

EDITORIAL

Cardiovascular diseases: causes, surveillance and prevention

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This supplement is based on papers presented at a conference held at the International Epidemiological Satellite Symposium 'Worldwide endeavour for epidemiology and prevention of cardiovascular disease' in Rome during September 1999. The papers cover a spectrum of critical, substantive and methodological issues from the field of cardiovascular disease (CVD) epidemiology. Many of the papers are based on the WHO Monica Project and all refer to the CVD situation in a large number of European countries; comparable data are also presented from the ARIC study, carried out in several communities in North America.

One of the messages from these papers is that there is a gap between what we know about the causes of CVD and our willingness to act on this knowledge and prevent the most preventable of major epidemics. The knowledge base has been accumulated over the last fifty years and covers the full range of laboratory, clinical, observational and experimental research. A striking deficiency has been in the development and application of appropriate prevention and control policies based on evidence rather than clinical experience.¹

There have been notable successes in reducing CVD death rates. In Australia, for example, death rates for CHD have declined by over 60% since the late 1960s and similar successes have occurred in the USA, New Zealand and several other wealthy European countries. However, the experience in Eastern Europe countries has been the opposite with CVD death rates now among the highest in the world and which, in some situations, especially in men, are still increasing. Overall, and largely for demographic reasons, the global burden of CVD continues to increase especially in the poorer regions of the world which are undergoing the most rapid population ageing.

CVD in a globalized world

The full application of existing prevention and control knowledge requires a major shift in the balance of preventive efforts to the population approach to primary prevention, especially in the poorer regions of the world. The global public health context is, of course, increasingly complex and presents serious difficulties for public health practitioners more at home dealing

with individual risk factors and traditional epidemiological study designs.²

An overarching determinant of population health status is the modern phase of globalization, especially its economic aspects. Defining globalization is not easy; however, a critical feature of the modern phase is the increasing interconnectedness of countries and the openness of borders to flows of ideas, people, commerce and, to an unprecedented extent, financial capital.³ Financial and economic globalization and the associated international trading rules and regulations constrain the ability of countries and national health services to respond adequately to health problems. Although national governments have, in principle, the power to shape these rules, their influence is often limited by the lack of resources as well as of expertise and technical support. Public health professionals have an obligation to ensure that these global rules work for, rather than against, health by ensuring that health concerns are at the forefront of the ongoing trade negotiations.

Poverty, absolute and relative, is the critical determinant of the health status of most of the world's population. Poverty is related to CVD risk in two general ways. Firstly, the burden of CVD primarily falls on the poorer countries, especially those undergoing rapid demographic, social and economic transitions. Secondly, within countries, the burden of CVD is especially felt by the poor and disadvantaged populations. Worldwide, one billion people live on a daily income of US\$1 per day, another 2 billion people live on US\$2 per day, thus half of the world's population live in extreme absolute poverty. It is encouraging that in some countries where communicable diseases predominate, it has been possible to have high standards of health in the context of poverty.⁴ However, as the double burden of communicable and non-communicable diseases emerges, this may be increasingly difficult.

CVD prevention policies and programmes must be placed in the context of the overall need for basic human development—economic, social, political and cultural. In most countries, the limited resources available to health services and the general disarray of public health services imply that prevention models that have worked in wealthy countries have no relevance.⁵ Although the USA spends approximately US\$4000 per person per year on health services (14% of GDP), this is a unique situation. The Indian government, national and state, spends approximately 1.7% of GDP on health and many countries have US\$10–20 per person per year to spend on health services. It is ironic that in poor countries most, perhaps 75%, of the money spent on health comes directly from individual and family resources. CVD prevention and control advice must be relevant

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to the local health system context and be sensitive to resource availability. It is critical that CVD prevention programmes do not contribute to the further impoverishment of already poor families.

A prime example of the added problems now facing public health practitioners and health policy makers compared with 50 years ago, is the global nature of the tobacco manufacturing and marketing industries.⁶ Tobacco consumption, particularly in the context of national diets with an unhealthy mix of fats, significantly increases the population burden of CVD. In most parts of the world, the products of the tobacco industry are responsible for more deaths from CVD than the more widely recognized causes such as lung cancer and chronic respiratory disease. The major exception to this pattern is China where respiratory deaths induced by tobacco are far in excess of the tobacco caused CVD deaths.⁷

There are, of course, positive features of the modern period of globalization, for example, the enormous growth in global wealth as a consequence of technological advances and trade liberalization. Unfortunately, this wealth has not been distributed equitably, either among or within countries. The resulting economic and social inequalities are likely to increase the unequal distribution of the major CVD risk factors and disease outcomes and to exacerbate the problems experienced by poor populations in receiving appropriate care for established disease.

CVD prevention and control programmes should benefit from the application of modern information and communication technologies, for example PROCOR.⁸ Unfortunately, the majority of the world's population still excluded by the digital divide has not yet harnessed these benefits.

CVD: the leading cause of death worldwide

The two leading causes of death, coronary heart disease (CHD) and stroke are currently responsible for 12 million deaths (22% of the 55 million total). Seven million deaths are due to CHD and 5 million to stroke, with another 6 million due to other causes of CVD. The majority of the CVD deaths occur in the poorer regions of the world, for demographic reasons alone. The pattern will be unchanged in 2020 with CHD and stroke remaining the two leading causes of death and together becoming one of the leading causes of disability adjusted life years lost (DALYs).⁹

These burden of disease estimates are based on cause-specific data of unknown quality from the one third of the world's population covered by vital statistical systems, and another third of the world's population in India and China covered by sample registration systems. There is a need for WHO to work with national governments to improve the coverage and quality of vital statistical systems and to implement simple surveillance systems, initially for risk factors and then for disease events.^{10–14} The risk factor surveillance data are required to highlight the need for action, to inform policy and to monitor the progress of prevention programmes.¹⁵ The disease surveillance data are essential for planning and evaluating the impact of health care interventions on CVD outcomes; the prime goal of prevention programmes is, after all, to reduce the population burden of disease, not just to reduce population risk factor levels.

Proximal and societal causes of CVD

The proximal causes of the CVD epidemics are well known.¹⁶ The major risk factors—inappropriate diet and physical inactivity as expressed through unfavourable lipid levels, obesity and elevated blood pressure, together with tobacco use—explain approximately 75% of the occurrence of new cases of CVD, at least in developed countries in the 1970s and 1980s.¹⁷ In the absence of these risk factors, CVD is a relatively rare cause of death. The optimal levels of CVD risk factors are known; unfortunately, only a very small proportion of the adult populations of wealthy countries, approximately 5%, is at low risk.^{17,18}

The nature of the CVD burden varies by region, with stroke being much more common than CHD in East Asian populations. However, the proximal causes of CVD are qualitatively the same in all populations, including the Japanese and Chinese populations.¹⁹ The quantitative relationship between the major risk factors and CVD endpoints varies by population, for example, the relationship between blood pressure level and the risk of stroke in Asia is steeper than in western countries.¹⁹

There has been much discussion recently of 'new' risk factors for CVD and this research endeavour consumes an inordinate share of the research funds available.²⁰ If inflammation due to infectious agents, for example, is shown to be an important determinant of CHD, this will be relevant for prevention efforts in all regions of both the economically developed and developing world. However, there is a real danger that the endless search for new risk factors will continue to divert attention from the application of existing knowledge.

Genetic factors are the research flavour of the new century. This research is likely to improve our understanding of susceptibility to disease at the level of the individual and on the interaction of the environment with individual risk determinants. However, this research is unlikely to contribute substantially to CVD control at the population level. The major population differences are due to factors related to the cultural and material environments of each society and to the different stages in the evolution of the CVD epidemics.^{7,21} Resources for research on CVD should to a large extent be redirected to questions concerning CVD prevention policy and programme effectiveness and to issues of importance for poor populations, for example, the determinants of CVD inequalities.^{22–24} The underlying causes of these inequalities lie in the social, economic and cultural domains, not easily investigated by traditional epidemiological methods. There is an urgent need for epidemiologists and other public health scientists to explore the applicability of new research methods to the upstream determinants of CVD, as is happening now with investigations into the health effects of global climate change.²⁵

Preventive strategies: a renewed international challenge

Much can be learnt about current prevention priorities from the research which has investigated the relative contributions of the various preventive strategies to the declines in CVD mortality, which began for CHD in the mid-1960s, and much earlier for stroke.²⁶ In the USA from the early 1990s this decline has slowed for CHD and stopped for stroke. The contributions of the different strategies to changing rates vary by time and place.

The initiation of the declines could only be due to reduction in population risk levels, especially from dietary changes and reductions in smoking prevalence especially in men, since there were no effective secondary interventions available. However, the contributions of both primary and secondary prevention have been evident since the mid-1970s. In the USA, huge resources have been directed towards the high-risk approach to CHD primary prevention and to secondary prevention and this has been moderately successful, though expensive.²⁷ By contrast in some of the MONICA populations, the greatest contribution to the CHD decline has come from the population-wide approach to primary prevention.²⁸ The reduction of population blood pressure levels through reduction of salt intake and, to a lesser extent, the better management of hypertension have been major factors in the decline in stroke mortality.²⁹

CVD prevention efforts in wealthy countries have concentrated on the measurement of risk factors in individuals, as exemplified by US efforts to encourage the population to 'know your numbers'. This approach has evolved slowly from a concentration on relative risk and single risk factors considered separately, to risk reduction strategies based on measures of absolute risk.³⁰ Clinical guidelines for the prevention of CVD developed in wealthy countries need to be evaluated for actual effectiveness in real life in these countries; in any case they are inappropriate for the majority of the world's population.

The critical policy question now, especially for poor countries, is the appropriate balance between primary and secondary prevention and between the population and high-risk approach to primary prevention. If the goal is to significantly increase the proportion of the population at low risk status, the only strategy with this potential is the population-wide approach to primary prevention.³¹ All other strategies will, at best, only restrain the epidemics; they will not prevent the epidemics. The challenge is to implement the population approach to primary prevention, that is, to shift the population risk factor distribution to the left. If the real goal is reduction of population risk, and since 95% of the population is not at the optimal risk level, it follows that the vast majority of resources should be directed towards this goal. The remaining very small proportion of resources should go to the high-risk individual approach.

Evidence is available in support of the policies required for the task of shifting risk distributions. The Asia Pacific Cohort Studies Collaboration¹⁹ indicates that a 2% reduction of mean blood pressure, achieved by a shift of the blood pressure distribution to the left, has by the year 2020 the potential to prevent annually 1.2 million stroke deaths (approximately 15% of all stroke deaths) and 0.6 million coronary deaths (6% of all CHD deaths). Reductions in mean blood pressures of this magnitude have been achieved in the USA, and could readily be achieved in many other populations by reducing the salt content of manufactured food.³² Where manufactured food with its high salt content is not readily available, a major educational effort is required to reduce the amount of salt used in food preservation and cooking. Favourable shifts in the population distributions of abnormal blood lipid levels could be achieved by the wider adoption of healthy dietary patterns based on the traditional Mediterranean diet.³³

Tobacco use is an exception to the goal of shifting distributions to the left, as tobacco avoidance is the key to reducing the impact of tobacco on health in the medium term. The two main

tobacco control measures are to prevent the uptake of smoking by children and to provide support to the intention of most adult smokers in many countries to give up. The impact of effective youth programmes will not be evident for decades, but its achievement is the ultimate goal. The achievement of complete adult smoking cessation will have a major positive effect on the burden of the tobacco pandemics in a comparatively short time.³⁴

Advancing global CVD prevention requires strong international leadership. There may also be an opportunity in some countries to work with communicable disease control initiatives to rebuild the public health infrastructure. WHO is again taking this international leadership role but needs to be supported at the country and regional levels. Support and advocacy are also required from the non-governmental organizations. Unfortunately, the American Heart Association has not yet adopted a global prevention perspective commensurate with its resources and prestige. The World Heart Federation, which should be supporting and advocating global CVD prevention efforts, has until now adopted a narrow individualistic approach quite divorced from the urgent need to promote the population-wide strategy of prevention.

There has been a long series of declarations on the need for CVD prevention; the most recent is the Osaka Declaration, which commendably stresses the need for action on the social, economic and political determinants of the CVD epidemics.³⁵ Declarations are important and can be inspiring. However, the real need now is for commitment and action. The continuing lack of concerted and appropriate CVD prevention action is an indictment on our ability to take our professional public health responsibilities seriously.

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