

Can we prevent cardiovascular diseases in low- and middle-income countries?

Claude Lenfant¹

Abstract Ischaemic heart disease, the largest cause of death worldwide, is rapidly becoming a major threat in low- and middle-income countries. Experience in a variety of populations has demonstrated that lowering certain risk factors, such as hypertension and hypercholesterolaemia, reduces illness and deaths from cardiovascular diseases. A dual approach is recommended: screening and intervening in cases of relatively high risk, while fostering population-wide preventive activities. This is both feasible and affordable. Now is the time to make such efforts.

Keywords Cardiovascular diseases/prevention and control/drug therapy; Myocardial ischemia/mortality; Risk factors; Primary prevention; Developing countries (*source: MeSH*).

Mots clés Cardiovasculaires, Maladies/prévention et contrôle/chimiothérapie; Ischémie myocardique/mortalité; Facteur risque; Prévention; Pays en développement (*source: INSERM*).

Palabras clave Enfermedades cardiovasculares/prevención y control/quimioterapia; Isquemia miocárdica/mortalidad; Factores de riesgo; Prevención primaria; Países en desarrollo (*fuentes: BIREME*).

Bulletin of the World Health Organization, 2001, 79: 980–987.

Voir page 982 le résumé en français. En la página 982 figura un resumen en español.

Currently, ischaemic heart disease is responsible for more deaths and a greater burden of disease than any other cause in the established market economies. Worldwide, ischaemic heart disease is the largest cause of death, and is fifth largest in terms of disease burden (1, 2). By 2020, the low- and middle-income countries will also have ischaemic heart disease as the most frequent cause of death and greatest disease burden. Some of the reasons for this are positive: they include reductions in other causes of death such as acute infectious diseases, improvements in sanitation and nutrition, family planning programmes resulting in improved maternal and child health, and increased longevity. Other reasons are not so positive. With the adoption of a Western lifestyle there is likely to be greater exposure to risk factors such as high blood pressure, diets high in saturated fat, leading to elevated serum cholesterol levels, and physical inactivity (2, 3). These kinds of changes have been seen in migration studies (4, 5). Importantly, cigarette smoking is already a major problem in many low- and middle-income countries. Increased longevity need not inevitably lead to the expected larger burden from cardiovascular disease, but reversing the incipient epidemic will require a number of actions.

Observational studies have shown that the risk factors for cardiovascular disease are the same in different populations (3, 6–10). Hypertension, hypercholesterolaemia, cigarette smoking, and diabetes all increase the risks of cardiovascular disease in the many populations in which they have been studied. The relative importance of these risk factors may vary across populations (6), but they have adverse consequences, even if to a different extent. Similarly, the absolute risk of developing cardiovascular disease may vary among populations and among subgroups within a population (3, 6). But the risk factors still operate among the low-risk groups, as they do among those at high risk (6).

Many large-scale, well-designed clinical trials of risk factor reduction have shown that lowering certain risk factors reduces illness and deaths from cardiovascular diseases. Particularly persuasive have been the trials of drugs for lowering lipid levels and blood pressure (11, 12). They have been conducted in a variety of populations, at various levels of risk, and in people with and without known end-organ damage. The latter is important, because it establishes the potential for early population-based intervention to prevent the occurrence of overt disease. Because of the consistency of findings among studies in different populations, there is every reason to believe that lowering risk factors or preventing their rise in low- and middle-income countries will produce the same sorts of relative reductions, or at least a slowing

¹ Director, National Heart, Lung and Blood Institute, Bethesda, MD 20892-2468, USA.

Ref. No. 00-0859

of progression, in cardiovascular disease that have been seen in clinical trials primarily conducted in the established market economies.

The dual approach of screening and intervening in cases of relatively high risk of cardiovascular disease and of fostering population-wide preventive activities (13, 14) is as appropriate in low- and middle-income countries as in the established market economies. Importantly, after promotion of a heart-healthy diet, prevention and treatment of weight gain, and facilitation of a physically active lifestyle, the pharmacological interventions that have been most clearly shown to work are often the cheapest. Thus, for hypertension, diuretics and beta-blockers are the first lines of treatment (14). For lipid-level lowering, the HMG-reductase inhibitors have been expensive, but the earlier ones are coming off patent and will be more affordable. In secondary prevention, aspirin clearly reduces cardiovascular mortality and morbidity and is cheap (15). Other drug classes proven to save lives and reduce morbidity, such as angiotensin-converting-enzyme inhibitors (16), are currently expensive. But at least one of these is coming off patent and the prices should come down.

It is more difficult to conduct intervention studies showing that prevention of risk factors prevents the occurrence of cardiovascular disease, as the sample sizes become huge. Nevertheless, trials of lipid-level lowering in people with serum cholesterol levels considered to be “normal,” at least in the context of Western societies, have demonstrated reduction in coronary heart disease (17). Prevention of hypertension by means of dietary salt reduction and weight loss has been successfully accomplished, over the short term, in clinical trials (18). Diets high in fruits, vegetables, and low-fat dairy products are extremely effective in lowering blood pressure, again, in the short term (19).

In view of these successes, the prevention or reduction of risk factors deserves priority. This is an especially important concept for populations experiencing a rise in risk factors due to the epidemiological transition. Many countries do not yet have a high incidence of cardiovascular disease and may not want or be able to devote the medical and economic resources to treating something that is not yet an overwhelming problem. They may be inclined not to pursue interventions for several reasons: first, because of insufficient evidence that it is cost-effective; second, because the benefit if it occurs is likely to do so in the distant future; third, because it is assumed that the number of people

that would have to be treated to prevent an event is too large. With respect to the third, it is true that, given similar relative benefits, the absolute benefit achieved is a function of the absolute risk of disease; in other words, the populations with the highest risk gain the most from risk reduction. However, if the development of risk factors can be prevented by relatively inexpensive population-based measures, then the costs of dealing with specific existing risk factors can be reduced. Thus, promotion of diets that limit the intake of saturated fats and sodium, efforts to prevent people from starting smoking, and efforts to encourage life-long physical activity, can all be done on a population-wide basis. Though accomplished in a nation with an established economy, the example from North Karelia in Finland shows what can be done on a population basis (20). Importantly, in addition to being less expensive than intervening for individuals, such efforts carry a low likelihood of adverse effects, and thus it is reasonable to pursue them in populations that are still at low absolute risk of developing cardiovascular disease. The high “number needed to treat” should not be a factor that discourages these population-based efforts.

Over the past 30 years, mortality from cardiovascular diseases has fallen considerably in countries with established market economies (21). The reasons for the declines in mortality, at least for coronary artery disease, are most likely to be a combination of prevention and better treatment, with different studies ascribing slightly different percentages to each (22, 23). It would be a shame if the low- and middle-income countries went through the same rise in cardiovascular disease experienced by the wealthier ones although steps can be taken to reduce it. As noted, many of these steps, whether they are population-based prevention or treatment with proven agents, are affordable, particularly those involving public education and lifestyle changes. The challenge is for policy-makers to develop the political will to establish cardiovascular disease prevention and education programmes.

In summary, numerous observational and intervention studies of prevention and treatment of cardiovascular disease provide valid information for low- and middle-income countries. Many of the approaches are affordable. Now is the time for these efforts to be made — before the expected cardiovascular disease epidemic becomes too great and puts impossible strains on the limited budgets of these countries. ■

Résumé

La prévention des maladies cardio-vasculaires est-elle possible dans les pays à revenu faible ou moyen ?

Les cardiopathies ischémiques, principale cause de décès dans le monde, constituent une menace en aggravation rapide dans les pays à revenu faible ou moyen. Des expériences menées dans diverses populations ont montré qu'en réduisant certains facteurs de risque, comme l'hypertension et l'hypercholestérolémie, on peut limiter les maladies et les décès dus aux maladies cardio-

vasculaires. Une double approche est recommandée : dépistage et intervention dans les cas à risque relativement élevé, et promotion d'activités de prévention à l'échelle de la population. Cette approche est à la fois réalisable et d'un coût abordable. Il est maintenant temps de passer à l'action.

Resumen

¿Podemos prevenir las enfermedades cardiovasculares en los países de ingresos bajos y medios?

La cardiopatía isquémica, principal causa de defunción en todo el mundo, se está convirtiendo rápidamente en una gran amenaza para los países de ingresos bajos y medios. La experiencia acumulada en diversas poblaciones ha demostrado que la reducción de determinados factores de riesgo, como la hipertensión y la hipercolesterolemia, reduce la morbilidad y la mortalidad

por trastornos cardiovasculares. Se recomienda un doble enfoque: cribado e intervención en los casos de riesgo relativamente alto, y fomento de las actividades preventivas a nivel poblacional. Este planteamiento es al mismo tiempo viable y asequible. Es hora de emprender ese tipo de actividades.

References

- Murray CJL, Lopez A, eds. *The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020*. Cambridge, MA, Harvard School of Public Health on behalf of the World Health Organization and the World Bank, 1996.
- Howson CP et al., eds. *Control of cardiovascular diseases in developing countries: research, development, and institutional strengthening*. Washington, DC, National Academy Press, 1998.
- Reddy KS, Yusuf S. Emerging epidemic of cardiovascular disease in developing countries. *Circulation*, 1998, **97**: 596–601.
- Kagan A et al. Epidemiologic studies of coronary heart disease and stroke in Japanese men living in Japan, Hawaii, and California: demographic, physical, dietary and biochemical characteristics. *Journal of Chronic Diseases*, 1974, **27**: 345–364.
- He J et al. Migration, blood pressure pattern, and hypertension: The Yi migrant study. *American Journal of Epidemiology*, 1991, **134**: 1085–1101.
- Grundy SM et al. Summary of National Heart, Lung, and Blood Institute Workshop on Cardiovascular Risk Assessment (submitted for publication).
- Ni Mhurchu C, Rodgers A, MacMahon S. The associations of diastolic blood pressure with the risk of stroke in Western and Eastern populations. *Clinical and Experimental Hypertension*, 1999, **21**: 531–542.
- Van den Hoogen PCW et al. The relation between blood pressure and mortality due to coronary heart disease among men in different parts of the world. *New England Journal of Medicine*, 2000, **342**: 1–8.
- Gotto AM et al. The cholesterol facts: a summary of the evidence relating dietary fats, serum cholesterol, and coronary heart disease. A joint statement by the American Heart Association and the National Heart, Lung, and Blood Institute. *Circulation*, 1990, **81**: 1721–1733.
- Savage PJ. Cardiovascular complications of diabetes mellitus: what we know and what we need to know about their prevention. *Annals of Internal Medicine*, 1996, **124**: 123–126.
- LaRosa JC, He J, Vupputuri S. Effect of statins on risk of coronary disease: a meta-analysis of randomized controlled trials. *JAMA*, 1999, **282**: 2340–2346.
- Gueyffier F et al. Effect of antihypertensive drug treatment on cardiovascular outcomes in women and men. *Annals of Internal Medicine*, 1997, **126**: 761–767.
- Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults. Summary of the Second Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel II). *JAMA*, 1993, **269**: 3015–3023.
- The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. *Archives of Internal Medicine*, 1997, **157**: 2413–2446.
- Antiplatelet Trialists' Collaboration. Collaborative overview of randomised trials of antiplatelet therapy-I: prevention of death, myocardial infarction, and stroke by prolonged antiplatelet therapy in various categories of patients. *BMJ*, 1994, **308**: 81–106.
- Heart Outcomes Prevention Evaluation Study Investigators. Effects of an angiotensin-converting-enzyme inhibitor, ramipril, on cardiovascular events in high-risk patients. *New England Journal of Medicine*, 2000, **342**: 145–153.
- Downs JR et al. Primary prevention of acute coronary events with lovastatin in men and women with average cholesterol levels. *JAMA*, 1998, **279**: 1615–1622.
- Trials of Hypertension Prevention Collaborative Research Group. Effects of weight loss and sodium reduction intervention on blood pressure and hypertension incidence in overweight people with high-normal blood pressure: the Trials of Hypertension Prevention, phase II. *Archives of Internal Medicine*, 1997, **157**: 657–667.
- Appel LJ et al. A clinical trial of the effects of dietary patterns on blood pressure. *New England Journal of Medicine*, 1997, **336**: 1117–1124.
- Jousilahti P et al. Twenty-year dynamics of serum cholesterol levels in the middle-aged population of Eastern Finland. *Annals of Internal Medicine*, 1996, **125**: 713–722.
- Morbidity & mortality: 2000 chartbook on cardiovascular, lung and blood diseases*. Bethesda, MD, National Institutes of Health, National Heart, Lung, and Blood Institute, 2000.
- Hunink MGM et al. The recent decline in mortality from coronary heart disease, 1980–1990: the effect of secular trends in risk factors and treatment. *JAMA*, 1997, **277**: 535–542.
- Rosamond WD et al. Trends in the incidence of myocardial infarction and in mortality due to coronary heart disease, 1987–1994. *New England Journal of Medicine*, 1998, **339**: 861–867.