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Cardiovascular Health

IC·HEALTH

Why address cardiovascular health?

Cardiovascular diseases (predominantly affecting blood vessels of the heart and brain) are a major cause of premature death and disability worldwide.

In 2001, 16.6 million deaths globally were due to cardiovascular diseases (CVD); this figure will increase to 25 million by 2025. The two leading causes of death worldwide are cardiovascular - coronary heart disease (which causes heart attack and heart failure) and cerebrovascular disease (which causes stroke).* The direct and indirect costs of CVD are high: enormous health care costs and productivity/income losses.

Of all global deaths from CVD, 65% occur in developing countries. This will increase to 75% by 2025. By then, cardiovascular disorders will be the biggest cause of lost disability-adjusted life years (DALYs) worldwide, and the second leading cause of DALY loss in developing countries.

In developing countries, **cardiovascular diseases predominantly affect people of working age (30-64 years).** Death and disability in middle age has major social and economic consequences.

As health transitions advance, there is a reversal in the socio-economic gradient, and **poorer and disadvantaged groups suffer the largest burden of CVD.** This has already occurred in developed nations, and seems to be manifesting in many middle and low income countries, especially for CVD risk factors that predict future events.

Prevention or treatment of risk factors for CVD is effective and sustainable in the long run. The risk of CVD can be reduced quickly and substantially with successful preventive practices. This also has a favourable impact on other non-communicable diseases (NCDs) that share the same risk factors.

Treatment of established CVD is expensive and resource intensive. Unregulated private health systems tend to direct a large proportion of resources to costly cardiovascular technologies available only to the wealthy few.

Risk Factors for CVD

The **most important risk factors** for CVD are well-established. They **include high blood pressure, glucose and lipids, and exposure to tobacco smoke.** The lower the level of the risk factors, the lower the CVD risk. *In any population, more individuals have CVD due to small concurrent adverse changes in multiple risk factors rather than extreme deviations in any single risk factor.*

Levels of cardiovascular risk factors are rising in most developing regions.

- 60% of the burden of cerebrovascular disease and about one-half of coronary heart disease globally is attributable to high **blood pressure.** The major modifiable factors influencing blood

pressure levels are dietary patterns (especially salt intake), body weight and physical activity.

- High **cholesterol** levels are responsible for about 20% of the global burden of cerebrovascular disease, and 60% of coronary heart disease. Important determinants of cholesterol levels can be modified: intake of saturated and trans-fatty acids, and physical activity.

- **Tobacco consumption** has risen sharply in many low- and middle-income countries. Tobacco use contributes an estimated one-eighth of the global burden of CVD.

- The number of adults with **diabetes** is projected to rise sharply from 135 million in 1995, to over 300 million by 2025. By 2025, >75% of adults with diabetes will reside in developing countries. The major modifiable risk factors for diabetes are overweight/obesity and physical inactivity.

There are over 1 billion **overweight** or **obese** people globally. Overweight and obesity are associated with raised blood pressure and cholesterol levels, and an increased risk of developing diabetes. Excess body fat (generalised or abdominal) accounts for about 60% and 20% of the global burden of diabetes and coronary heart disease, respectively. Major modifiable determinants of overweight and obesity are **unhealthy diet and physical inactivity.** The latter is estimated to account for about one-fifth of the global burden of coronary heart disease.

DALYs lost to cardiovascular diseases in regions of the world 1990-2020
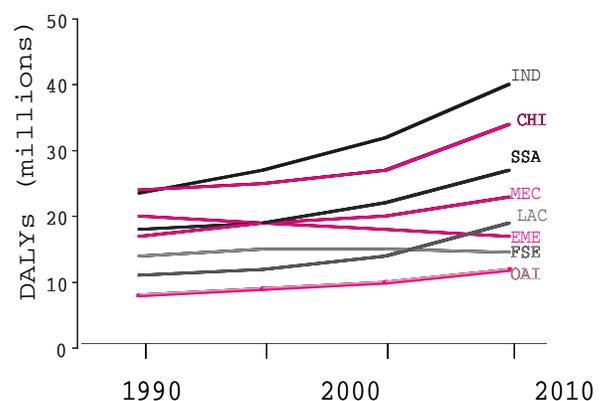
IND-India; CHI-China; SSA-Sub-Saharan Africa; MEC-Middle Eastern Crescent; LAC-Latin American Countries; EMA-Established Market Economies; FSE-Former Socialist Economies; OAI-Oceania.
Source: WHO

How to improve cardiovascular health

There are two *complementary* approaches to preventing cardiovascular diseases:

* This fact sheet does not cover Rheumatic Heart Disease and Chaga's Disease that contribute to CVD burdens in many developing countries, and are related to infectious causes.

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Key Actions to Reduce CVD

Area	Essential Package (core components)	Comprehensive Package (other components	Beneficiaries/ Target Groups	Indicators
INCREASED AWARENESS OF CVD	Sensitize governments and NGOs		Policy-makers	✓ Surveillance of knowledge, attitudes and practice among health policy-makers, health care providers, patients and the general community.
	Community/school/workplace related awareness promotion programmes	Media coverage	Entire population	
	Continuing medical education (CME), training for multipurpose health care workers, nurses, physicians	Context-specific changes in medical curricula.	Health care providers	✓ Identification and referral of individuals at high risk of CVD.
PREVENTION	**Tobacco Control** (see tobacco control at a glance) (taxation, regulation, education)		Whole population	✓ Real price of tobacco products, tobacco free places, no advertising
	Promote Healthy Diets (production, pricing, consumer empowerment) including preparing and disseminating national food based dietary guidelines	National Nutrition Policy (involving agriculture and industry)	Whole population	✓ Saturated fat production, availability of low fat/salt alternatives, fruits and vegetables
	Promote Physical Activity (planning of cities and work-sites, community education)	National Transport Policy (pollution control and promotion of physical activity)	Whole population	✓ Availability of dedicated cycle and pedestrian lanes, gymnasiums/sports facilities at work-place
	School/workplace programs for 'Learning to Live Healthy'		School children/ Employees	✓ Health awareness, changes in health related behaviour (e.g. tobacco use, physical activity etc)
SURVEILLANCE	**Risk factors** (core panel from Step I and Step II of WHO-STEPS program) – Tobacco consumption habits – H/o diabetes, hypertension – Blood pressure – Pulse rate – Body mass index – Waist circumference **CVD mortality** **National aggregate indicators** (e.g., production and consumption of tobacco, fruit and vegetables)	• Risk factors (extended panel from WHO STEPS program) – Blood lipids (total and HDL cholesterol; others like triglycerides if resources permit) – Blood glucose • Health beliefs • Dietary consumption patterns • Physical activity patterns • CVD morbidity (disability) • Effectiveness of prevention strategies	Adult population (initially restricted to special groups, later extended to everyone)	
SCREENING	'Opportunistic' evaluation for: – Tobacco consumption – High blood pressure, overweight and obesity, known history of CVD, diabetes	'Targeted' evaluation for presence of : – Diabetes – Dyslipidemia – Coronary heart, cerebrovascular and peripheral vascular disease	Individuals at risk	✓ Level of appropriate/ inappropriate case finding at various levels through audits and surveillance. ✓ Audit of referral linkages
MANAGEMENT	Primary and secondary prevention in Individuals at high overall risk for CVD (diabetes; multiple risk factors) Cost-effective clinical algorithms for: – Chronic coronary heart disease; chronic cerebrovascular disease – Congestive Heart Failure – Acute Coronary Syndromes – Hypertension	Clinical Algorithms for: – Dyslipidemia – Stroke	Individuals: – at high-risk – with chronic forms of CVD – presenting with acute vascular events	✓ Level of appropriate/ inappropriate prescription/ practice through healthcare facility audit or surveillance
HEALTH SYSTEMS	• Integrate core components of prevention, surveillance, screening and management into primary and secondary health care • Strengthen healthcare provider education (learning and skills relevant to CVD control) • Enhance knowledge and decision making ability of health care managers in elements of CVD control • Implement essential drugs policy for providing CVD related drugs	• Strengthen quality assurance in CVD related health care delivery • Perform technology audits to identify and correct inappropriate use of expensive technologies • Strengthen the production and distribution of cost-effective drugs and devices for CVD care in collaboration with industry	Health Services Managers/ Administrators	✓ Qualitative research/audits for the capacity/ practices for CVD prevention in the Health Services
RESEARCH	Strengthen capacity for research relevant to CVD control through national and international partnerships (implementation research, to effectively	Support innovative research in the aetiology of CVDs (as relevant to local population groups) and to identify new technologies which are contextually	Research Bodies	✓ Audits of proportion/level of funds/projects allocated to research relevant to CVD prevention and control.

1. The *population-wide* approach targets the whole community and aims to shift the entire population distribution of risk factors in a favourable direction. These strategies act through creating a conducive environment by policy changes or by raising awareness, motivation and skills for behaviour change through health education and promotion. Population-wide strategies, if successful, have the potential to result in large reductions in disease incidence. Strategies include:

- **Promoting the importance of CVD as a public health priority at all levels.** This requires a national commitment to prevention and control of CVD, that can be promoted through advocacy and awareness activities influencing policymakers, people and health professionals.

- **Reducing tobacco consumption:** raising taxes on tobacco products reduces consumption (which is price sensitive); a comprehensive ban on tobacco advertising and smoke-free policies in public places are effective and among the evidence-based measures endorsed by the WHO Framework Convention on Tobacco Control.

- **Modifying behaviour relating to diet and physical activity** using policy and educational interventions. Available evidence suggests that policy changes influencing fruit and vegetable consumption (e.g. in Poland) and altered patterns of dietary fat intake (e.g. in Mauritius and Poland) have a substantial effect on reducing cardiovascular risk. Community based educational interventions have had variable effects in demonstration projects, but nationwide impact was achieved in Finland by scaling up the experiences of the North Karelia Project. Other measures like provision of recreational and dedicated walking space, and environmental changes like availability of foods which have a low content of saturated and trans- fats, and salt also help prevent CVD.

2. The *individualized* approach aims to detect individuals at greatest absolute risk of experiencing a cardiovascular event, and target them for risk reduction therapy. A number of non-pharmacological and pharmacological treatments have proved highly effective in reducing CVD risk by changing the level of risk factors (e.g. blood pressure, cholesterol, glucose) or by other mechanisms (aspirin, beta- blockers, ACE Inhibitors, w-3 fatty acids). Health diets like the Mediterranean diet and more physical activity have been proven to reduce cardiovascular risk significantly. Several drugs used for risk reduction are available at low cost in generic form in developing nations.

A focus of the individualized approach, as currently recommended, is on treating individuals based on an assessment of their overall risk of developing cardiovascular disease, rather than on the basis of the presence of an individual risk factor (See Box on Relative Risk below). For example, individuals should be selected for blood pressure lowering because they are at high risk due to having multiple risk factors and/or pre-existing vascular disease, rather than on the basis of a screening process that identifies them as "hypertensive".

The individual approach to management has proved effective, but identifying cost-effective methods to detect and risk-stratify individuals in resource-limited countries is a research priority. Education for healthcare providers is needed to ensure wider application of algorithms for evidence based high-risk primary and secondary prevention of CVD.

Controlling the epidemic of cardiovascular diseases requires both a population-wide and an individualized approach. The latter provides a cost-effective strategy to reduce disease burdens in the short term while the former provides sustainable benefits in the long term. The threshold of absolute risk (based on risk evaluation of individuals) at which the interventions for individual approach are initiated, will depend on locally available resources. Similarly, population-wide approaches require policy and educational interventions that are tailored to specific needs, capacity and resources.

Both these approaches require **promoting health system reforms** that will enable context-specific and resource-sensitive integration of CVD prevention in existing healthcare infrastructure, particularly at the primary care level.

Where to start

Each region/country would need to decide, based on its resources and health system capacity, on a 'core' essential package to be implemented in the short-term, and a 'comprehensive' long-term CVD prevention policy and program. A model package is suggested (see table).

Important steps for countries to take:

- Establish *surveillance systems,* within the constraints of available resources, to enable ongoing assessment of risk factors, disease burden and prevention programs. It is best to develop surveillance systems for non-communicable diseases and their common risk factors as a group (see WHO STEPS programme at www.who.int>>WHO Sites>> NCD Surveillance)

The RELATIVE RISK OF DEVELOPING A CVD EVENT is approximately similar across populations for changes in the level of any risk factor, for example:
- For every 20 mm Hg increase in systolic blood pressure, the risk of coronary heart disease (CHD) doubles;
- For every 1% increase in total cholesterol, the risk of CHD increases by 2%;
- Smokers have 2-3 times higher risk of developing CHD than non-smokers

BUT

ABSOLUTE RISK FOR DEVELOPING A CVD EVENT DIFFERS
- **Across populations,** due to determinants like ethnicity, dietary patterns and other population-specific factors (e.g. in the Seven Countries Study, the risk of CHD at any given cholesterol level was different in the populations of Japan, Southern Europe, Western Europe and USA).

and
- Within each population, **at the individual level,** due to a variable combination of
  - Non-modifiable risk factors like age and gender, and
  - Modifiable risk factors like diabetes, high blood pressure, dyslipaedemia
- In presence of **pre-existing vascular disease** which greatly increases the risk of future CVD events

For example:
- A smoker with SBP of 132-141 mmHg. and serum cholesterol of 203-220 mg% has a CHD mortality risk of 28.9 per 10,000 person years compared to a risk of 12.4 in a non-smoker with SBP below 118 mmHg, and serum cholesterol exceeding 245 mg%
- A 65 year old man with diabetes, TIAs, and BP of 145/90 mmHg will have annual risk of major CVD events 20 times greater than 40-year old man with same BP but without diabetes or history of CVD, *while a*
- 40-Year old man with BP of 170/155 mm Hg will have risk of major CV event 2-3 times greater than man of same age with BP of 145/90 mm Hg and similar other risk factors

- *Assess local capacity* of human and financial resources within existing health care, to introduce preventive strategies for cardiovascular diseases. The assessment should include absolute risk thresholds for intervention as well as resources required to identify high-risk individuals.

- *Increase awareness of cardiovascular diseases,* their causes, and their prevention among policy-makers, health care workers, and the general community.

- Emphasize the importance of population-wide *public policy initiatives,* particularly in relation to tobacco control, diet and physical activity. Population strategies require both `bottom up' (community health education and empowerment) and `top down' (legislation and regulation) approaches.

- Develop and promulgate local context-specific and resource-sensitive *guidelines that incorporate clinical algorithms* to identify high-risk individuals. Integrated practices for CVD prevention and management should be emphasised, especially at primary care level. This also requires allocation of resources to ensure adequate training of health care workers to implement relevant guidelines.

- Ensure the *availability of low-cost drugs* that have proved effective in preventing cardiovascular diseases, (e.g. aspirin, beta-blockers and low-dose diuretics), possibly in the form of an "essential vascular package". Even the more expensive but highly effective drugs like statins and ACE Inhibitors could be used widely in the form of generics or off-patent formulations where available.

- Initiate measures for *multi-sectoral coordination* of actions to prevent CVD, among the various stakeholders, public and private.

Do's and Don'ts

DO combine population-wide strategies (in particular legislative and fiscal controls on tobacco use) **with individualized approaches** for cardiovascular disease prevention.

DO encourage the treatment of individuals based on level of absolute risk of developing cardiovascular disease, rather than treating individual risk factors to try and reach arbitrary targets.

DO integrate practices for detecting and managing high-risk individuals into existing health delivery services at the primary health care level.

DO ensure that primary health care services allow for long-term follow-up to ensure adherence to prescribed therapy.

DO encourage evidence-based use of effective but inexpensive drugs through adherence to an essential drugs list.

DO reserve a pharmacological approach for those at high-risk of CVD. Use non-pharmacological approaches for individuals at moderate risk. The low-risk individuals will continue to benefit from population based interventions.

DO NOT allow, promote or prescribe expensive diagnostic or therapeutic measures particularly when they are inappropriate and a reasonable evidence-base is absent.

DO NOT invest in expensive and technology intensive tertiary care of CVD without ensuring adequate and widely available primary care for CVD.

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Useful websites

www.ichealth.org

www.procor.org extremely useful website including the "Links' Section

www.who.int/ncd/cvd/index

http://www5.who.int/cardiovascular-diseases/download.cfm?id=680 WHO CVD Risk Management Package for low-and-medium resource settings.

http://nhlbi.nih.gov/health/index.htm

http://www.cdc.gov/cvh/index.htm Cardiovascular disease website of the CDC

http://www.cdc.gov/nccdphp/bb_heartdisease/index.htm Chronic disease website of CDC- heart disease section

www.heartfile.org

www.worldheart.org World Heart Federation website

http://www.nzgg.org.nz/library/gl_complete/bloodpressure/table1.cfm New Zealand Guidelines for assessing absolute cardiovascular risk

Expanded versions of the "at a glance" series, with e-linkages to resources and more information, are available on the World Bank Health-Nutrition-Population web site: www.worldbank.org/hnp