to draw valid conclusions on their impact or effectiveness. A Swedish review of the literature (22) pointed out that only eight of the community-based heart health projects met with the given criteria for study design and evaluation: these were the North Karelia Project (Finland), the Stanford Three-Community Study (USA), Stanford Five-City Project (USA), Minnesota Heart Health Program (USA), Pawtucket Heart Health Program (USA), the Swiss National Research Programme, the German Cardiovascular Prevention Study, and the Kilkenny Health Project (Ireland).

Both the Swedish review (22) and a similar review in the USA (23) agree that the most rigid evaluations of the projects usually show only a modest or no real effect on the target risk factors or disease rates. At the same time, they discuss the

severe restrictions in the experimental scope of the interventions and the difficulties in assessing the true overall impact. This is because of the varying nature of the interventions, and because of diffusion to other areas and linkage with national trends. A British review of both intervention trials and community studies arrived at similar conclusions (24). It stated that, for pooled effects on mortality, a small but potentially significant effect (about 10% reduction) may have been missed in the evaluated studies.

The US review and synthesis (23) responded to criticism of the finding of “meagre effects” by stating that the expectations for community-level interventions were often too high, which led to the use of samples that were not big enough to show smaller effects. Commercial advertising campaigns, which generally have substantially more resources than community prevention trials, are typically satisfied with quite modest increases in market share. The US review further recognized that “subgroup component studies demonstrate the efficacy of many risk reduction strategies”. Mittelmark et al., in their review (25), also call for “realistic outcomes” and conclude that it has been demonstrated that a broad range of intervention strategies can favourably modify the health behaviours of specific community groups, such as employees and schoolchildren.

A very important aspect is the “dose” or scale of exposure to the intervention because most of the projects in larger communities, over a number of years, have only very limited resources — and thus the “dose” is small. The US review (23) found that the results support a dose–response relationship, with evidence of “stronger effects where adequate exposure to the intervention was achieved”.

The importance of “dose” is further strengthened by the observation that more restricted interventions have repeatedly demonstrated a greater effect than the larger comprehensive community projects. An example of this is with dietary interventions. A recent meta-analysis of dietary trials analysed the experience of 17 trials on dietary behaviour interventions. According to the analysis, the mean net change for dietary fat as a percentage of energy was -2.5% and for serum cholesterol -0.22 mmol/l (26). It should be recognized that such changes, when established permanently in the population, would have a major impact on coronary heart disease rates in the country. Another illustrative case is the recent cholesterol-lowering village competition in North Karelia, Finland, where the 16 participating villages lowered their average serum cholesterol level by 9% and the winning village by 16%, although this was only for a short period (27).

The North Karelia project provides an example which illustrates the long-term experience and potential of sustained heart health promotion work. After the early success of the pilot project in the 1970s, with significant net reductions in both risk factors and CHD mortality, intensive and comprehensive activities were started on the national level to

which the project contributed actively. During this latter period the decline in risk factor and disease rates accelerated, the changes moving in parallel in both North Karelia and the whole country. Thus, after 25 years a remarkable decline has taken place in smoking rates among men, major dietary changes have occurred, and serum cholesterol and blood pressure levels have fallen markedly. During the same period in North Karelia, among the male population aged 35–64 years, the CVD mortality rate declined by 68%, coronary heart disease mortality by 73%, cancer mortality by 44%, lung cancer mortality by 71%, and deaths from all causes by 49% (28). At the end of this follow-up period, the respective changes for the whole of Finland have been nearly as great: for example, CHD mortality down by 65%. Separate analyses have shown that most of this decline in CHD mortality is explained by the population-level changes in the main risk factors (29). The general dietary changes seem to have been the most important determinant.

Programmes in the developing countries

WHO's Interhealth Programme

Even if most of the integrated NCD community programmes have been carried out in the developed countries, the great increase in the NCD burden in many developing countries has led to similar activities in these places also. Many of these have been carried out in conjunction with the WHO Interhealth Programme (7), which was started in 1986. The aim was to demonstrate how an integrated programme could be implemented in populations in all regions of the world, at every stage of the demographic and epidemiological transition.

The core of the programme consisted of interventions aimed at modifying the levels of the major risk factors of NCDs in the community through an integrated community approach to health promotion and maintenance. Based on the recommendations contained in the core protocol, a quasi-experimental design was used in selecting intervention and reference populations to assess the effect of the intervention activities. The following 10 (out of 12) countries provided risk factor data (measured by the MONICA methodology), based on random samples of middle-aged populations (30): Chile, China (Beijing and Tianjin), Mauritius, and the United Republic of Tanzania representing the developing countries, and Finland, Cyprus, Lithuania, Malta, Russian Federation, and the USA representing the developed countries. As expected, the results showed that the prevalences for all the risk factors were higher in the developed countries, except for smoking, which was much higher among men in Mauritius and China. The prevalence of hypertension was already significant (9–17%) in the less developed countries as well. In the framework of the Interhealth Programme, special activities were undertaken

among schoolchildren in Chile, and the United Republic of Tanzania (31). Large-scale community programmes were launched in Mauritius (32, 33) and China (34–36).

Regional development

At the same time as the start of the global Interhealth Programme, WHO's European Regional Office launched the CINDI Programme. Following its positive experiences, the Regional Office for the Americas started a similar network called CARMEN in the 1990s. With the regional development, the Interhealth Programme ended, and WHO's Africa and Eastern Mediterranean Regional Offices have taken steps to launch similar networks.

In *Latin America*, Cuba has for a long time been carrying out NCD prevention programmes connected with WHO activities, with Havana and Cienfuegos as the main sites. Chile also participated in the Interhealth Programme. Argentina has an active network called "PROPIA" which involves particularly heart health interventions in a number of demonstration sites. Several other countries have recently joined the CARMEN programme, Chile being the first Latin American country to join this programme.

In *Africa*, there is a long history of community-based CVD prevention in South Africa (15). Nigeria and some other countries also have a long history of community-based activities for hypertension control. Mauritius and the United Republic of Tanzania participated actively in the Interhealth Programme, and useful positive experience was gained from community-based interventions in the Interhealth Project in Mauritius. In the latter, during a five-year period, a considerable effect on diet and serum cholesterol level was observed as a result of nutrition policy and education interventions although the rates of obesity and diabetes increased (32, 33).

In *Asia*, community-based initiatives have been initiated in Sri Lanka, Thailand, Singapore, India, Pakistan, Malaysia, Iran and other countries. Particularly active development has taken place in China, where the Interhealth Programme was involved in initiatives in Tianjin and Beijing (34).

The Mirame Project in Chile

Results from surveys among the adult population of the Metropolitan Region in Chile (1988 and 1992) revealed an urgent need to do something, considering the high prevalence of risk factors found in all age groups and both sexes, but mainly in the low socioeconomic categories (37). Because most of the risk factors leading to cardiovascular diseases are already present in early life, an intervention programme was designed to probe and evaluate strategies to promote healthy lifestyles in schoolchildren and their families in the Metropolitan Region. A 3-year health education programme based on the principles of social learning theory (38) was conceived. The objectives were firstly to develop

skills to resist social, environmental and peer pressure and learn how to say "No" to such pressures, and secondly to inform the children and the family about the most common health risk behaviours and biological risk factors.

The results from the baseline survey indicate that children take up health risk behaviours at an early age, important examples being smoking (84%) and alcohol consumption (12%). Some 30% of the children were physically inactive, 15% were obese, 8% had high blood pressure and 18% a high cholesterol level. All these risk factors increased with age, so that by the age of 13–14 years the prevalences are similar to those in the adult population. All factors were worse in children living with families "at risk". After three years of intervention a significant positive impact on alcohol consumption and smoking was observed in the intervention schools, the net change being from 8% to 11% in favour of the intervention population. Today, the programme has been covering some 30 000 schoolchildren in Chile using very low resources.

The Tianjin Project in China

The Tianjin Project, the first major NCD project in China, was launched in 1984 and focused on the four leading chronic diseases in China — stroke, coronary heart disease, cancer and hypertension. Although a national project, the Tianjin Project has been cooperating with other groups for NCD control in Finland, China and the USA since 1989. The project area consists of both intervention and reference areas, which were randomly selected in the urban Tianjin district (9 million inhabitants).

The aims of the project were to reduce high sodium intake among the entire population, decrease smoking especially among men, and provide hypertension care by reorganizing the existing primary health care services. Both feasibility and the effects of the project were evaluated. The results so far show a significant reduction in sodium intake in men after three years of intervention, with similar reductions in all socioeconomic groups (34, 39), and, after five years, the prevalence rates of both hypertension and obesity decreased among 45–65-year-olds, but increased in the younger age groups (39). Smoking rates also showed an increase among men, especially those with higher education (40).

During the same period, travel to and from work was found to have decreased in the population (41).

Discussion

Which component has worked?

Integrated community-based intervention programmes are comprehensive packages in which different kinds of feasible activities are combined to produce a synergistic effect. Thus, strictly speaking, the effect of the components cannot be singled out. However, some comments on the main components of these interventions are given below.

Health education and media campaigns have played a prominent role in many community-based programmes. The most sophisticated of these campaigns have certainly been the projects in the USA. Although the impact of a media campaign by itself is limited, such campaigns are useful and necessary components in the comprehensive package.

Health service interventions do not have as much visibility as the major media campaigns, but the systematic involvement of primary health care centres can, in the long run, be one of the most effective intervention tools. This may be particularly true where the intervention deals with biological risk factors such as hypertension or elevated blood cholesterol. The experiences from both the North Karelia Project in Finland and the Tianjin Project in China emphasize the important role of primary health care workers.

Community organization means involvement and collaboration with various sectors of the community. This has been the particular strength of the North Karelia Project, where the involvement of many nongovernmental organizations (NGOs), such as housewives' organizations, was considered to be a key component. The North Karelia Project also demonstrated the potential of involving lay opinion leaders, a concept that has been successfully applied on many occasions in the developing countries (42).

It is difficult for intervention measures in small communities to include collaboration with industry and businesses, but this policy may be very cost-effective in large interventions or those at the national level. The experience of Mauritius is a good example. The dramatic and important reduction of blood cholesterol levels in Finland was the result of collaboration with the food industry, which was also supported by policy decisions (43).

Close collaboration between the community-based project and the national health authorities has been important for sustaining the activity and for taking care of national implications. A major role of the community-based project is to demonstrate and stimulate a national NCD prevention policy.

The economic impact

It is difficult to review the various economic effects of community-based health interventions. What is obvious is that the economic burden of NCD is enormous and that, by reducing the known risk factors and unhealthy lifestyles in the population, the situation can change markedly (28). Another clear observation is that even the large community projects have used resources that have been very small compared with the huge health services costs for NCD treatment. The data on costs reported by many of the community projects mentioned in this article support this conclusion. Actually the low "dose" of some interventions has often been mentioned as a reason for results that are smaller than expected (23).

Programmes can, in health economics terms, be assessed for their "cost benefit", although there

are relatively few hard data to assess these issues in the larger, more complex NCD programmes. Some components have been assessed concerning their cost-effectiveness: for example, antismoking interventions in the Stanford Project (44) and the Pawtucket Program (45), and the hypertension intervention in the North Karelia Project (46). As far as the high-risk approach is concerned, it appears that the more cost-effective an intervention is, the better the identification of persons at high risk. Field et al. (47) concluded that the most cost-effective strategy for screening and intervention is one that is targeted at older men with raised blood pressure, and limits the use of cholesterol-lowering drugs only to those with very high blood cholesterol levels.

On the other hand, a cost-effective population approach calls for inexpensive measures that can be implemented on a mass scale. Examples are routine advice given by doctors to quit smoking, mass smoking-cessation campaigns (e.g. Quit and Win (35)), and specific dietary campaigns. Obviously, some legislative changes, for tobacco control, food subsidies and the like, for instance, and the involvement of private industry can be effective without incurring many direct costs.

An illustration of the overall economic consequences of successful heart health interventions comes from the North Karelia Project. This project assessed the overall CVD-related costs in North Karelia and in the whole of Finland in 1972 (at the outset) and again in 1992. After those 20 years the age-adjusted CVD rates had been reduced by a remarkable extent. The conclusions were as follows. The social costs generated by CVD are likely to have declined since 1972, especially in terms of the cost per capita. The decreases in annual costs in all Finland have been about US\$ 100 million for persons over 64 years old and US\$ 600 million for those from 35 to 64 years old. The estimated proportional reduction was greater in North Karelia than in all Finland. This could translate into savings of US\$ 35 million in 1992 alone (48).

Conclusions and recommendations

The findings of the review of community-based heart health interventions in the USA concluded that "the community approach in CVD prevention has a high degree of generalizability, cost-effectiveness due to the use of mass communication methods, ability to diffuse information successfully through use of community networks, and potential for influencing environmental, regulatory and institutional policies that shape health" (23). These conclusions are supported by the fact that the countries with major demonstration projects on heart health have usually been the ones that were active in promoting them in many ways, as a result of which there were major declines in CVD rates. Thus, it is clear that major heart health promotion projects are linked with national progress in this area of health care.

The following recommendations for non-communicable disease prevention programmes are based on the theoretical considerations and the results and experiences reviewed in this article.

First, essential elements for a successful community intervention programme include a good understanding of the community (“community diagnosis”), close collaboration with various community organizations, and full participation of the people themselves.

Second, community-based intervention programmes should combine well-planned media and communication messages with a broad range of community activities, involving such elements as the primary health care services, voluntary organizations, the food industry and supermarkets, work sites, schools and the local media.

Third, to obtain a reasonable outcome an effective “dose” of intervention is needed. Cost-effective intervention modalities should be developed. This is especially important in the developing countries.

Fourth, the strength of a community intervention programme is derived from its emphasis on changing the social and physical environments in the community through adoption of lifestyles that are

healthy or are more conducive to health. Supportive policy decisions are of great importance for achieving this.

Fifth, an essential component of all community programmes, and especially of national demonstration projects, is a good and reliable monitoring and evaluation system, both for continuous monitoring of the change process and for more comprehensive summary evaluations.

Sixth, major community intervention programmes will not only benefit the target community, but, as a demonstration programme, can also have a broad impact at the national level. To help achieve this, the results of the experience and evaluation should be disseminated widely, and the project should work in close contact with the national authorities.

Finally, considering the global health burden of noncommunicable diseases and the impact of globalization on contemporary lifestyles and health, the need for international collaboration is great. Practical networks sharing common guidelines, but adapted to local cultures in a flexible way, have proved to be very useful. WHO’s leadership in these networks has been very valuable. ■

Conflicts of interest: none declared.

Résumé

Interventions communautaires contre les maladies non transmissibles : l’expérience des pays développés au service des pays en développement

Les programmes communautaires de prévention et de lutte contre les maladies cardio-vasculaires ont débuté en Europe et aux Etats-Unis d’Amérique au début des années 70. La forte mortalité par maladies cardio-vasculaires en Finlande a conduit au lancement du projet de Carélie du Nord. Depuis, de très nombreuses publications ont été consacrées à la discussion de l’expérience acquise dans ce domaine. Les résultats indiquent que les programmes de santé cardiaque sont parfaitement généralisables, ont un bon rapport coût-efficacité et peuvent infléchir les politiques de santé. Au cours des années 80, ces programmes ont élargi leur cible aux maladies non transmissibles, car il existe pour toutes ces maladies des facteurs de risque communs avec les

maladies cardio-vasculaires. On s’attache maintenant à promouvoir cette approche dans les pays en développement, où la prévalence des maladies non transmissibles est en augmentation. Aussi bien la théorie que l’expérience montrent que les programmes communautaires de lutte contre ces maladies doivent être planifiés, conduits et évalués selon des principes clairs, collaborer avec tous les secteurs de la communauté et maintenir un contact étroit avec les autorités nationales. Etant donné la charge que représentent ces maladies, et compte tenu de la mondialisation, la collaboration internationale est une nécessité. Des réseaux pratiques disposant de lignes directrices communes mais adaptables de façon souple aux cultures locales se sont avérés d’une grande utilité.

Resumen

Intervenciones comunitarias contra las enfermedades no transmisibles: lecciones de los países desarrollados para los países en desarrollo

Los programas comunitarios de prevención y control de las enfermedades cardiovasculares (ECV) comenzaron a funcionar en Europa y los Estados Unidos a principios de los años 70. La elevada mortalidad por ECV registrada en Finlandia llevó a poner en marcha el Proyecto Karelia del Norte. Desde entonces se han publicado numerosos trabajos para presentar los resultados y discutir la experiencia. Los resultados indican que los programas de salud cardíaca son altamente generalizables y costo-eficaces y pueden influir en las políticas sanitarias. En los

años 80 esos programas ampliaron su alcance para englobar en general las enfermedades no transmisibles (ENT), debido sobre todo a los factores de riesgo comunes detectados. El interés se está centrando ahora en promover este enfoque en los países en desarrollo, donde se observa un aumento de la prevalencia de ENT. La teoría y la experiencia acumulada muestran que los programas comunitarios de ENT se deben planificar, ejecutar y evaluar de acuerdo con principios y normas nítidos, deben colaborar con todos los sectores de la

comunidad y han de estar en estrecho contacto con las autoridades nacionales. Habida cuenta de la carga que suponen las ENT y de la globalización, la colaboración

internacional es indispensable. Se ha demostrado que las redes prácticas con directrices comunes pero adaptables con flexibilidad a las culturas locales son de gran utilidad.

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