

Cardiovascular Disease Worldwide: A Global Challenge

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At the beginning of this century, cardiovascular diseases (CVD) showed an epidemiological behavior very similar to those of the great endemics of past centuries and were responsible for high mortality rates worldwide.

This current epidemiological profile of CVD is evident in data from the World Health Organization (WHO), which show that of the 56.9 million total deaths reported worldwide, approximately 30.5 % or 17 million people had CVD listed as the cause of death [1, 2].

An important epidemiological fact that needs to be considered is the uneven geographic distribution of CVD deaths. Lower mortality rates are observed in developed countries and much of Latin America, and higher rates are observed in lower income countries, such as Eastern European countries [1].

Data released by the WHO in 2008 indicate that of the total number of CVD deaths worldwide, approximately 80.1 % occurred in low- and middle-income countries, and only 19.9 % occurred in high-income countries.

If this global scenario is already alarming at the beginning of this new century, the expectations for the future are even more troubling; it is estimated that if concrete

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actions are not implemented, by the year 2030, seven out of ten deaths will be due to non-communicable diseases (NCDs), and CVD will account for the highest percentage of these deaths [1, 3].

However, although the CVD mortality rates in developed countries have been declining in recent decades, as previously mentioned, the rates in most developing countries are still increasing. This is due, among other factors, to the increased economic power of developing countries. Rising incomes *per capita* have led to improvement in the health and basic living conditions of these populations, resulting in a significant reduction in the incidence of and mortality from infectious and parasitic diseases, with a proportional increase in the number of deaths caused by NCDs. In addition, the lifestyle adopted by urban populations in developing countries has significantly increased the prevalence of risk factors for cardiovascular diseases such as obesity, physical inactivity, tobacco use, high blood pressure, excessive salt intake, dyslipidemia, and diabetes [4, 5].

Risk Factors for CVD

At the end of the 1940s, important epidemiological studies, such as the pioneering study by Framingham, began to identify predictive risk factors for the development of CVD. The primary factors listed were systemic hypertension, dyslipidemia, tobacco use, obesity, physical inactivity, excessive salt intake, and mental/emotional stress [6, 7]. The identification of these and other risk factors in populations in both developed and developing countries indicated the steps that should be followed to counter this epidemiological challenge.

At first, population programs were developed and applied in developed countries, including some European countries, the USA, Canada, Australia, and Japan. These programs were designed to establish some type of epidemiological control over these risk factors in their populations. Analyses of the results of these programs have shown a significant reduction in CVD mortality rates where and when they were applied. The Framingham Heart Study, the North Karelia Project, and the Stanford Project are some of the more notable programs implemented [5, 7, 8].

In Finland, for example, efforts to implement well-organized cardiovascular prevention programs have been rewarded with a reduction in CVD risk factors and CVD mortality rates. The combined efforts of governments, health professionals, food companies, universities, and non-governmental organizations have resulted in effective actions [8]. The results of these actions have led to the consumption of healthier diets with reduced levels of sodium and saturated fats and a decreased prevalence of tobacco use and physical inactivity. Between 1972 and 2007, in Finland, there was a significant reduction in cholesterol levels by approximately 21 %, systolic blood pressure by 10.1 mmHg, and the prevalence of tobacco use by 51 % [9].

The implementation of this program model would surely bring potential benefits to developing countries such as Brazil, which has a high CVD mortality rate. According to data published by the Ministry of Health (Ministério da Saúde—MS) of Brazil and obtained from a telephone survey conducted in 2010 in major Brazilian

cities (Surveillance of Risk and Protective Factors for Chronic Diseases Telephone Survey—VIGITEL), 15 % of adults 18 years and older are smokers, only 30 % regularly consume fruits and vegetables, whereas 34 % reported consuming meat with excess fat, and only 30 % practice physical activity regularly (including leisure activities and commuting to work) [10, 11].

According to the 2012 European Guidelines on Cardiovascular Prevention, there are eight reasons to promote cardiovascular prevention [12]:

1. Atherosclerotic CVD, especially coronary artery disease, is the leading cause of premature death worldwide;
2. CVD affects men and women equally;
3. CVD mortality rates are declining in many European countries but remain high in Eastern Europe;
4. More than half of the observed decrease in the CVD rate is related to changes in risk factors, and 40 % is due to improved treatments;
5. Preventive efforts should be applied throughout life, from birth to old age;
6. Preventive approaches limited to high-risk individuals are less effective, and education programs for the entire population are needed;
7. Despite gaps in knowledge, there is ample evidence to justify intensive efforts related to public health and individual prevention;
8. There is still room for improvement in the control of risk factors, even in high-risk individuals.

Prevention of Risk Factors, Early Diagnosis and Treatment of CVD

The evolution and improvement of diagnostic methods and the therapeutic arsenal for CVD have created a valuable tool for reducing cardiovascular mortality. Some epidemiological studies still attribute a greater impact on reducing cardiovascular morbidity and mortality to treatment rather than to prevention. More recent studies, however, reveal a balance between preventive and therapeutic actions in the fight against CVD. In 2007, an epidemiological analysis was published that used the validated IMPACT mortality model, and it showed a significant decrease in mortality rates due to coronary heart disease in both men and women in the USA between 1980 and 2000. Furthermore, the authors concluded that approximately 44 % of this decrease was due to the control of several cardiovascular risk factors, while 47 % resulted from therapeutic actions. Preventive actions that contributed to this result included reductions in total cholesterol (24 %), systolic blood pressure (24 %), the prevalence of tobacco use (12 %) and physical inactivity (5 %) [13, 14]. This result was counterbalanced by the significant increase in the prevalence of obesity and diabetes in this population.

Figure 1 summarizes the main epidemiological studies that have been published in recent decades evaluating the impact of treatments and preventive actions on reducing cardiovascular mortality.

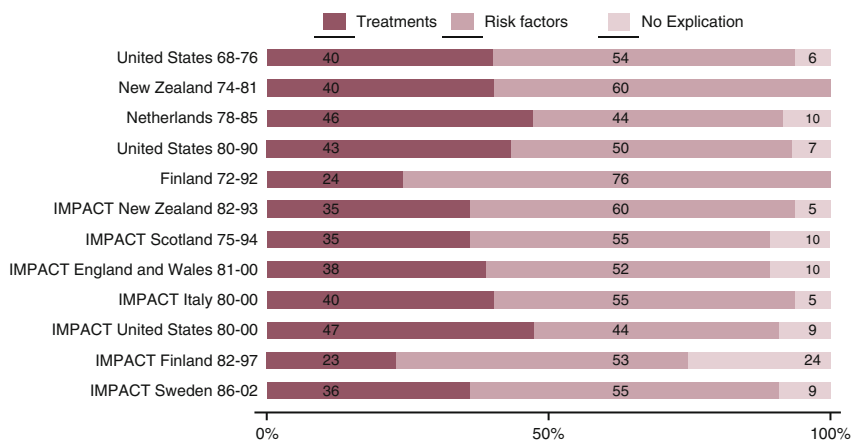


Fig. 1 Percent decrease in the number of deaths from coronary heart disease attributed to changes in treatment and risk factors in different populations. (Adapted from Di Chiara and Vanuzzo [13])

Global Targets for the Prevention and Control of CVD

The data presented here reinforce the importance of a new strategy for combating CVD, which will require a combination of cardiovascular prevention actions and earlier and more accurate diagnosis methods, as well as increased availability of effective treatments. The balance of these actions will result in significant reductions in the current epidemiological indices and also a change in future prospects.

During the World Health Assembly in 2012, the WHO initiated the campaign “Unite in the Fight against NCDs,” setting a global target to reduce premature mortality rates due to NCDs by 25 % by the year 2025 [15]. The campaign was based on well-defined principles and supported by all recent scientific evidence related to the prevention of NCDs. The pillars of this campaign are the following:

- Accelerate tobacco control;
- Reduce salt intake;
- Implement appropriate treatment of high-risk CVD;
- Reduce alcohol consumption;
- Reduce physical inactivity.

The WHO has encouraged all countries to unite around this banner of cardiovascular disease prevention, proposing an alliance between the United Nations, governments, civil society, and private sectors.

The goal of the WHO is to promote a collaborative effort to change the serious epidemiological reality of CVD and the future prospects that have been projected for the next 30 years [15, 16].

The Letter from Rio de Janeiro

In line with the WHO proposal, the Brazilian Society of Cardiology (Sociedade Brasileira de Cardiologia—SBC) gathered a committee formed by the presidents of five of the most important cardiology societies in the world in 2013 in the city of Rio de Janeiro: the World Heart Federation, American Heart Association, European Society of Cardiology, Interamerican Society of Cardiology, and Brazilian Society of Cardiology. In conjunction with specialists in global cardiovascular prevention, a document was prepared containing targets for the prevention and control of NCDs [16]. The document, called the “Letter from Rio”, was ratified by the presidents of the participating societies and aims to provide an overall view of CVD and propose strategic actions to reduce the prevalence of the risk factors contributing to the high CVD mortality [17, 18]. The letter confirms the global target of a 25 % reduction in early mortality due to NCDs by the year 2025. The following are included in the resolutions contained in the Letter from Rio:

- Work together in defense of global targets for achieving a 25 % reduction in mortality from NCDs by the year 2025;
- Implement public policies for the prevention and control of NCDs in the general population and specific groups;
- Act on social determinants that contribute to the occurrence of CVD through government policies;
- Interact with health policy makers to develop cardiovascular prevention programs and methods for evaluating their results;
- Mobilize the media to continuously disseminate information on the importance of CVD, its major risk factors, and means of prevention.

Targets from the Letter from Rio for the Prevention and Control of NCDs

- 25 % reduction in mortality rates from NCDs;
- 10 % reduction in the prevalence of physical inactivity among adults;
- 25 % reduction in the prevalence of hypertension (defined as a systolic blood pressure ≥ 140 mmHg and a diastolic pressure ≥ 90 mmHg);
- Reduction in the average intake of salt in the adult population to ≤ 5 g/day (2000 mg sodium);
- 30 % reduction in the prevalence of tobacco use;
- 15 % reduction in the intake of saturated fatty acids to achieve the recommended level of <10 % of the daily fat requirements;
- Reduction in the prevalence of obesity;
- 10 % reduction in excessive alcohol consumption;
- 20 % reduction in hypercholesterolemia;
- 50 % of eligible individuals should receive counseling and drug therapy to prevent heart attacks and strokes;
- Make available essential technologies and drugs, including generics, to 80 % of the population suffering from NCDs in both the public and private sectors.

Conclusion

The recognition that CVD is responsible for 30 % of all deaths worldwide, together with the alarming projections for the coming years, indicate that CVD should be the target of actions against it that involve governments, trade associations, and civil society.

The identification of the main factors responsible for the occurrence of CVD and the significant technological and scientific advancements in the diagnostic and therapeutic arsenal against NCDs have created valuable tools for intervention in this context. An analysis of the results of cardiovascular prevention programs implemented in some developed countries, using the triad of reduction of cardiovascular risk factors, early diagnosis, and proper treatment, has shown significant reductions in CVD mortality and has indicated the paths to be followed in the future.

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